HANDBOOK OF THE BIRDS OF THE WORLD

Edited by
Josep del Hoyo
Andrew Elliott
David Christie

Volume 16

Tanagers
to
New World
Blackbirds

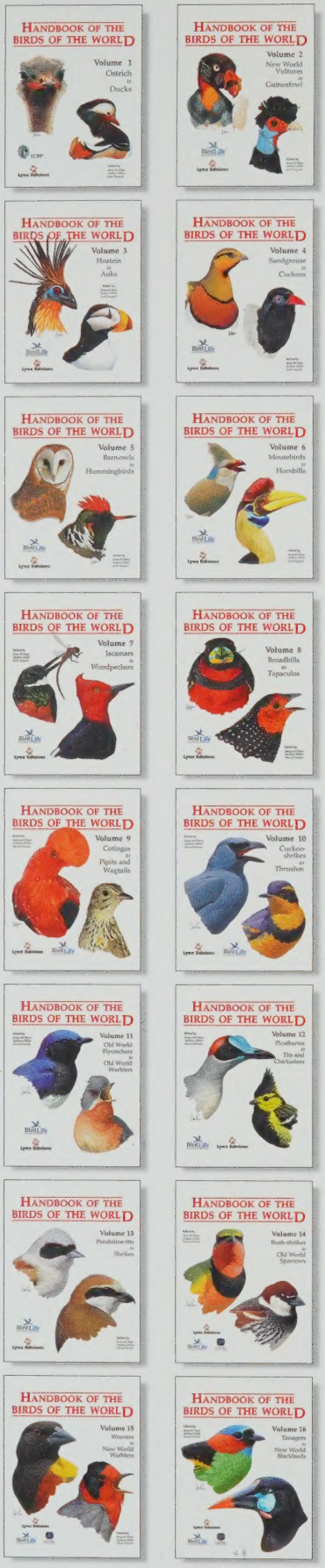




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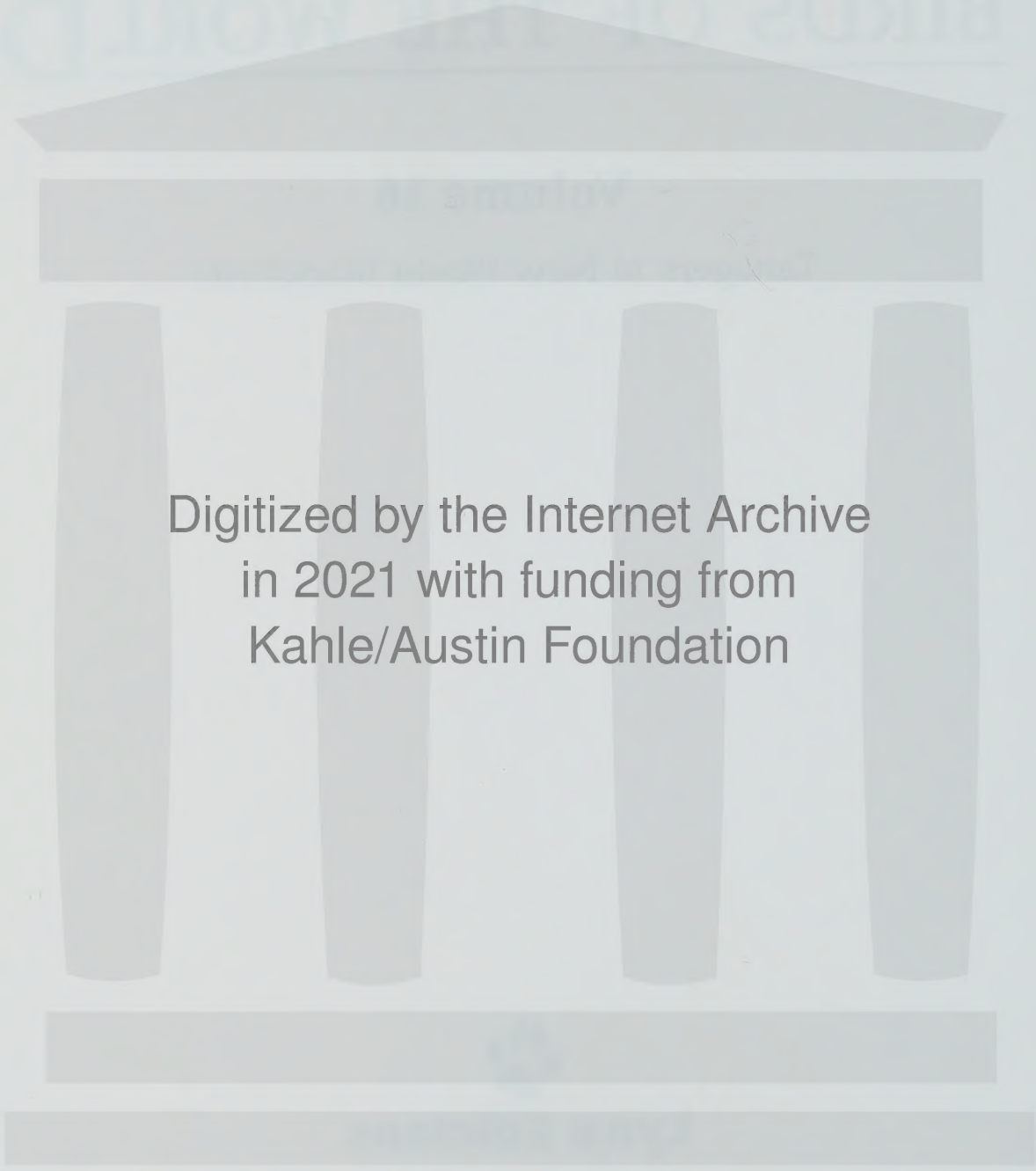
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HANDBOOK OF THE BIRDS OF THE WORLD

Volume 16

Tanagers *to* New World Blackbirds

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AJ — A. Jaramillo
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Foreword

Climate Change and Birds

Introduction

Most ornithologists older than 40 and living in the northern hemisphere will be able to remember a time just a couple of decades ago when spring migrants arrived considerably later, and many species that now breed at high latitudes did not do so. When these ornithologists are polled about their concerns for the future, they identify climate change as one of the most important issues. Climate change is currently occurring at an unprecedented rate, with severe consequences not just for birds but for humans and all other living beings alike. The immensity of the effects of climate change is on a scale that defies imagination, from the extensive current melting of the ice in Greenland and the Antarctic to the retreat of numerous glaciers around the world (Figure 1). Sea levels rose rapidly by 15–20 cm during the 20th century (Figure 2), with dramatic implications for hundreds of millions of people living in coastal areas; future projections of sea level rise vary from a few tens of centimetres to several metres, depending on the rate of ice melt in Greenland and the Antarctic. Global temperature increased by 0·7°C during the last century, but hardly at all during the previous 900 years (Anon. 2007c). Reconstructed climate variables covering more than 1000 years clearly show that climate change in recent years has been unprecedentedly rapid, with concomitant biological change. Further to climate warming, additional effects of climate change include an increased frequency of droughts, hurricanes and altered seasons. These changes are attributed by the majority of scientists to the effects of man-made changes to the atmosphere due to greenhouse gases (Hurrell & Trenberth 2010), with more than 98% of scientists with the largest scientific impact agreeing on this assessment (Anderegg *et al.* 2010). Thus, so-called climate sceptics constitute a tiny minority of scientists with little or no standing in the scientific community at large.

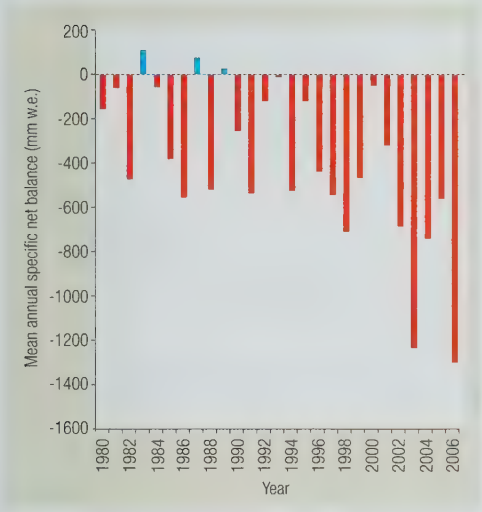


Figure 1
Melting of glaciers around the world in terms of water equivalents.
Adapted from UN Environment Programme (Anon. 2008).

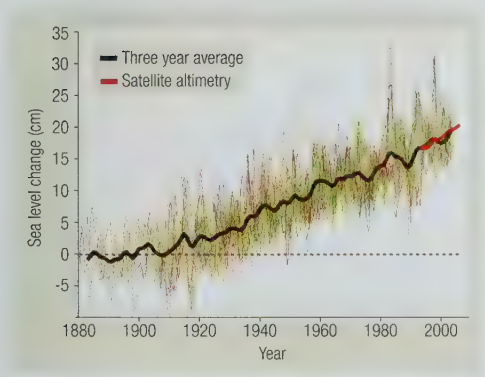


Figure 2
Sea level rise (cm) during the 20th century from 23 annual tide gauge records.
Adapted from Robert A. Rohde/Global Warming Art.

Climate change biology is a young science. The first paper that addressed this issue for birds, by Peter Berthold, only appeared 20 years ago (Berthold 1991). Since then there has been a dramatic increase in research on this topic, and almost 300 papers on birds and climate change were published in 2010 alone. Most of this research is purely descriptive, which is natural for a phenomenon where the basics still need to be fully elucidated. However, a purely descriptive approach raises concerns about causation versus correlation, and the possible impact of unknown variables on what might at first sight look like causal relationships. Climate change has increased linearly in many parts of the world, but so too have numerous other factors, such as intensification of agriculture, forestry and fisheries, expansion of urban areas, and release of pollutants. Caution needs to be taken in investigating the role of climate change alone, since any of these factors on their own or in combination may also affect living organisms.

Because of its obvious utility to decision-makers and politicians, who want to know the consequences of climatic change, research to date has been increasingly based on predictions or projections of future climate. This may be problematic, because models often only include a single climatic variable as a driver, making it unlikely that the projections will fit any future empirical observations. Especially given the influence of climate change sceptics, it is important to make careful conclusions that can face reality. Climate change research being shown up as ill-substantiated or tendentious will not benefit anyone: scientists, amateurs, decision-makers and certainly not the general public who must cope with a changing world. It is with this perspective in mind that I have written this overview of what we know and do not know about birds and climate change.

In this review, I first describe the major recent changes in climate that have already occurred, including extreme climatic events, to set the stage for the biological phenomena. Second, I review information on the annual cycle of birds and its component parts in relation to climate change, describing its effects on the start of the reproduc-

tive season, nest-building, egg-laying date, clutch size, incubation and nestling periods, number of clutches, reproductive failure, temporal mismatch between reproduction and food availability, duration of the breeding season, and dispersal. Third, I present an extensive review of the effects of climate change on bird migration, emphasising timing and duration of spring and autumn migration, and recent changes in arrival dates (their distribution, consistency and evolution, and how they may be influenced by geographical variation, breeding and winter effects, phenotypic plasticity and sex differences). Fourth, I describe how morphological traits such as secondary sexual characters, colour and body size have changed in response to climate change. Fifth, I assess to what extent the responses of individual birds to climate change may have effects at the population level, including population dynamics, interspecific competition, predation, host-parasite interactions and extinction risk. Sixth, I analyse studies of range expansion including observed and projected changes in distributions and range margins, and dynamics at the edges of populations. Seventh, I discuss changes in bird communities, and how generalist species have become predominant and communities are becoming ever more impoverished. Finally, I relate climate change to conservation issues by identifying which species are particularly susceptible to climate change, and briefly suggest means by which climate change effects can be mitigated and hopefully reversed. I have tried to find examples from a broad geographical range of species and systems. However, long-term time series data on migration, breeding and many other aspects of the life of birds are specialities of the subtropical, temperate and arctic climates of the northern hemisphere, and as yet few data are available from the tropics and the southern hemisphere.

Climate in a changing world

Climate has always changed on the long time-scale of millennia, but rarely so much and so rapidly as during the last century (Figure 3). This is disturbing, because while all living beings should supposedly be able to adapt to gradual climate change, the current speed of change may exceed what is possible for adaptation both by natural selection, and by plastic adjustments of individuals to changing conditions during their lifetime (known as phenotypic plasticity). During the ice ages, climate changed due to changes in precipitation caused by shifts in the Intertropical Convergence Zone, and this sometimes occurred at an abrupt pace, with temperatures increasing by 2–4°C from one year to the next (Steffensen *et al.* 2008). Current climate change, by contrast, is mainly linked to CO_2 and other greenhouse gases such as methane, and has caused an overall climate warming of 0·7°C during the last 100 years. However, temperature increases are unevenly distributed across the globe, and increases are particularly dramatic at high altitudes and latitudes (Figure 4). Hurrell & Trenberth (2010) provide an extensive overview of climate change, and interested readers can find further references to different aspects of climate change in that source.

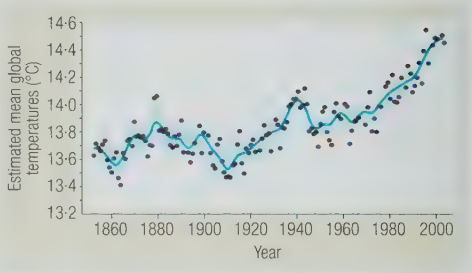


Figure 3
Change in mean temperature (°C) of the Earth during the last 150 years. Values are means, sliding averages (line) and 95% confidence intervals (wide band).
Adapted from IPCC (Anon. 2007c).

Climate change has been particularly marked in the Arctic. The diminution of the Arctic ice sheet since the 1970s has been unprecedented, with an average decrease of 7·4% per decade during 1978–2005. Since then, several years have set records in terms of ice melt, with a 20% reduction in ice cover in 2007 compared to 2005, which was the warmest year since measurements started in 1850. The effects of warming have been particularly pronounced for species dependent on or associated with sea ice. Likewise, effects of climate change in the Antarctic Peninsula have been marked; interestingly this has not been so for the Antarctic south of 65° S, where temperature has not shown any clear trends to date. In the Antarctic, changes are largely driven by the Southern Oscillation which governs sea surface temperatures and sea ice extent in the Southern Ocean, which in turn affects abundance of krill. The Southern Oscillation Index has shown a regime shift since the 1970s, resulting in less sea ice, with dramatic consequences for marine birds (Masson-Delmotte *et al.* 2003).

Climate change in the temperate zone has been almost as dramatic as in the Arctic. Temperature increases per decade have occurred unevenly in different geographical regions, and have been particularly strong in parts of Western Europe, Mongolia and China, but moderate or absent in large parts of North America, Eastern Europe and Russia. Decreases in snow cover in many regions of the northern hemisphere, especially in spring, have advanced spring phenologies. Precipitation has been increasing in eastern parts of North and South America, Northern Europe and Northern and Central Asia, while increasingly dry summers in Russia and North America have increased the frequency of forest fires.

In the subtropics, climate change has mainly affected temperature and precipitation: many areas are experiencing increasingly dry conditions and accelerating

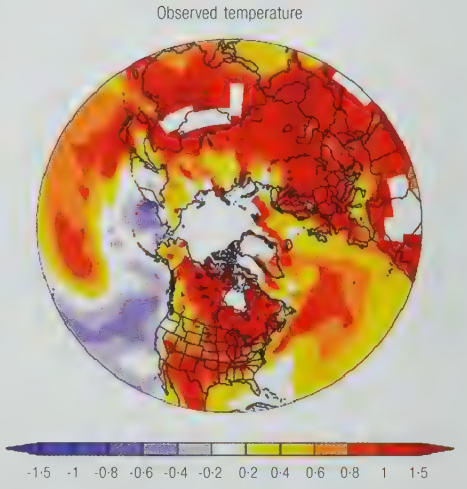


Figure 4
Temperature anomalies during 1998–2002 (°C) in different parts of the Earth.
Adapted from US Climate Change Science Program (Cook et al. *2010).*

desertification. Parts of the Mediterranean basin, the Sahel zone of Africa, southern Africa and southern Asia have all reported rises in desiccation.

In the tropics, climate change has been relatively modest in terms of temperature change. However, changes in sea level and the frequency of tropical storms are likely to have a negative effect on communities of birds in coastal areas, including many oceanic islands which have a disproportionately high fraction of endemic species. Indirect effects of climate change on birds in the tropics will arise as a consequence of displacement of human populations living in coastal areas, in concert with a projected expansion of such human populations.

Climate change may have its most profound effects on islands, where birds and other organisms have no other place to go. This is particularly serious because island bird communities contain disproportionately large fractions of endemic species. Many islands will become inundated completely owing to the rise in ocean levels, although rises in seawater levels will be uneven due to differences in water temperature.

The effects of climate change will also be particularly acute on mountain tops, where high-altitude species similarly have no other place to go once low-altitude vegetation and its associated fauna move up. Reductions in glaciers and ice caps were dramatic during the 20th century, and during the next century many glaciers in the tropics will disappear entirely.



Medium Ground-finch
Geospiza fortis
[Illustration by Brian Small]

Extreme climate change: Is it just more of the same, or is it different?

While there is no doubt that climate has changed dramatically during the last century, and in particular during the last couple of decades, there has been less research emphasis on extreme climate change. Not only will average temperatures and precipitation change, but extremes are predicted to become more frequent and pronounced. Extreme climatic events are defined by climatologists as rare events that occur at a frequency of 5% or less of the time as judged from the expected distribution of the climate variable (Anon. 2011b), and include droughts, heat waves and hurricanes. All of these are predicted to become much more common in most future climate scenarios (Anon. 2007c, Hurrell & Trenberth 2010). Already the frequency of heat waves has increased over the last 50 years, and there has also been a rapid increase in the number of warm nights. These changes have consequences for the tropical cyclones that since 1970 have increased in frequency and duration, although it needs to be borne in mind that older data before satellites became common may be of less rigorous quality (Trenberth 2007).

A consequence of extreme drought is increased risk of forest fires, as seen in large parts of Russia and Ukraine during the summer of 2010. The scientific study of the biology of extreme climatic events is in its infancy, precisely because such events by definition are rare. The obvious question arising is whether extreme events just constitute a continuation of the distribution of more commonly encountered events, or whether extreme events represent qualitatively different conditions that affect birds and other animals in a completely novel way (Møller 2011b).

Extreme climatic events are well known to biologists, as shown by effects of a violent snowstorm on House Sparrows (*Passer domesticus*) (Bumpus 1899) and powerful El Niño events on Darwin's finches (Grant, P.R. & Grant 2002a). Both of these events completely changed the phenotypic composition of the bird populations concerned, although they ultimately reverted to their former condition. Another common example is heavy mortality during migration (Newton 2007), as seen in Barn Swallows (*Hirundo rustica*) when passing mountain ranges in autumn, with dramatic consequences for life history and behaviour (Møller 2011b). Moreno & Møller (2011) recently reviewed the life history consequences of such extreme events and found that under normal conditions, complete reproductive failure occurred on average in 27% of breeding attempts; however, this rose to 79% during extreme events (Figure 5). Likewise, adult survival rate was three times worse during extreme events than under normal conditions. These findings clearly show that the intensity of selection is dramatically increased during extreme events, because only a small fraction of individuals will survive and reproduce and hence contribute to the next generation. Under such extreme natural selection, whether an individual survives or not often depends on the size of a given morphological character (known as "truncation selection"); for example, wing length may dictate survival during severe conditions on migration. This kind of selection has particularly strong effects on the composition of the population after a selective event.

Extreme climatic change may also increase variation in demographic parameters such as fecundity and survival. This has the effect of reducing the overall population

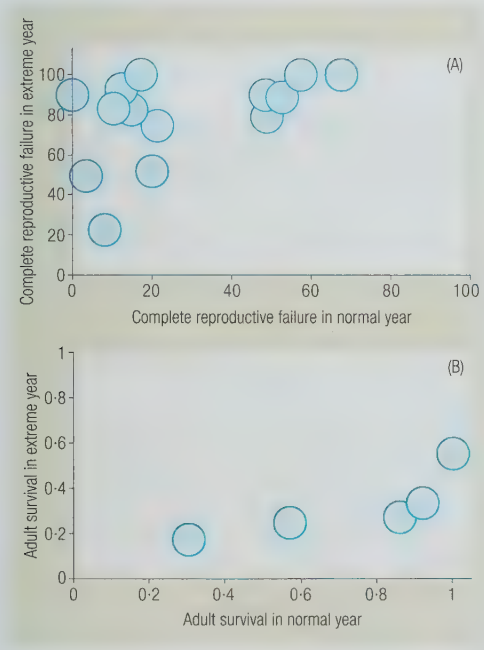


Figure 5
(A) Rate of reproductive failure and (B) adult survival rate of birds during extreme and normal weather conditions.
Adapted from Moreno & Møller (2011).

growth rate, even if mean rates of fecundity and survival remain unchanged. For example, European Shags (*Phalacrocorax aristotelis*) are coastal seabirds with high variation in annual survival rate caused by mortality due to severe winter storms (Frederiksen *et al.* 2008). A 43-year study revealed that survival rates varied greatly among years, especially in second-year birds and adults which were greatly affected by years with the strongest winds and heaviest rainfall. Shags and other cormorants do not have fully waterproof plumage as do other seabirds. This allows them to dive more efficiently, but also renders them very susceptible to the effects of cold and wet weather. Extreme weather conditions are predicted to increase in frequency, forecasting future population declines.

A particularly illuminating example of an extreme event is the heat wave that affected most of Western Europe, and France in particular, during 2003. This qualifies as an extreme event since temperature anomalies of up to +6°C occurred during April–August. It resulted in severely reduced primary productivity across Europe (Ciais *et al.* 2005) and an excess mortality of 2600 humans in France alone (Hémon & Jougla 2003). Intriguingly, bird species that were declining before 2003 declined particularly strongly in 2003, while increasing species increased particularly strongly in 2003 (Jiguet *et al.* 2006). It is therefore interesting to ask whether the natural thermal range of different species influenced how they responded to these temperature anomalies. To answer this question each species' thermal range was first determined from the range of temperatures experienced in the 50 warmest and 50 coldest grid cells within its European breeding distribution. This showed that bird species with the smallest thermal range suffered the largest declines in population size between 2003 and 2004, following the temperature anomalies of the summer of 2003 (Figure 6). These findings imply that the thermal ranges of birds reflect the past temperature fluctuations they have experienced in their evolutionary history, and thus their thermal adaptation to the environment. These findings also clearly imply that species with narrow thermal niches are particularly likely to be negatively affected by future heat waves. Indeed, modelling exercises suggest that future heat waves may lead to reductions in abundance and perhaps extinctions in many of the warmer parts of the world (McKechnie & Wolf 2009).

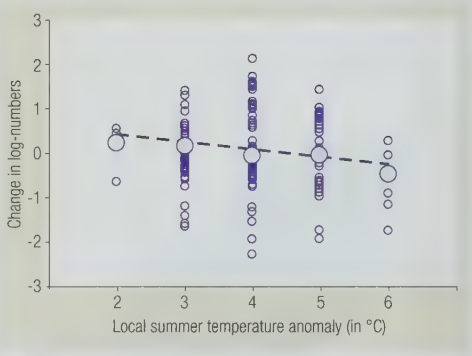


Figure 6
Decline in population size due to the heat wave in France in 2003 in relation to the thermal range of different species of birds. Large symbols represent mean values and the line is the linear regression line.
Adapted from Jiguet et al. *(2006).*

Effects of climate change on the annual cycle of birds

Numerous examples illustrate how dramatic changes have already occurred the in timing of reproduction and other annual events. These changes include an earlier start to singing by breeding birds in spring, advancing dates of migration and breeding, longer annual breeding cycles, and altered patterns of departure from the breeding grounds and, hence, autumn migration. Many birds can now be seen at times when and in places where they were previously never to be found. These observations raise questions about the organisation of the annual cycle, which is the subject of the next section. This is followed by a review of how climate change can affect when and where birds sing, as well as other aspects of the breeding cycle. Finally, this section is rounded off by discussing how climate change has caused reproductive timing to interfere with the other two major components of the annual cycle, migration and moult.

How rigid is the annual cycle and what determines the duration of its component parts?

All living organisms must schedule their life histories to fit within the time they have available. In birds this is reflected by the relative duration of reproduction, moult and migration in the annual cycle. Because the duration of each of these components increases with body mass, large-bodied species may come up against a threshold value at one year. If they are unable to fit these activities in less than a year, large species are forced either to reproduce every other year, to moult less than once a year, or partially to overlap migration and breeding with the start of gametogenesis (the production of gametes). The last mentioned means that sperm and egg production occurs during migration or arrival at the breeding grounds, while retaining energy reserves that allow an early start to reproduction (Hedenström 2006, Wingfield 2008). These trade-offs between different activities suggest that the timing of events in the annual cycle may be constrained, particularly in species with long migrations, moults or reproductive cycles. Species with very slow developmental rates of offspring, species with slow rates of moult (such as aerial foragers) and species with very long migrations may particularly suffer from constraints on the timing and duration of life history

events. Migrants are further constrained by typically short breeding seasons imposed by seasonal environments, especially when producing two or more clutches.

Moult and breeding, and moult and migration, rarely overlap, owing to the extreme costs of each activity. At northern latitudes, however, moult and breeding may overlap, and some passerines even become partly or fully flightless while breeding (Haukioja 1971b). On the other hand, some species of raptor, and other large-bodied species with prolonged moult periods, do extend moult across two or more years, apparently because fast moult is incompatible with prey capture (Rohwer, Ricklefs *et al.* 2009). These examples underscore the severe constraints on the timing of annual events.

The timing of moult determines when subsequent components of the annual cycle can take place. For example, migration with moulting feathers is energetically much more expensive than migration with full plumage. We currently know very little about changes in the timing of moult by migrants when their timing of migration has changed. Superficially, we should expect that earlier migration would allow moult to start earlier. However, Barn Swallows of Eastern European breeding origin wintering in South Africa have delayed their moult during the last eleven years, resulting in a delay in timing of spring migration (Møller, Nuttall *et al.* 2011). This would prevent an early departure from the South African winter quarters. The timing of the start of moult (as well as the maturation and regression of gonads) is under photoperiodic control, and therefore should not change if the photoperiod remains unchanged in the migrants' winter quarters. That is the case even when a photoperiodic response is fine-tuned by factors such as temperature at the breeding grounds (Dawson 2005, 2008). Moreover, migratory responses to climate change could be constrained by genetic correlations between timing of egg-laying and timing of autumn migration (Coppack *et al.* 2001), and between onset of autumn migration and timing of juvenile moult (Pulido & Coppack 2004). This is because these genetic correlations mean that selection for earlier laying would simultaneously result in selection for earlier autumn migration. Therefore, there are multiple mechanistic constraints on whether and to what extent the timing of moult can respond to climate change.

Start of the breeding season and singing

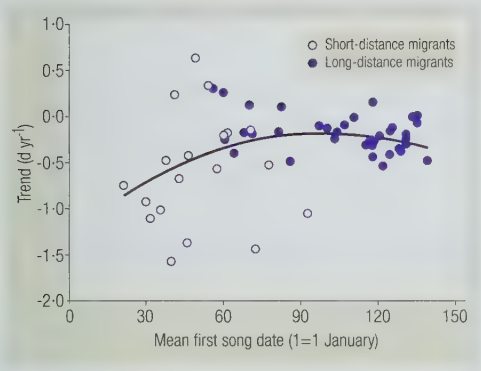


Figure 7
Rate of advance in date of first singing by birds in Parchim, Germany, in relation to migration distance. The line is the polynomial regression line. Adapted from Rubolini et al. *(2010).*

The start of the breeding season is commonly ascribed to increasing levels of hormones and their influence on reproductive behaviour such as singing and other sexual display. However, the empirical evidence suggests that these mechanisms can evolve to change in response to earlier springs. Schmidt & Hüppop (2007) analysed trends in first song dates of 56 resident and migrant bird species for 43 years during a period of rapid climate change. First song dates advanced by 0·3–0·6 days per year, similar to the advances in arrival date of migrants. A key conclusion from this unique dataset is that both migrants and non-migrants responded to climate change by advancing singing date. This suggests that migration appears not to impose a constraint on response to climate change by preventing long-distance migrants from responding to climatic changes at the breeding grounds until after spring arrival. Rubolini *et al.* (2010) compared changes in onset of singing in spring in short- and long-distance migrants using the same dataset. Species that migrated a distance of less than 4° latitude (450 km) advanced their first song dates more than long-distance migrants (Figure 7). This advancement was explained by increasing spring temperatures. However, species laying two or more clutches per year showed a stronger advance in first singing date than species laying only a single clutch. This result implies that more than a single clutch per year imposes a stronger selection pressure for earlier start of reproduction. Interestingly, the effect of temperature on first song date was unrelated to migration status. Taken together, these findings imply that the difference in the temporal trend between short- and long-distance migrants was mainly due to environmental cues regulating departure of migrants from the wintering areas, rather than to differential responses of first song date to local temperatures.

Climate change may also affect the environment that birds use for singing. Birds typically sing from exposed positions in the vegetation even when such positions make them vulnerable to predators. An important consequence of recent climate change is that bushes and trees are leafing much earlier in spring than just a couple of decades ago. This has consequences for the choice of song-posts, because early-sprouting foliage imposes greater interference to sound transmission, making it more favourable to sing from higher positions (Møller 2011a). Indeed, the average song-post height of various species of birds increased by 18% (or 1·2 m) between 1986–1989 and 2010 in a Danish study. These changes were absent for species singing in the herb layer, moderate for species singing in bushes, and most pronounced for species singing in trees, as expected from the effect of earlier leafing. In addition, species with increasing popu-

lation trends and species with sexually dichromatic coloration (and hence more intense competition for mates) were those that increased song-post height the most. These findings suggest that climate change can affect vocal behaviour of birds not only in terms of phenology, but also in terms of habitat use.

Nest-building

Nest-building takes up a significant amount of time in the reproductive cycle. A study of 200 European species found that females, males or both sexes spend from two to 105 days on the activity. Nests are sometimes much larger than required for containing and protecting eggs and young; nests of species in which both sexes contribute to building are on average twice as large as those of species where females build single-handedly (Soler *et al.* 1998). This implies that in some species nest size and building plays a role in mate choice and sexual selection. In the Barn Swallow, pairs consisting of a male with a short tail that is less attractive to females build larger nests than pairs with a long-tailed male. Interestingly, nest size has decreased over time by a factor of three owing to the negative effect of climatic conditions in North Africa on the survival of short-tailed, poor-condition males, which build larger nests over longer periods than long-tailed, good-condition males (Møller 2006). These findings suggest that not only is nest-building time-consuming and likely to constrain the speed of breeding, but also that it may be influenced by non-random selection imposed by climate change.

Laying date

Timing is everything when it comes to reproduction. Since timing of migration and timing of singing has advanced in response to climate change in many different bird species, it is not surprising that equally many species have started to lay eggs earlier, as in the striking case of the Northern Lapwing (*Vanellus vanellus*) (Both *et al.* 2005). Dunn & Winkler (2010) reviewed the literature and showed that 59% (against the random expectation of 5%) of 68 species mainly from Europe and North America have significantly advanced their laying date. Likewise, 79% advanced their laying date during the last decades when temperatures increased. The rate of advance was 0·13 days per year. This can be compared to the rate of advance of 0·39 days per year for phenology in general in the UK (Thackeray *et al.* 2010) and a rate of advance of 0·37 days per year for first arrival date of migrants (Lehikoinen *et al.* 2004). Because the rate of change for laying date is only a third of the rate of change for migration and for phenology in general, and because migration phenology is delayed compared to general phenology, these data suggest that the breeding date is lagging severely behind.

While there is general consistency in the advancement of laying date among species, implying that the same species respond similarly at different sites, there is also additional variation between populations of the same species. Several studies have shown heterogeneity in response between populations, with those encountering the largest degree of increase in temperatures also showing the strongest responses (Dunn & Winkler 1999, Sæther *et al.* 2003, Visser *et al.* 2003, Both *et al.* 2004, Both & te Marvelde 2007), even at very local scales of a few kilometres (Møller 2008b). This effect of temperature is causal, since experimental increases in temperature advance the breeding date of captive birds (Visser, Holleman & Caro 2009). Therefore, selection for earlier laying should increase as optimal conditions for breeding advance due to climate change.

Much of the variation in the advancement of laying date lies among species (rather than among different populations of the same species, for example), and some of this can be explained by differences in ecology. The single most important factor explaining advancement in laying date is the number of clutches produced per year (Dunn & Winkler 2010). While species with a single clutch advanced their laying date by 0·19 days per year, species with multiple clutches only advanced theirs by 0·06 days, or less than a third. This has been clearly shown for tits (Visser *et al.* 2003, Husby *et al.* 2009). This difference is expected because laying two or more clutches constitutes a more difficult problem, in terms of adjusting laying date to the peak of food abundance, than does laying a single clutch. Another ecological determinant of advancement in laying date is trophic level. Across all organisms, species at higher trophic levels, such as consumers of herbivores (predators) and super-predators (predators of predators), have shown slower phenological responses to climate change than species at lower trophic levels (Thackeray *et al.* 2010). Indeed, in birds, Dunn & Winkler (2010) showed greater advancement in laying date for herbivores (0·45 days per year) compared to insectivores (0·11 days per year) and carnivores (0·14 days per year), although these differences were not statistically significant (see also van der Jeugd *et*

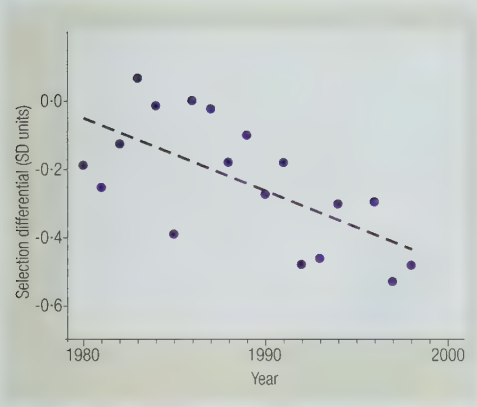


Figure 8
Strength of natural selection for early laying in the European Pied Flycatcher (Ficedula hypoleuca) *in the Netherlands. The line is the linear regression line.*
Adapted from Visser & Both (2001).

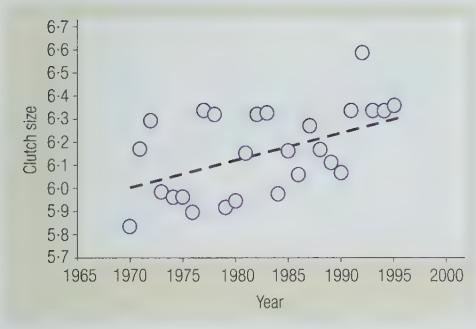


Figure 9
Increase in clutch size of the European Pied Flycatcher (Ficedula hypoleuca) *in Germany during recent decades.*
Adapted from Winkel & Hudde (1997).

al. 2009). Surprisingly, there was no difference in advancement of laying date in relation to migratory behaviour. Residents and short-distance migrants advanced their start of laying at a rate that did not differ from that of long-distance migrants. This lack of difference in laying date with respect to migration behaviour may appear to be contrary to what would be expected from the observed delay in arrival for long-distance migrants caused by climate change (Lehikoinen & Sparks 2010), and future research will be needed to resolve the effects of climate change on the simultaneous evolution of migration and breeding phenology.

It is usually advantageous to lay early, because early hatching coincides with the annual food peak while late laying prevents parent birds from benefiting from the annual peak in food abundance. In addition, early reproduction results in more time for offspring to develop independence before migration and/or moult. These benefits imply that there is a greater fitness advantage to early laying, and many studies have found such an affect. However, the pattern is not clear-cut. Dunn & Winkler (2010) reported that selection for early breeding has increased in recent years in only half the studies to date, in species as diverse as European Pied Flycatchers (*Ficedula hypoleuca*) (Figure 8; Both & Visser 2001), Great Tits (*Parus major*) (Visser *et al.* 1998, Charmantier *et al.* 2008), Barnacle Geese (*Branta leucopsis*) (van der Jeugd *et al.* 2009), Common Murres (*Uria aalge*) (Reed *et al.* 2009) and Arctic Terns (*Sterna paradisaea*) (Møller *et al.* 2006a). However, equally many studies have shown no evidence of change in directional selection (review in Dunn & Winkler 2010).

What evolutionary mechanism underlies such changes? Shifts in laying date could result either from evolutionary change (changes in the genetic composition of the population), or through phenotypic plasticity (individuals changing their behaviour according to environmental conditions). The foregoing studies have generally suggested that despite the fact that natural selection favours an advancement in laying date, there is no evidence of evolutionary change, and responses to selection have been entirely phenotypically plastic (Charmantier *et al.* 2008).

Egg-laying and clutch size

While the literature on phenology is extensive, there is much less information on change in clutch size. Because early laying and large clutches tend to go together both within and across species, we should expect increasingly earlier laying to be associated with increasingly larger clutch size. However, while studies of European Pied Flycatchers and Barn Swallows have shown such increases (Figure 9; Winkel & Hudde 1997, Møller 2002), studies of Collared Flycatchers (*Ficedula albicollis*), Great Tits and Common Blue Tits (*Cyanistes caeruleus*), Tree Swallows (*Tachycineta bicolor*), Eastern Bluebirds (*Sialia sialis*) and Red-winged Blackbirds (*Agelaius phoeniceus*) have not (Winkel & Hudde 1997, Winkler *et al.* 2002, Sheldon *et al.* 2003, Torti & Dunn 2005). Dunn & Winkler (2010) suggested three explanations for a lack of increase in clutch size. One possibility is that in warmer years it is easier for individuals to lay early, but this shift is not associated with an increase in clutch size because the association between clutch size and laying date has changed. Second, laying date may advance without clutch size increasing if a larger fraction of females of poor quality (who are unable to achieve large clutches) enter the population under such benign environmental conditions. A final possibility is that laying date has a greater impact on total fitness than clutch size, due to the negative effects of mistiming laying in relation to the food peak. Therefore, laying another or a few more eggs would delay hatching and run the risk of further mistiming. There have been no attempts yet to evaluate these alternative explanations.

An additional consequence of climate change for egg-laying is that the difficulty of finding sufficient resources to produce eggs should ameliorate as spring weather becomes warmer. One measure of this difficulty is the incidence of deviations from the normal rule of one egg being laid daily, since birds may skip a day if insufficient resources for egg production are available. Indeed, there was a decrease in laying interruptions in the Common Blue Tit by 0·58 days per egg during 1979–2007 (Matthysen *et al.* 2011). By contrast, no significant change was detected in Great Tits, as expected since a Great Tit's clutch is a smaller proportion of its body weight and therefore less costly to produce.

Duration of incubation and nestling periods

Changes in the duration of developmental periods may also allow birds subtly to adjust the timing of breeding in relation to changing environmental conditions. The

incubation period is largely determined by the developmental requirements of the embryo, which should be fixed in relation to climate change. Nonetheless, one study suggested that the incubation period of Great Tits has increased by on average two days in response to climate change; together with clutch size and onset of incubation, this enabled tits to fine-tune hatching date in relation to food peaks (Cresswell & McCleery 2003). Interestingly this effect was not statistically significant in a study of Common Blue Tits and Great Tits in Belgium (Matthysen *et al.* 2011), showing that different populations do not respond to climate change in the same way.

The only evidence to date on changes in nestling period also comes from tits: Matthysen *et al.* (2011) showed that in recent years, the duration of the nestling period has on average decreased by 1·5 days for Common Blue Tits, and by 1·3 days for Great Tits. Obviously neither the incubation nor nestling periods can dramatically adjust timing of breeding to altered phenology of food, although they may be contributing factors, as shown for incubation in Great Tits.

Number of clutches

Many species lay more than a single clutch per year, because the season is sufficiently long to permit multiple reproductive events. However, in order to benefit from a single annual food peak, the timing of these clutches may have to be relatively early for the first clutch and relatively late for the second clutch, compared to an optimally timed single clutch (Crick *et al.* 1993). This should particularly be the case for residents but less so for migrants, which are constrained by the twice-yearly migrations between breeding areas and winter quarters. If the problem of fitting two (or more) clutches into a single breeding season is an important factor determining reproductive success, then increasing spring temperatures should allow birds to space their clutches better, without sacrificing their own survival prospects. Indeed, warming springs have allowed Barn Swallows to start breeding earlier in recent years, thereby increasing the duration of the interval between first and second clutches by more than ten days during a period of only 40 years (Figure 10; Møller 2007a). This less "hectic" breeding schedule, with a longer time between the start of the first and the second clutch, allows females to recover from the large investment in first clutches. Pairs with a longer inter-clutch interval can increase their reproductive output without compromising the survival of reproducing females. This study shows that there is scope for changes in the timing of multiple reproductive events when climate changes.



Barn Swallow
Hirundo rustica
[Illustration by Hilary Burn]

Can climate change also influence the incidence of second clutches, as well as their timing? There is marked geographical variation in the frequency of second clutches among species, and even among populations within species. For example, the frequency of second clutches in the Great Tit ranges from zero in high-latitude populations, and populations in the UK, to more than a third in some other populations (Sanz 2002). Some studies have shown a decreased incidence of second clutches with increasing temperatures, while others have not. As noted above, populations that lay two clutches have to optimise the timing of laying of these two clutches, causing the first to be too early and the second to be too late for the main single food peak. For example, caterpillars are the main food source for breeding tits. Increasing spring temperatures will advance the development rate of caterpillars, causing an advancement in the date of the food peak, but also a reduction in the width of the food peak, thereby reducing the reproductive value of second broods. In this situation, when the width of the food peak is reduced, females should adjust their laying date of the first clutch to the food peak, delaying the laying date relative to the optimum when two broods are attempted, and in that way counteracting the effect of temperature on advancement of laying date due to advancement of the food peak. Visser *et al.* (2003) predicted that laying date should advance in populations with either no second clutches or a stable proportion of second clutches, because the first clutch laying date is not a compromise between the laying date of the first and the second clutch. They also predicted that laying date will have advanced to a lesser extent or not at all in populations with a decreasing frequency of second clutches. That was indeed the case for both Great Tits and Common Blue Tits: populations that experienced a decline in the proportion of second clutches experienced greater advancements in laying date (Figure 11). These findings suggest that exactly how birds might optimally adjust laying date to climate change depends on the trade-offs between optimal timing with respect to the food peak, and the frequency of multiple clutches.

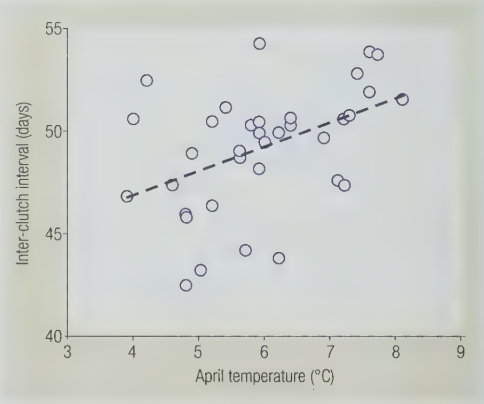


Figure 10
Duration of the interval (days) between start of laying of the first and the second clutch in the Barn Swallow (Hirundo rustica) *in Denmark in relation to April temperature (°C). The line is the linear regression line. Adapted from Møller (2007a).*

However, the patterns just described for tits may not be general. Barn Swallows and Northern House Martins (*Delichon urbicum*) show large differences in the frequency of second clutches among European populations, declining markedly with increasing latitude (Møller 1984). Although the breeding dates of both species have advanced consid-

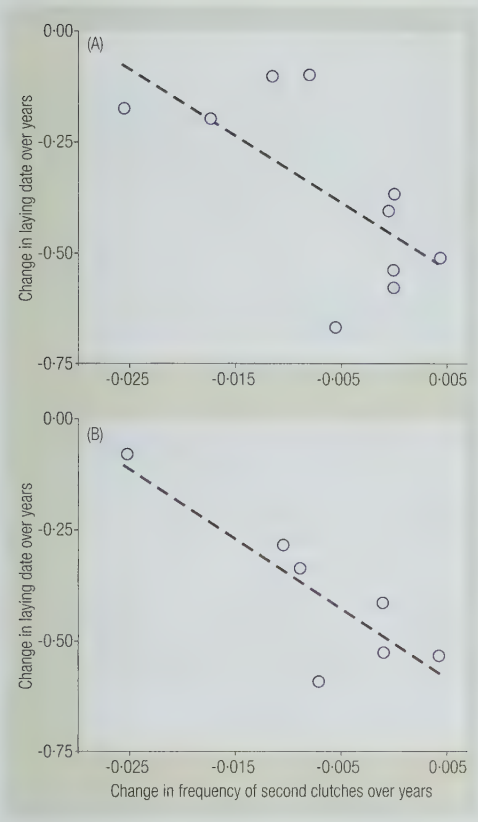


Figure 11
Decline in the frequency of second clutches in Great Tits (Parus major) *and Common Blue Tits* (Cyanistes caeruleus) *in relation to advancement in laying date of the first clutch. The lines are the linear regression lines. The negative relationships imply that populations that have advanced their laying date the most are those that have increased the frequency of second clutches the most. Adapted from Visser* et al. *(2003).*

erably during the last 20 years associated with climate change, there has been no change in the frequency of second clutches whatsoever (Møller 2002 and unpublished data).

Reproductive success

While there are many data on changes in phenology and few data on changes in clutch size, there are even fewer data relating changes in reproductive success to climate change. An earlier start of reproduction and a longer growing season may reduce costs of reproduction. Thus under certain circumstances climate change may even improve reproductive success: as noted above, warming spring temperatures have enabled an increase in the interval between first and second clutches in Barn Swallows, and Møller (2007a) has shown that reproductive success almost doubled between clutches with the shortest and longest intervals between first and second clutches. Female Barn Swallows that invest more in reproduction than males benefitted from this longer breeding season and longer interval between clutches by no longer paying a viability cost of producing a second clutch, as they did just a couple of decades ago.

Reproductive success may also be affected by climate change in unexpected ways. In the Barn Swallow, the frequency of unmated males has decreased through improved male survival caused by improved environmental conditions in North Africa during spring migration (Møller 2004b). Unmated males can secure reproductive success through infanticide at nests that are not well guarded by the owners, causing a divorce and subsequent remating by the female with the infanticidal perpetrator. Incidence of infanticide has decreased with climate change in North Africa (Møller 2004b). Because fewer males remain unmated now than before climatic changes in North Africa, the frequency of infanticide has changed from affecting 5% of all nests to being virtually absent in recent years, thus improving reproductive success with respect to this parameter (Figure 12; Møller 2004b). Thus, the effects of climate change on behaviour and reproductive success are often idiosyncratic and difficult to predict.

Mismatch between food, breeding date and optimal timing of reproduction

Animals typically breed at times when the probability of successful reproduction reaches a maximum (Lack 1954). Therefore, breeding is timed such that food requirements for offspring are typically maximal when food availability peaks. There are numerous examples of such a match between supply and demand, since selection has favoured those individuals that use cues that ensure breeding at an optimal time, and therefore leave the most descendants to the next generation. A classical example of reproductive match between timing of breeding and food supply is provided by Great Tits and their caterpillar prey, which show a marked peak in abundance in spring well after laying, when chicks are being fed (Figure 13).

Obviously, however, matching reproductive phenology to food availability represents a challenge, mainly because the phenology of more than one organism is involved, providing ample opportunities for errors (Visser *et al.* 2004, Both 2010b). Many species have responded to increasing spring temperatures by laying earlier, although not early enough to maintain synchrony with their caterpillar food (Buse *et al.* 1999, Visser *et al.* 2006). Mismatch in timing of breeding by Great Tits results in a reduced probability of offspring being recruited into the population (Visser *et al.* 1998). The impact of climate change on timing of Great Tit reproduction has differed among populations, with the Oxford (UK) and Antwerp (Belgium) populations having become better synchronised than before (Charmantier *et al.* 2008, Matthysen *et al.* 2011), whereas the Hoge Veluwe (Netherlands) population has become less synchronised. Mistiming may arise from a number of different mechanisms, including timing of food changing more than timing of breeding, the food peak becoming more spread in time (thus reducing the effects of mistiming), or the food peak becoming more concentrated in time (thus increasing the effects of mistiming) (Both 2010b). However, caterpillars and tits do not live in a vacuum, but coexist with different food plants, competitors and predators. Indeed, Both *et al.* (2009) showed that while the caterpillar emergence date has advanced considerably, and the breeding dates of three species of tits and European Pied Flycatchers have all advanced (albeit to a lesser degree than caterpillars and to a different degree in different bird species), the timing of budburst of oaks (*Quercus* spp.) and of breeding by Eurasian Sparrowhawks (*Accipiter nisus*), which eat tits and flycatchers, has not changed at all (see also Nielsen & Møller 2006). Thus mismatch is not just a question of optimal individual decisions and optimal timing of life history events to the environment and to climate change, but also of optimal timing to the web of life that surrounds all living beings.



Great Tit
Parus major
[Illustration by Hilary Burn]

Although studies have revealed mismatches in timing of reproduction relative to food abundance in many species, equally many species have shown no such mismatch (Dunn *et al.* 2011). The reasons for such interspecific differences remain poorly understood. There are limits to optimal behaviour by birds because there are limits to local adaptation. For example, gene flow at a local scale may prevent individuals from behaving optimally, if individuals adapted to timing of food availability in other populations immigrate from elsewhere (Dhondt *et al.* 1990). Likewise, evolutionary lag may prevent birds from catching up with ever-changing peaks in food abundance. There has always been mistiming of phenological events, and that will remain the case with or without climate change. So when should we expect mismatch and when should we not? At which level of climate change should we expect mismatch? Visser & Both (2005) suggested that an appropriate yardstick for assessing the level of mistiming is the extent to which a species adjusts its timing of reproduction to the availability of its primary food. However, every individual of every species is predicted to have to time its reproduction to numerous factors such as prey, predators, competitors or parasites. Clearly, these adjustments cannot all be simultaneously maximised; we should rather expect the temporal match to different species to depend on the strength of selection that each species imposes. Moreover, degree of temporal match should also perhaps depend on the availability of cues that can influence decision-making by individuals of any given species.

A different way of addressing the question about temporal mismatch is to test for changes in phenological response to climate change at different trophic levels, because overall mismatches between trophic levels would increase the possibility of widespread mismatches between particular interacting species. Thackeray *et al.* (2010) analysed more than 25,000 rates of phenological change for 726 species in the UK, and found consistent advances in phenology by 0·39 days per year. Such widespread and homogeneous advance is suggestive of a common external driver, namely climate change. This advancing phenology also paralleled the rate of change in temperature, as one should expect if climate change was the main driver. Importantly, the change in phenology depended on trophic level: secondary consumers such as Great Tits showed a slower response of 0·22 days per year compared to the response of primary consumers such as caterpillars (0·43 days per year) and primary producers such as oaks (0·40 days per year). These findings raise significant concern about the synchrony of different trophic levels, and hence the risk of breakdown of interspecific interactions and ecological communities.

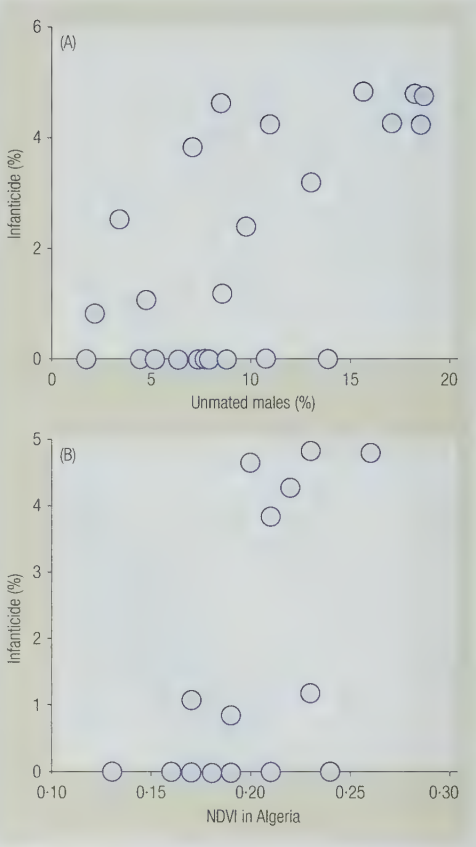


Figure 12
(A) The frequency of infanticide in the Barn Swallow (Hirundo rustica) *increases with the frequency of unmated males in different years. (B) The frequency of infanticide has increased with increasing rainfall in North Africa, because rainfall allows better male survival.*
Adapted from Møller (2004b).

Duration of the breeding season

The breeding season is defined as the period during which environmental conditions allow adults to rear offspring successfully. As described above, the timing of breeding may not always be optimal with respect to food because very early breeding may allow more clutches to be produced during a year, hence temporally displacing both first and second clutches from the time when food availability peaks. Because the growing season at lower trophic levels (i.e. plants) has advanced due to climate change (Schwartz *et al.* 2006), we should also expect the breeding season to advance. That would result in a longer breeding season if more broods were produced, or the interval between broods expanded. Møller, Flensted-Jensen *et al.* (2010) analysed change in the duration of the breeding season for 20 bird species in Denmark. There was considerable interspecific variation, from a shortening of the breeding season by 36 days in the Sandwich Tern (*Thalasseus sandvicensis*) to an extension by 36 days in the Common Woodpigeon (*Columba palumbus*). This change in the duration of the breeding season was directly related to mean temperature during the month when breeding started, with species breeding in cooler months experiencing increasingly longer breeding seasons. Long-distance migrants have not responded as strongly in terms of arrival phenology as short-distance migrants (Lehikoinen & Sparks 2010), so we might expect a different change in duration of the breeding season between migrants and residents. Surprisingly, there was only a weak effect of migration distance, with small reductions in the duration of the breeding seasons of long-distance migrants over the period that climate change has occurred, rather than large increases as we might expect. While species laying multiple clutches per year increased the duration of the breeding season by 0·43 days per year, species with single clutches actually reduced the duration of their breeding season by 0·44 days per year (Figure 14). This effect can be expected because an increase in temperature causes a shortening of the period of full gonadal maturation (Dawson 2005). Therefore, breeding seasons show considerable flexibility in duration depending on the number of clutches produced per year.

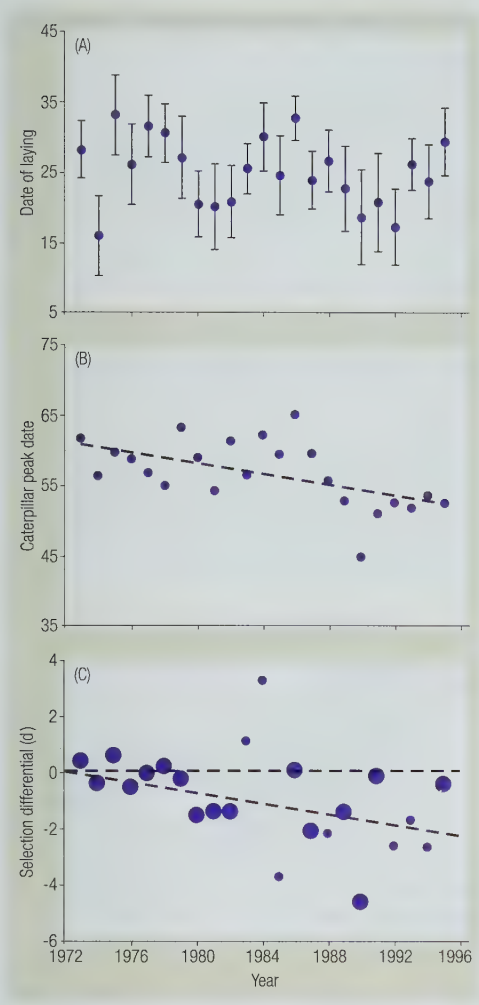


Figure 13
(A) Laying date (1=1 April), (B) caterpillar peak date and (C) selection differential on laying date in Great Tits (Parus major) *in the Netherlands. While date of laying has not advanced, the peak date for caterpillars had advanced, with the consequence that selection for early laying has increased (i.e. has become more negative).*
Adapted from Visser et al. *(1998).*

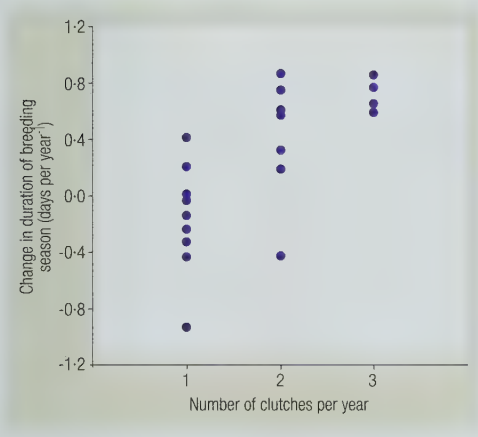


Figure 14
Rate of change in the duration of the breeding season (days per year) in relation to number of clutches produced per year for different species of birds in Denmark.
Adapted from Møller, Flensted-Jensen et al. *(2010).*

Evidence for a role of the number of clutches in response to climate change also comes from studies of number of clutches and migration. Bird species with multiple clutches per year advanced their spring migration in Hungary more than species with just a single clutch (Végvári *et al.* 2010).

Dispersal

Dispersal may affect adaptation to changing climatic conditions because gene flow from populations at different latitudes that already experience warmer climates may promote local adaptation; conversely, gene flow may erode local adaptation. Recent studies suggest that dispersal propensity and habitat breadth may increase at range margins, thereby increasing the rate of range expansion (Thomas *et al.* 2001) and perhaps thus hastening responses to climate change. Unfortunately, there are very few studies that have related dispersal propensity of birds to climate change. Arctic Terns are long-distance migrants that breed in temperate and Arctic regions of the northern hemisphere, and winter in Antarctic parts of the Southern Ocean. In this species, natal dispersal distances from the site of hatching to the site of first breeding have increased from a mean of 15 km in the 1930s to almost 90 km in the 1990s in a marginal Danish population (Figure 15; Møller *et al.* 2006b). However, this study also found that long natal and breeding dispersal distances were costly as they delayed reproduction in a given year. Their incidence was related to climatic conditions both on the breeding grounds and in the winter quarters: natal dispersal distance depended on climatic conditions in the year of hatching and the year of breeding, but breeding dispersal distance was only affected by climate conditions in the second year of the dispersal event. Thus, while natal dispersal distance depended on conditions in the breeding areas, breeding dispersal also depended on the weather in the Antarctic winter quarters, showing that via dispersal, the extent of gene flow was affected by climate in two different parts of the annual range.

Indirect estimates of dispersal can also be obtained from stable isotope profiles, since the isotopic fingerprint of a moulting site is recorded in the chemical composition of feathers. American Redstarts (*Setophaga ruticilla*) grow or moult their feathers at the breeding grounds. Juveniles winter in either favourable mangrove habitat or inferior scrub, with the latter birds departing on spring migration later than the former. Early departure allowed mangrove birds to migrate relatively short distances to their breeding grounds and settle there to benefit from early spring phenology and an early food supply (Studds *et al.* 2008). In contrast, juvenile American Redstarts wintering in secondary scrub habitat left late on spring migration, forcing them to migrate further north and thereby risk a temporal mismatch between food availability and timing of breeding. Adults showed highly consistent stable isotopic profiles of their feathers among years, suggesting that they bred at the same sites once having dispersed during natal dispersal.

Another consideration in relating dispersal to climate change is that dispersal decisions may differ among populations, resulting in divergent patterns of selection (Balbontín *et al.* 2009a). Barn Swallows from a Spanish and a Danish population differed in their dispersal propensity because Spanish birds were six times as likely to be philopatric (to breed in the same place as were they hatched) as Danish birds. Environmental conditions in Africa as reflected by the Southern Oscillation Index differentially increased philopatry in Spain, while decreasing philopatry in Denmark. Thus, population differences in dispersal propensity as mediated by climatic conditions in the winter quarters (Southern Oscillation Index) may help maintain local adaptation and prevent mixing of populations. Furthermore, such differences may prevent homogeneous responses to climate change, even when the same climatic conditions (Southern Oscillation Index) are acting on different breeding populations.

Bird migration under climate change

Studies of bird migration provide some of the clearest examples of the effects of climate change. However, they also illustrate many of the problems encountered when analysing and interpreting biological data relating to climate change.

Timing and duration of spring migration

Starting in 1749, Linnaeus (1757) organised the recording of the first arrival dates of birds in Finland (Figure 16), which have been continued ever since. These long-term

phenological data for first arrival dates are particularly illuminating for several reasons. First, they even show patterns corresponding to shorter-term changes in climate, such as the two relatively brief periods of warming during the years 1860–1889 and 1930–1940 (Lehikoinen *et al.* 2004). Second, all species tend to change in unison, so that periods with early arrival are consistent among species. Third, birds advanced their arrival dates in recent years in a manner consistent with current climate change. Even longer phenological time series exist for cherry blossoms in Kyoto, Japan, dating back to the 9th century (Aono & Kazui 2008), showing that timing of flowering now is earlier than it has been during the period 850–2010.

Migration is an adaptation to the exploitation of seasonal environments. Birds may change from migrants to residents over a few generations if environmental conditions during winter allow. Many populations of northern species that were completely migratory just 100 years ago are now almost exclusively resident, for example Hooded Crow (*Corvus cornix*), Common Blackbird (*Turdus merula*), European Robin (*Erithacus rubecula*), Dunnock (*Prunella modularis*) and Common Chaffinch (*Fringilla coelebs*), all of which are now residents in central and northern Europe (Berthold 2001, Newton 2008). The optimal timing of arrival depends on its benefits in terms of competition for territories and mates and the possibilities of early breeding, the production of an additional clutch and recruitment of the offspring to the next generation, and its costs in terms of risk of mortality from adverse weather during spring arrival (Jonzén *et al.* 2007).

Species differing in migration ecology have responded differently to climate change, with long-distance migrants responding less than short-distance migrants (Lehikoinen *et al.* 2004, Lehikoinen & Sparks 2010). There are two main reasons why long-distance migrants might be expected to arrive later relative to the phenology of their breeding grounds: first, timing of migration may be under the influence of conditions in the winter quarters often thousands of kilometres away from the breeding areas, and second, because endogenous rhythms determining departure for the breeding grounds are responding only weakly or not at all to climate change. For example, European Pied Flycatchers in the Netherlands have shown a steadily advancing breeding date over the past 20 years but no advance at all in their spring arrival date (Figure 17; Both & Visser 2001).

Earlier spring arrival may be permitted by such factors as faster migration, earlier autumn departure, and the use of wintering areas closer to the breeding grounds. For example, numerous North American species have been shown to migrate more quickly across the US in warmer years (Marra *et al.* 2005). Several studies also suggest that changes in stopover time and fuelling time are possible when climatic conditions allow (Bairlein & Hüppop 2004). Barn Swallows may rapidly change their departure date from their South African winter quarters in response to changes in the annual cycle of breeding, migration and moult (Møller, Nuttall *et al.* 2011). Examination of the geographical distribution of ringing (banding) recoveries reveals that migratory birds now winter further north than they used to do just a few decades ago (Siriwardena & Wernham 2002, Fiedler *et al.* 2004, Visser, Perdeck *et al.* 2009, Ambrosini *et al.* 2011). These findings of rapid change in migration schedules are supported by recent increases in the frequency with which tropical migrants such as Barn Swallows and European Pied Flycatchers now winter in the Mediterranean region (Lehikoinen & Sparks 2010).

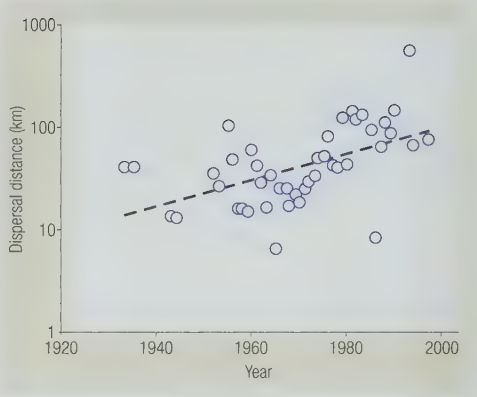


Figure 15
Change in natal dispersal distance (km) by Arctic Terns (Sterna paradisaea) *in Denmark during the last 80 years. The line is the linear regression line. Arctic Terns dispersed much longer distances as spring weather became warmer.*
Adapted from Møller et al. *(2006b).*



Arctic Tern
Sterna paradisaea
[Illustration by Ian Willis]

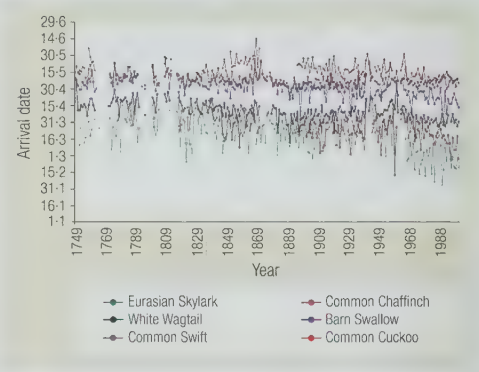


Figure 16
First arrival date of various species to Finland since 1749.
Adapted from Lehikoinen et al. *(2004).*

Distributions of arrival dates under climate change

Databases on arrival (and departure) dates are extensive. For example, Lehikoinen & Sparks (2010) were able to analyse 3827 sets of time series data of first and mean arrival dates for 455 species, ranging in duration from 18 to 53 years. An astonishing 82% showed a tendency for earlier arrival, with significant effects of species and geographical region (Figure 18). The latter effects imply that the advancement in arrival date was consistent for different populations of the same species, but also that different countries have experienced different levels of climate change and hence different degrees of advancement of arrival. The average trend was for earlier arrival by 0·28 days per year for first arrivals, and 0·18 days per year for mean arrivals.

Such results and conclusions rest on a number of assumptions that may cause smaller or larger degrees of bias (Lehikoinen *et al.* 2004, Lehikoinen & Sparks 2010). In order to obtain distributions of arrival and departure dates, information about the actual arrival (and departure) dates on the breeding grounds is ideally required. Thus daily (or less regular) data on arrival must be collected from individuals of known identity (i.e. ringed individuals). There are very few long-term datasets of such accuracy for birds of known breeding origin, and these are restricted to studies of Barn

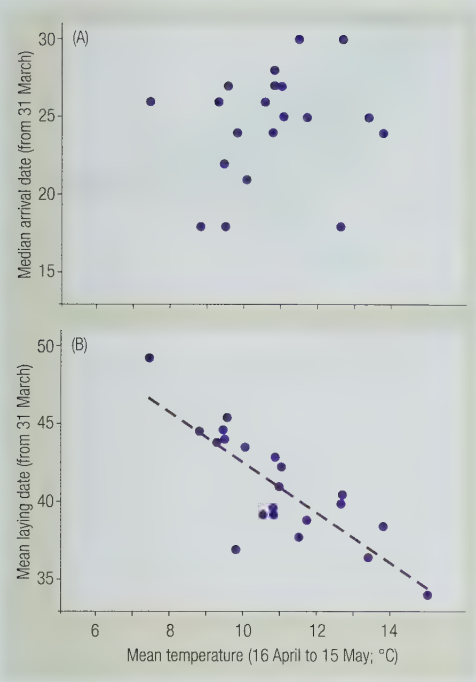


Figure 17
(A) Lack of advance in arrival date by European Pied Flycatchers (Ficedula hypoleuca) *to the Netherlands, while (B) breeding date has advanced.*
Adapted from Both & Visser (2001).

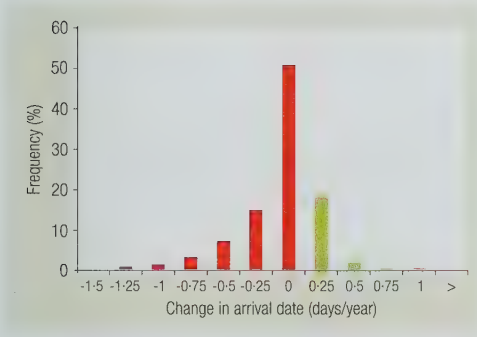


Figure 18
Advance in arrival date of migratory birds in Europe. Many more species advanced (red) than delayed (green) their arrival.
Adapted from Lehikoinen & Sparks (2010).

Swallows and a few other species. Most time series of arrival dates are rather based on observations or captures of birds on migratory passage at bird ringing stations, but these data pose many problems. They may be affected by variation in sampling effort among years, as well as by changes in population size. First arrival dates, in particular, will become artificially delayed in decreasing populations (Miller-Rushing *et al.* 2008). If migrating birds are not close to their actual breeding sites, samples of arriving individuals may be biased because more than one population may contribute to the sample recorded. Moreover, changing weather conditions can affect the frequency, timing and duration of stopover during migration, and such changes can affect not only the kinds of birds recorded or captured but also the frequency with which migrating birds land at ringing stations and hence have a probability of being captured. There are additional problems when comparing samples from different years, and when comparing spring and autumn migration, because any of the factors just mentioned (e.g. change in population size, uncertainty about breeding origin of migrants, effects of weather) may change in response to climate change. Using observations collected by amateur birdwatchers may introduce even more bias, for example owing to higher intensity of observations during weekends, or owing to observer activity increasing over time (Sparks *et al.* 2008).

Ideally, the entire distribution of arrival (or departure) should be recorded in order to provide the best information on timing of migration (Sparks *et al.* 2005). Not surprisingly, as noted above, there are only a handful of such studies involving individuals of known breeding origin for a sufficient number of years to allow meaningful analyses. Møller (1994b, 2008a) analysed the distributions of arrival date for Barn Swallows over 32 years, using four key measures obtainable from statistical frequency distributions: mean, variance, skewness and kurtosis ("peakedness" of the distribution). These four measures, which all changed during the study, were related to environmental conditions in North Africa during spring migration as reflected by the Normalized Difference Vegetation Index (a measure of live green vegetation coverage obtainable from satellite data). During benign years when survival was high, mean arrival dates were delayed, showed increased variance, showed decreased skewness, and showed increased kurtosis. This shows that when conditions are better in Africa, not only do Barn Swallows arrive earlier, but weaker selection from mortality on passage lets through birds with a wider range of individual quality: for example, under favourable conditions, poor quality birds survive and arrive later than the smaller number of survivors in normal years. Moreover, arrival time was independently affected by spring temperature on the breeding grounds, with mean arrival being earlier, the variance smaller and the kurtosis smaller in warm springs. These analyses suggest that different aspects of the arrival distributions change in response not only to climatic conditions en route, but also to weather conditions on arrival on the breeding grounds.

Consistency and geographical variation in arrival date

Given the many difficulties associated with time series data of arrival and departure dates, one might ask whether they nonetheless provide us with any worthwhile biological signals. Several studies have shown that they do. First, Rubolini *et al.* (2007) analysed more than 600 sets of time series data with a minimum span of 15 years, showing an overall advance in arrival date, especially so in first rather than in mean arrival dates. Importantly, different species varied significantly in advancement of arrival date, showing that while some species have responded to climate change, others have not. First arrival dates advanced more strongly at intermediate latitudes in Europe, and arrival dates advanced more for short- than for long-distance migrants. Second, as mentioned above, Lehikoinen & Sparks (2010) showed similar differences among species in advancement of first and median arrival dates for more than 3800 sets of time series data. Thus, we can conclude with confidence (1) that different species vary in their response to climate change, (2) that the mean advancement in arrival date is clear and highly significant, and (3) that geographical patterns of advancement in arrival date follow geographical patterns of climate change, which has been particularly pronounced in central Europe.

Evolution or phenotypic plasticity of arrival date in response to climate change

Despite numerous data being collected over more than 200 years, we still do not know to what extent changes in arrival dates are due to phenotypic plasticity (individuals changing during their lifetimes) or evolution (heritable genetic change) (Pulido & Berthold 2004, Pulido 2007, Sheldon 2010). Extent of migration, migratory direction

and annual timing of migration are all heritable characters that can change rapidly in response to artificial selection, as demonstrated by elegant studies of the Blackcap (*Sylvia atricapilla*). Indeed, date of migratory restlessness by Blackcaps has advanced considerably among nestlings from the wild that were reared in the laboratory (Pulido & Berthold 2004, 2010), implying that even in a constant environment there is a significant advance in timing of migration. We also know that many species have altered their migration strategy during the last hundred years, and even during the last 20 years. However, this does not resolve the question about the evolutionary basis for such changes. Because long-distance migrants live on a different continent during winter, and cannot readily be subject to environmental influences from the breeding range in winter, it has been suggested that their response must be due to micro-evolution (i.e. genetic change) (Jonzén *et al.* 2006). However, to demonstrate convincingly that a change in arrival date is caused by micro-evolution rather than phenotypic plasticity, we need to show that the individual genetic component of arrival date has changed in response to climate change. Such analyses in turn require separating the variation in arrival date into its environmental and genetic components, and evidence that the individual genetic component, the so-called breeding value of the individual, has changed. To achieve this, information on arrival date for a reasonably large pedigree of individuals is needed, with information on parents, offspring and grand-offspring. These requirements are difficult to fulfil because migratory birds generally have long natal dispersal distances, making it difficult to record such genealogical data. When estimates from a meta-analysis showing an average advance in arrival date were converted into rates of evolutionary change, the rates were within the limits of what can be considered possible from genetic change alone (Gienapp *et al.* 2007). However, only the study by Karell *et al.* (2011) on plumage coloration has produced conclusive evidence that climate change effects on birds are due to evolution rather than phenotypic plasticity (Gienapp *et al.* 2008, Sheldon 2010).



Blackcap
Sylvia atricapilla
[Illustration by John Cox]

If genetic information on arrival is difficult to obtain, another approach is to test whether phenotypic plasticity alone can account for the observed changes in phenology. If phenotypic plasticity is the underlying mechanism, we might specifically predict that cross-sectional data (comparing individuals in a given year) and longitudinal data (following individuals throughout their lives) should show similar patterns (Przybylo *et al.* 2000). Saino *et al.* (2004) analysed cohorts of Barn Swallows and their temporal change in arrival date for an Italian population that winters in Central Africa, in relation to winter conditions estimated from the Normalized Difference Vegetation Index. They found that the arrival date of old (but not yearling) Barn Swallows was advanced during springs that followed winters with benign environmental conditions in Africa (Figure 19). These patterns of within-individual variation in arrival date subsequently affected the timing of breeding and offspring production, showing that environmental conditions in Africa have carry-over effects to the breeding season, with consequences for annual reproductive success. Interestingly, extensive analyses of another population of Barn Swallows breeding in Spain and wintering in West Africa provided slightly different results: ecological conditions during migration advanced arrival date, while conditions in the winter quarters delayed arrival date; again, however, phenotypic plasticity was sufficient to account for these effects (Balbontín *et al.* 2009b).

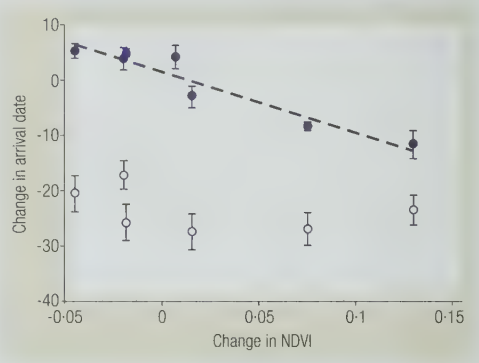


Figure 19
Change in spring arrival by yearling (open symbols) and older (filled symbols) Barn Swallows (Hirundo rustica) *in northern Italy from their Central African winter quarters in relation to change in rainfall in winter as reflected by satellite imaging (NDVI). The line is the linear regression line. Error bars are SE. Adapted from Saino* et al. *(2004).*

Is there any evidence for a role of genetic factors in changes to the timing of migration? To date, the only indication we have comes from an analysis of the genetic basis of arrival date in two populations of Barn Swallows. This showed that spring arrival date was both phenotypically and genetically negatively correlated with morphological traits involved in migration (wing and tail length) and life history traits (time until breeding) (Teplitsky *et al.* 2011). One implication of this finding is that negative genetic correlations may constrain adaptation to climate change, because selection for earlier arrival will necessarily be associated with a delay in breeding.

Breeding vs. winter and stopover effects on arrival date

Changes in arrival dates for migratory birds to the breeding grounds may provide a misleading perspective on climate change if environmental conditions in the winter quarters are in fact the main determinants of timing of migration. However, this is not the only possibility, because early arrival to the winter quarters may allow early moult and hence early departure, as seen in some species (Kok *et al.* 1991, Beaumont *et al.* 2006, Chambers 2008, Møller, Flensted-Jensen & Mardal 2009), but not in others (Møller, Nuttall *et al.* 2011). Therefore, early departure from the winter quarters may in turn be influenced by the timing of autumn migration. Since conditions on the breeding grounds cannot be assessed from the winter quarters, it is difficult for migrants to

adjust their arrival times to conditions at the breeding sites. There is some evidence suggesting that temperature anomalies in Africa affect the arrival date of migrants to the breeding grounds (Saino *et al.* 2007). Investigations of the effects of conditions in the winter quarters on arrival to the breeding grounds have produced mixed results: some studies showed earlier arrival during benign conditions (Saino *et al.* 2004, Gordo & Sanz 2005, Gordo *et al.* 2005, Both, Sanz *et al.* 2006, Møller 2008a), another reported delayed arrival following a benign winter (Balbontín *et al.* 2009b), and another found no effects (Tøttrup *et al.* 2008). Note, however, that only Both, Sanz *et al.* (2006), Møller (2008a), Saino *et al.* (2004) and Balbontín *et al.* (2009b) used breeding populations of known origin, so only these studies are likely to provide reliable tests of how winter conditions affect arrival time to the breeding grounds.

The question is even more complicated by the fact that migrants rest at stopover sites during migration, and that environmental conditions at these sites may affect migration and hence the date of arrival. The frequency of stopover and the time required for refuelling appears to have changed in recent years (Bairlein & Hüppop 2004), and it is known that environmental conditions for both European Pied Flycatchers and Barn Swallows in North Africa during spring stopover affect their arrival date to the breeding grounds (Both, Sanz *et al.* 2006, Møller 2008a, Both 2010a). Furthermore, weather conditions on migration also affect arrival date, especially as migrants approach their breeding destinations, perhaps because migrants at these locations are better able to adjust their migration activity to prevailing weather in large areas in northern Europe (Ahola *et al.* 2004, Tøttrup *et al.* 2008). These data suggest that the annual schedule of migration is determined by environmental conditions in all geographical areas encountered throughout the annual cycle, rather than pinpointing changes in migration schedules to events in a particular area during a specific period.

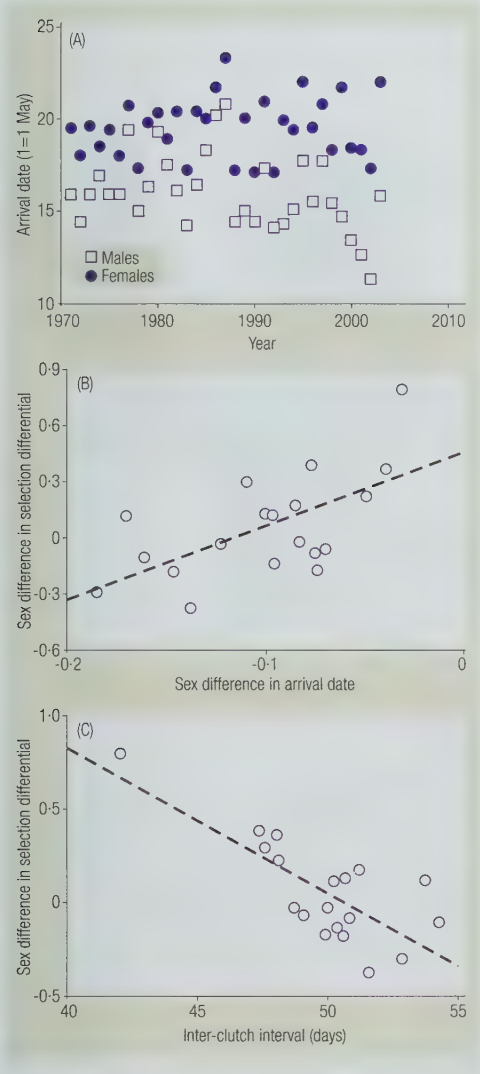


Figure 20
(A) Timing of arrival by male and female Barn Swallows (Hirundo rustica) *in Denmark. (B) The selective advantage of early arrival differed between males and females and changed over time. (C) This sex difference in selection was mediated by an increase in the interval between laying of first and second clutches. The lines are the linear regression lines.*
Adapted from Møller (2007b).

Timing and duration of autumn migration

There are many fewer data on departure dates from the breeding grounds than there are for arrival dates. Lehikoinen & Sparks (2010) analysed 683 time series datasets for 246 species, including 374 last departure dates and 150 median departure dates. A total of 60% of last departure dates became delayed over the study period, while only 36% of median departure dates became delayed. Studies of autumn departure at specific sites show similar trends, at least for long-distance migrants (e.g. Jenni & Kéry 2003). That changes in autumn departure dates should be less clear than those for spring arrival dates is as expected if there has been an advance in the start of reproduction, but little or no change in the end of reproduction. However, some studies suggest that autumn departure is advanced just as spring arrival, at least in single-brooded species with relatively short migrations (e.g. Jenni & Kéry 2003, Van Buskirk *et al.* 2009a).

Sex differences in arrival date and protandry

Bird migration is under intense selection because early-arriving individuals have higher mating and breeding success than later-arriving individuals (e.g. Møller 1994b). Males and females do not benefit equally from early arrival, because competition for high-quality mates is more intense among males, and because tertiary sex ratios (i.e. sex ratios among reproducing adults) are often male-biased, implying that a fraction of males do not mate. Therefore, males should experience stronger selection for early arrival than females, and the fitness benefits males might thus accrue can be quantified. Møller (2007b) analysed the fitness advantages of early arrival in male and female Barn Swallows during a period when spring arrival advanced in a Danish breeding population. Arrival date was quantified by weekly captures of adults at breeding sites, and the fitness advantage was quantified as survival to the next year, as well as by the number of offspring reared during the current year. Males arrived before females, and increasingly so in recent years (Figure 20A). Advancing early arrival was associated with increasingly better survival in males, while females showed the opposite pattern. While early-arriving males survived better and females worse at the start of the study, by the end of the study early-arriving individuals of both sexes survived worse than later-arriving individuals (Figure 20B). Further analyses revealed that this result arose because early-arriving males survived better when inter-clutch intervals were short, while early-arriving females survived better when inter-clutch intervals were long (Figure 20C). Therefore, patterns of selection in the two sexes change in response to advancing arrival dates, leading to a complex result.

The extent of sex difference in arrival date will depend on the cost and benefits of early arrival for males and females. Earlier arrival in males than in females (protandry)

is caused by more intense competition among males (Kokko 1999, Morbey & Ydenberg 2001). In Barn Swallows the degree of protandry (the number of days that the average male arrives before the average female) has increased in recent years because males, responding to warmer springs, arrive earlier, whereas females do not (Møller 2004a). Specifically, the degree of protandry grew as temperatures increased during April, which is when the first birds arrive. In addition, the sex difference in arrival date depended on condition during spring migration in North Africa. Recent years have been characterised by dry weather and resultant poor vegetation quality, as measured by the Normalized Difference Vegetation Index (Møller & Szép 2005). Barn Swallows are at their most vulnerable in North Africa, when they have just crossed the Sahara, and deterioration in environmental conditions here increased the mortality rate, allowing only males in prime condition to survive. Not surprisingly the degree of protandry was larger in years when mainly long-tailed males in prime condition survived; by contrast, in years when even males in poor condition were able to survive, the sexes tended to arrive simultaneously (Møller 2004a).

While these analyses concern protandry at the population level, selection acts at the level of individuals, and any given male may breed with a female that arrives relatively early or relatively late. Does it matter for males if they mate with an early- or late-arriving female? Males that arrived well before their mates gained a fitness advantage because they fertilised more eggs in their own nests than did later-arriving males. The fitness advantage of males mated to females that arrived earlier came from earlier breeding, which allowed their offspring to fledge early and hence have a high probability of survival (Møller, Balbontín *et al.* 2009). These results demonstrate the complexities of selection acting on arrival date when it advances in response to climate change.

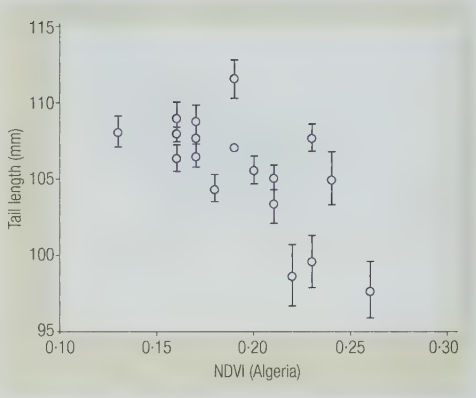


Figure 21
Change in tail length of male Barn Swallows (Hirundo rustica) *in relation to change in rainfall in North Africa during spring migration as reflected by satellite images (NDVI). The error bars are SE. Adapted from Møller & Szép (2005).*

Evolution of secondary sexual characters, colour and body size

Climate change is a forceful selective agent, and it may become even more so in the near future. Characters with high evolvability (i.e. having high genetic diversity on which natural selection can act) should therefore be expected to respond rapidly to climate change. Evidence for this has emerged in several recent studies of secondary sexual characters, coloration and body size, which are all traits that are indeed expected to have high evolvability.

Male Barn Swallows have outermost tail feathers that are on average 20% longer than those of females, and males with long tails enjoy mating advantages in terms of mating success, laying date, annual fecundity and paternity, among others (Møller 1994a). Tail length is also strongly dependent on the individual's condition, so climate change may affect the expression of this secondary sexual character through phenotypic plasticity depending on environmental conditions. Barn Swallows from the Danish population under study winter in southern Africa and migrate across the Sahara through North Africa. As noted above, rainfall has decreased in North Africa since the mid-1980s, resulting in reduced survival mainly of Barn Swallow individuals in poor condition. This change in climate has led to an increase in mean tail length of over 12 mm in males (but not females) at the population level (Figure 21; Møller & Szép 2005). This change in tail length is associated with changing temporal patterns of selection on male tail length due to survival.

A clear example of the effects of climate change on plumage coloration comes from Tawny Owls (*Strix aluco*) in Finland (Karell *et al.* 2011). Tawny Owls occur in two colour morphs that are either brown or grey, as determined by simple Mendelian inheritance with two alleles. There is strong natural selection against the brown morph in winters with lots of snow, when they survive poorly, whereas survival of grey morphs is independent of snow depth. Such snowy winters have become rare, as increasing temperatures have caused snow depth to decline from 12 cm to 2 cm over the period 1981–2008. This has produced a dramatic increase in the frequency of brown morphs, from around 12% in the early 1960s to 42% in 2005–2010 (Figure 22). Thus, climate change has clearly altered natural selection on colour morphs.

Body size of birds is the result of past selection for adaptation to local conditions. Bergmann's Rule states that the body mass of populations of species increases with decreasing mean annual temperature, which is explicable in terms of larger body size reducing the surface-to-volume ratio, and hence minimising loss of energy. We should therefore predict that under climate change, body mass will decline as temperatures rise. The prediction was supported in a study of the size of five bird species in Israel, using body mass and tarsus length of museum specimens for 1950–1999. Body mass and tarsus length were found to have declined in four and two species respectively



Tawny Owl
Strix aluco
[Illustrations by Tim Worfolk]

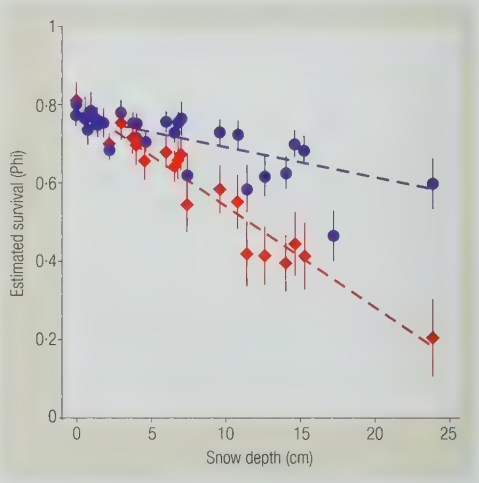


Figure 22
Changes in survival of the grey (blue) and the brown (red) morph of the Tawny Owl (Strix aluco) *in Finland in relation to snow depth (cm). The lines are the linear regression lines. The error bars are SE. Adapted from Karell* et al. *(2011).*



Red-billed Gull
Larus scopulinus
[Illustration by Ian Lewington]

(Yom-Tov 2001), and various alternative explanations could not account for these trends. This pattern was further confirmed in a number of breeding bird species in the UK over a period of 40 years (Yom-Tov *et al.* 2006) and in migratory birds in Pennsylvania over a period of 50 years (Van Buskirk *et al.* 2009b). However, no such pattern was found in extensive data on locally hatched juveniles of twelve species of birds in Central Europe (Salewski *et al.* 2010). Thus, while there is evidence for reductions in body size of birds in response to climate change, the findings are not all consistent. It remains to be seen whether these inconsistencies result from differences in sampling, geographical differences in climate change, or other factors. Whether these changes in body size represent phenotypic or genetic changes also remains largely unknown. One study that was able to distinguish the two types of change involved Red-billed Gulls (*Larus scopulinus*) in New Zealand during 1958–2004, and showed a 4% decrease in mean body mass as temperatures increased. In this case the change could be shown to have come about through phenotypic plasticity rather than genetic changes, underscoring the general pattern that commonly observed responses to climate change may arise from plastic adjustments rather than evolution (Teplisky *et al.* 2008). Thus, this example provides evidence than changes in size can be entirely phenotypic rather than genetic.

Climate effects at the population level

Climate change and population dynamics



Emperor Penguin
Aptenodytes forsteri
[Illustration by Francesc Jutglar]

There is little doubt that climate can affect behaviour, reproduction, survival, migration and dispersal of individuals. However, that does not necessarily mean that these individual effects will trickle up to the population level and have an impact on population dynamics. How might climate impact population size? Several alternative mechanisms need careful consideration. For example, climate may have either density-independent or density-dependent effects, depending on whether the fraction of individuals affected by climate is independent of their density (e.g. through extreme weather events causing mortality), or has greatest effect at low and high densities (e.g. through an impact on food availability). We also need to consider whether climate mainly affects reproduction, or mainly survival. Last, we need to consider whether climate mainly affects the mean of demographic values such as population size or reproductive success, or rather their variance. For example, climate may, through its effects on food availability, change mean reproductive success. But as already described, extreme climatic conditions can also dramatically increase the fraction of individuals without reproductive success, thereby increasing the variance in demography among individuals. These alternatives can have significant impacts on expected population responses, as we shall see below.

Population regulation may act during the non-breeding season, either through climatic conditions or through the effects of population density on non-breeding mortality (Lack 1954). Alternatively, populations may rather be regulated by climatic conditions affecting productivity, and hence the number of recruits entering the breeding population. There is an extensive literature analysing effects of weather on population sizes of birds, and a review (Sæther *et al.* 2004) has shown that weather has important consequences for changes in mean demographic variables (such as population size and composition), environmental stochasticity (environmental events affecting the entire population) and demographic stochasticity (variation in demographic parameters among individuals). It also showed that weather has clear effects on density-dependence: northern temperate altricial species such as tits tend to have their populations regulated by winter climatic conditions, whereas it is weather during the breeding season that tends to regulate populations of precocial species such as ducks and partridges.

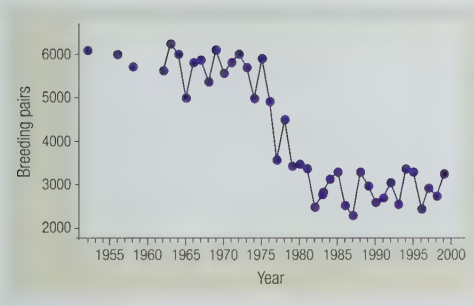


Figure 23
Change in population size of the Emperor Penguin (Aptenodytes forsteri) *in the Antarctic due to changes in ice conditions of the Southern Ocean. Adapted from Barbraud & Weimerskirch (2001).*

The diversity of population responses to climate change is large (Sæther & Engen 2010). Three examples will suffice. The first concerns Emperor Penguins (*Aptenodytes forsteri*), which breed on the Antarctic ice shelf. There has been a dramatic decline in population size of Emperor Penguins associated with a decline in ice cover (Figure 23), with adult survival strongly affected by sea ice conditions and temperature during winter (Barbraud & Weimerskirch 2001, Masson-Delmotte *et al.* 2003, Jenouvrier *et al.* 2005). Because population growth is mainly determined by adult survival, the negative impact of climate change on survival has reduced the population size by half. However, breeding success improved when population size declined, because less competition allowed Emperor Penguins to forage closer to their colonies. Nonetheless, because population size is determined by adult survival, this

improved breeding success has not led at an increase in population size in recent years (Jenouvrier *et al.* 2005, 2009). In contrast to Emperor Penguins, other Antarctic penguin and seabird species have responded differently to these changes in local climatic conditions (Jenouvrier *et al.* 2003, 2005, Forcada *et al.* 2006). This shows that climate change can affect different demographic traits such as reproduction and survival in opposite directions, with complex effects on population size and population growth.

A second example concerns spatial patterns in population dynamics of tits and European Pied Flycatchers. We can understand the spatial dynamics of populations of these species because they have been studied in numerous places for decades. Surprisingly, even neighbouring populations in the Netherlands can show a ten-fold difference in the impact of temperature on local recruitment (Grøtan *et al.* 2009). When analysing the amount of variance in local population dynamics of Great and Common Blue Tits explained by climate, after accounting for density-dependence and demographic stochasticity, there was large variation among populations, even to the extent that climate may affect different populations in different directions (Sæther *et al.* 2007). Some of the variation in the importance of climate is explained by latitude (Sæther *et al.* 2003): while the North Atlantic Oscillation (NAO) only weakly affected dynamics at low latitudes, this effect increased strongly at high latitudes. Among Great Tit populations, NAO explained a larger proportion of the variance in annual size at higher latitudes, while in European Pied Flycatchers there was no latitudinal effect because the proportion of environmental variation in population dynamics also increased with latitude. What mechanism might explain such temporal patterns in effects of climate on population dynamics? One possibility is suggested by the finding that population declines in European Pied Flycatchers in the Netherlands occurred in sites with late food peaks and hence a mistiming between food peak and timing of breeding, while early-breeding populations that did not mistime their reproduction remained stable (Both, Bouwhuis *et al.* 2006).

Population dynamics can be affected not only by processes within a given population, but also by immigration from elsewhere. However, dispersal and immigration rates are generally poorly known. A convincing example of the role of immigration comes from White-throated Dippers (*Cinclus cinclus*), which have experienced population size increases as a consequence of climate change. Cold winters are the main cause of mortality in the species (Sæther *et al.* 2000), and population increases during warm springs are attributable not only to improved success of locally hatched juveniles, but also to higher recruitment of immigrant yearlings from other populations (Figure 24). A surprisingly similar situation has been observed in Great Tit populations in the Netherlands, in which both local recruitment rate and immigration rate were positively affected by environmental variables (Grøtan *et al.* 2009).



European Pied Flycatcher
Ficedula hypoleuca
[Illustration by Norman Arlott]

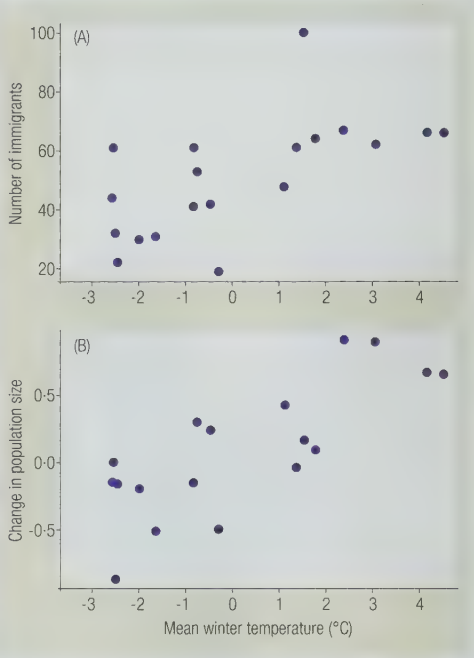


Figure 24
Change in (A) number of immigrants and (B) population size of the White-throated Dipper (Cinclus cinclus) *in a Norwegian population in relation to mean winter temperature (°C). Adapted from Sæther* et al. *(2000).*

Climate change and interspecific competition

Climate change will affect the relative abundance and the composition of different species, through its effects on timing of reproduction and changes in range size. This should in turn lead to changes in the intensity of interspecific competition. A clear example of interspecific competition comes from Dhondt's (1977) classic experiments on tits. These showed that Common Blue Tits consume the early life stages of caterpillars, which therefore never have a chance to grow up and hence become suitable food for the larger Great Tit. More recently, this interspecific competition for food has been shown to be affected by climate, since its intensity varies both among populations and with respect to local climate change (Dhondt 2011).

Climate change can also alter competitive relationships between resident and migratory birds, through its effects on timing of breeding or population density of the competing species. A potential example concerns competition for nest-holes in Europe between resident Great Tits and migratory European Pied Flycatchers that winter in tropical Africa (Ahola *et al.* 2007). Competition arises from individuals of the two species fighting over boxes in limited supply, often with a fatal outcome for one of the individuals. As the interval between laying date of European Pied Flycatchers and Great Tits has decreased due to climate warming advancing the arrival date of European Pied Flycatchers, the number of cases of European Pied Flycatchers dying in the attempt to take over a box of a Great Tit has increased. A higher density of European Pied Flycatchers exacerbated this effect, and the density of each species was respectively determined by climate in Africa for the migrant flycatcher, and climate in Europe for the resident tit.

Both of the foregoing examples provide clear evidence that shifts in the balance of competitive interactions between species are another consequence of climate change.



White-throated Dipper
Cinclus cinclus
[Illustration by Hilary Burn]

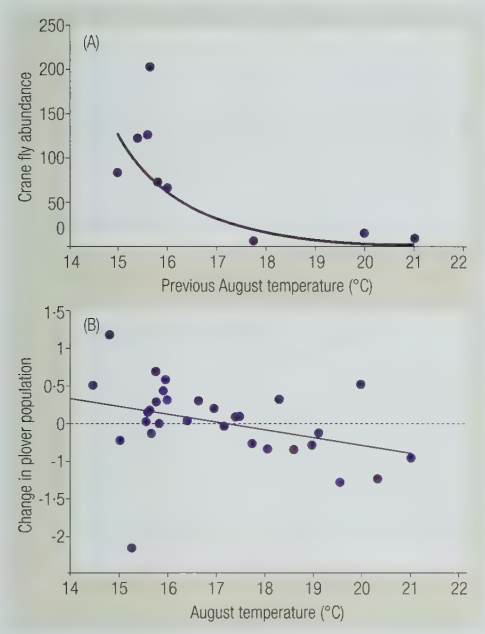


Figure 25
Change in (A) abundance of tipulid prey and (B) population size of Eurasian Golden Plovers (Pluvialis apricaria) *in relation to August temperature (°C). The lines are polynomial and linear regressions.*
Adapted from Pearce-Higgins et al. *(2010).*

Climate change and predation

Predators survive by consuming prey, be they krill (*Euphausiacea* sp.) consumed by Emperor Penguins, tipulids by Eurasian Golden Plovers (*Pluvialis apricaria*), herring (*Clupea harengus*) by Atlantic Puffins (*Fratercula arctica*), caterpillars by Great Tits, or Great Tits by Eurasian Sparrowhawks. This diversity of predator-prey interactions can be affected by climate change in direct and indirect ways, and with significant consequences for populations and communities (Bretagnolle & Gillis 2010). The relationship between the abundance of prey and their predators depends both on the functional response (reflecting how the abundance of prey changes in response to consumption by predators), and the numerical response (changes in abundance of predators as a consequence of prey being consumed by and thus converted into predators). Both these responses can be affected directly and indirectly by climate change. The main factors involved are changes in (1) the distribution of prey and predator, (2) the phenology of prey and predator, (3) the population density of prey and predator, and (4) changes in behaviour of prey and predator.

The evidence to date for these four factors is as follows. First, changes in the distribution (in both space and time) of prey and predators may occur as a consequence of one or both parties responding differently to climate change, for example owing to different feeding ecology. Brommer & Møller (2010) showed that insectivorous birds, and in particular terrestrial herbivorous birds, have expanded their range margins the most under recent climate change; however, there was no evidence for differences in range expansion between birds of prey and insectivorous or granivorous birds. Second, an effect of phenology has been shown by Thackeray *et al.* (2010), who found a stronger phenological response of secondary consumers (predators) than primary consumers (herbivores), implying an increasing degree of phenological mismatch for the former (Visser *et al.* 2004). Even studies of bi-trophic food webs (birds and their predators) or tri-trophic food webs (insects, insect-eating birds and their predators) suggest that predators have responded less than their prey (Nielsen & Møller 2006, Both *et al.* 2009). Third, evidence for an impact of climate change on predator and prey density comes from Pearce-Higgins *et al.*'s (2010) work on Eurasian Golden Plovers, which have been affected by climate change-induced changes in the density of their tipulid prey (Figure 25). Fourth, what is the evidence that climate change could affect predator and prey behaviour? To date no studies appear to exist showing that climate-induced changes in behaviour or morphology of prey or their predators have affected predator-prey interactions. One possible scenario we might predict is that the decrease in body size of many bird species linked to recent climate warming (Yom-Tov 2001, Yom-Tov *et al.* 2006, Van Buskirk *et al.* 2009b) may change the prey species preference of predators.

Irrespective of the mechanism, the effects of climate change on predator-prey interactions are likely to depend on whether predators are specialists on one or a few prey species, or generalists consuming a wide variety of prey. Generalists should be relatively unaffected by climate change, because they can switch from one prey species to another if any of their main prey species changes in abundance. However, such prey switches are then likely to affect not only competition among different prey species, but also competition among coexisting predator species. Increasing evidence supports such complex ecological interactions responding to climate change. For example, Millon *et al.* (2009) studied Eurasian Sparrowhawks in Denmark, where their main prey species are the Common Blackbird and the Eurasian Skylark (*Alauda arvensis*). An increase in the abundance of blackbirds was followed by an increase in consumption by the sparrowhawk, resulting in a numerical response through increased sparrowhawk population size, which in turn reduced the abundance of the closely related Song Thrush (*Turdus philomelos*) to very low levels. A study of a specialist vole predator showed that climate change had a ten-fold stronger impact on the Eurasian Buzzard (*Buteo buteo*) than on vole abundance (Lehikoinen *et al.* 2009). Interestingly, the Eurasian Buzzard breeding at the northernmost limit of its range in Finland did not benefit from climate change despite increasing winter temperatures that should have advanced breeding, apparently because cold summer temperatures caused reductions in chick productivity and survival. An example of effects of climate on more than a single predator species comes from a study of two specialist predators, the Long-tailed Skua (*Stercorarius longicaudus*) and the Snowy Owl (*Nyctea scandiaca*), which feed almost entirely on nearctic collared lemmings (*Dicrostonyx groenlandicus*). While there were clear fluctuations in predators and prey until 2000, the density of lemmings subsequently remained very low, leading to a complete absence of Snowy Owls, and Long-tailed Skuas are predicted also to experience severe declines (Gilg *et al.* 2009). These effects were hypothesised to have arisen from climate change affecting the abundance of prey and, therefore, the abundance of predators.



Snowy Owl
Nyctea scandiaca
[Illustration by Tim Worfolk]

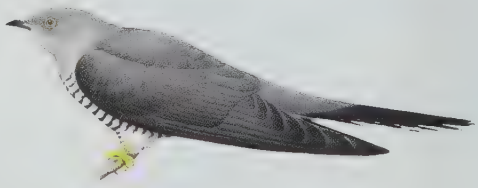
Climate change and host-parasite interactions

Parasites and infectious diseases are common causes of mortality in birds, albeit poorly studied ones. One way in which parasitism could be climate-dependent is that parasites that live away from their hosts for some of their life cycle necessarily depend on climatic factors such as temperature and rainfall. Therefore, climate change will affect the timing of emergence of many parasites, and hence also influence which part of the year parasites are active and can use for reproduction (Dawson *et al.* 2005, Hudson *et al.* 2006). Indeed, several bird ectoparasites, such as louseflies now emerge significantly earlier than just a few years ago (Møller 2010). Such advances in date of emergence also apply to ticks, fleas and other ectoparasites, and to vectors of blood parasites such as blackflies and mosquitoes (Merino & Møller 2010, Møller 2010).

Parasites impose fitness costs on their hosts either by using resources that hosts could otherwise have used for themselves, or by inflicting pathological damage. Extensive studies of humans (Guégan *et al.* 2003, Guernier *et al.* 2004) and birds alike (Møller, Arriero *et al.* 2010) have shown that parasites inflict more severe costs on their hosts in the tropics. This latitudinal trend is apparently due to parasites maintaining high population densities throughout the year in warm climates, whereas at high latitudes, severe winters reduce parasite population size and rate of reproduction. In birds, nestling mortality caused by parasites increases from the northern temperate zone to the tropics (Møller, Arriero *et al.* 2010). Regardless of latitude, increasing temperatures could be expected to result in an increase in virulence (i.e. the impact of parasites on the fitness of their hosts), because more parasite generations can fit into a longer growing season, resulting in an increased rate of parasite evolution. If so, then we should expect virulence to increase with global warming. Effects of increased virulence could be worsened if climate change negatively affects the condition or the nutritional status of the host, thus weakening their immune responses. Recent evidence for rapid changes in virulence came from a study of Barn Swallows, which experienced (by contrast) decreasing per capita costs of parasitism from tropical fowl mites (*Ornithonyssus bursa*) (Møller 2010) over a period of 30 years. Moreover, parasites can also have particularly negative effects on their hosts during adverse environmental conditions (de Lope *et al.* 1993, Merino & Potti 1996). This may help explain how parasites interact with climate to synchronise changes in population numbers of Rock Ptarmigan (*Lagopus mutus*) across different geographical locations in the United Kingdom (Cattadori *et al.* 2005).

Studies of bird parasitism under climate change are particularly important because avian parasites such as those causing malaria and avian influenza may also have implications for human public health. Two recent studies have shown a rapid increase in the proportion of bird hosts infected with malaria and other blood parasites (Møller 2010, Garamszegi 2011). First, two species of blood parasites of the genera *Haemoproteus* and *Leucocytozoon* in the Barn Swallow more than doubled in abundance over a period of 20 years (Møller 2010). Second, an analysis of all studies of blood parasites in birds similarly revealed a strong temporal trend towards increasing prevalence of blood parasites, especially after 1990, when climate change started in earnest (Garamszegi 2011). These findings, albeit preliminary, suggest that blood parasites may increase in abundance with potentially negative impacts on their hosts. Blood parasites have already had significant negative impact on endemic bird populations in Hawaii and New Zealand, and climate change may allow mosquito vectors to move to higher altitudes, reducing the remaining populations of endemic birds that are currently surviving in forest remnants at high altitudes (Benning *et al.* 2002, Tompkins & Gleeson 2006).

The Common Cuckoo (*Cuculus canorus*) and its hosts provide a particularly illuminating example of the effects of climate change on parasites. Arrival dates of long-distance and short-distance hosts have advanced at different rates, with short-distance migrants advancing on average by 0·38 days per year and long-distance migrants by 0·16 days per year (Saino *et al.* 2009). Because the cuckoo is also a long-distance migrant, it has only advanced its arrival date by 0·13 days per year, thus becoming increasingly mistimed with its short-distance migratory hosts. In countries with no change in spring temperature, cuckoos used short-distance migratory hosts in about 80% of parasitized nests, but in countries with the strongest increase in spring temperature, this declined dramatically to only 5% of parasitized nests (Figure 26; Møller, Saino *et al.* 2011). If analysed in terms of change in use of short-distance migratory hosts in relation to their previous levels, countries with no change in spring temperature were predicted to experience an increase in frequency of short-distance migrant hosts by 20%, while the frequency of short-distance migrant hosts in countries with the greatest increase in spring temperature would decrease by an astonishing 60% (Møller, Saino *et al.* 2011). Cuckoos have host races (also often known as "gentes")



Common Cuckoo
Cuculus canorus
[Illustration by Ian Willis]

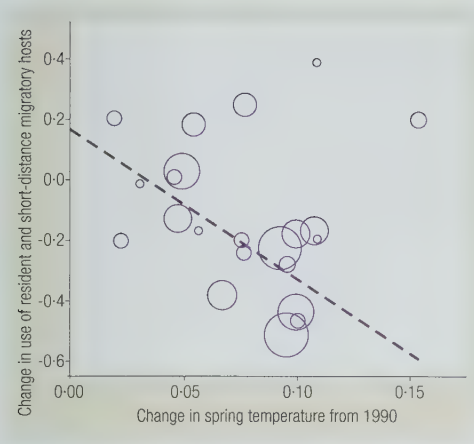


Figure 26
Change in the frequency of parasitism of short-distance migratory birds by the Common Cuckoo (Cuculus canorus) *in relation to change in spring temperature (°C) in different European countries. The size of symbols reflects sample size. The line is the linear regression line.*
Adapted from Møller, Saino et al. *2011.*

specialised to exploiting different host species by mimicking their eggs in terms of colour and volume. The above findings suggest that host races that rely on short-distance migrants such as Meadow Pipits (*Anthus pratensis*), Northern Wrens (*Troglodytes troglodytes*) and European Robins may decrease radically in abundance and ultimately go extinct. This is serious because host races such as those exploiting Common Redstarts (*Phoenicurus phoenicurus*) differ by more than 2% between northern and southern populations, clearly comprising evolutionary important cryptic genetic diversity that exceeds the levels generally considered to reflect divergence at the species level (Johnsen *et al.* 2010).

Climate change may not only affect parasites, but also the ability of their hosts to defend themselves by means of immune responses. Components of the immune system depend strongly on the condition of the host, and any deterioration in climatic conditions can have severe negative effects on the ability of birds to produce an immune response. Indeed, size of the spleen and cell-mediated immunity are reduced in years with adverse weather conditions (Møller & Erritzøe 2003, Merino & Møller 2010), although at present we have no long-term data on immunity in relation to global climate change.

Climate change and extinction risk

The vulnerability of bird populations and their ultimate risk of extinction may depend on climate change. Many ecologists have addressed questions about the extinction risk of populations, trying to provide reliable answers for decision-makers. Most recently Sæther *et al.* (2005) used data on the probability of individuals being recruited into the population to quantify extinction risk for different species. Environmental stochasticity (environmental events affecting the whole population, such as climate change) had the strongest immediate effect on the risk of extinction in birds, while long-term population persistence was most strongly affected by population growth rate. Species with smaller clutches were predicted to have the longest persistence, because stochastic effects on population dynamics were less severe in species with small clutches. Modelling exercises disregarding such stochastic effects have suggested that a large proportion of species may run the risk of extinction (Thomas *et al.* 2004), although the reliability of these projections remains poorly known. Extinction caused by climate change or other factors has important consequences beyond the species involved, since extinction processes may affect wider ecosystem processes (Sekercioglu *et al.* 2004). Even species that are currently common may become extinction prone in the near future, with significant consequences for ecosystem processes such as decomposition, pollination and dispersal of seeds. Two recent studies highlighted the immediacy of potential climate-induced extinction. First, Sekercioglu *et al.* (2008) suggested that a large percentage of bird species inhabiting high altitudes in mountain ranges may risk going extinct as the weather changes and plant communities move upslope. Second, Huntley *et al.* (2010) judged that the risk of extinction among South African birds is greater than previously thought. However, such predictions are fraught with uncertainty because many factors other than climate will affect future distributions of species, making it difficult to assign causality to different potential drivers of extinction (e.g. Vallecillo *et al.* 2009). Moreover, extinction risks entirely based on climate variables and climate change may be exacerbated by other environmental drivers of extinction such as changes in land-use (Brook *et al.* 2008). When making predictions about extinction risks it is crucial to take account of these uncertainties, although this is frequently left aside (Thuiller *et al.* 2004).

With time, real data may come to exist to validate such theoretical predictions about extinction risk. It will certainly be very valuable to closely track changes in population sizes, but in particular to confront such changes with predictions, as environmental conditions enter a phase that has never been seen before in recent history.

Range expansion

Projected changes in distributions and range margins

Future projections of the distribution of species rely either on population viability analysis, which requires very detailed information on demography and population dynamics, or on habitat suitability modelling, which uses information on current distribution to predict the extent of the geographic area that in the future might be occupied by the species. Habitat suitability modelling relies on the observation that climatic

conditions or other factors often predict current distribution ranges quite well, and therefore that we should be able to forecast potential future distributions based on our knowledge of current distributions and future climatic scenarios (Thuiller & Münkemüller 2010). There are many different types of models with their own advantages and limitations, and deviations from assumptions may have large effects on forecasts. One commonly used way to reduce the risk of drawing false conclusions is to use ensembles of climate scenarios—the list of climate change scenarios provided by the IPCC (Anon. 2007c)—rather than a single scenario, when predicting the future distributions of species (Araújo & New 2007).

It is possible to validate the forecasts of such models, and this is often done. One possibility is to test the performance of the model across space or time, for example by comparing predictions with observed population trends, or using retrospective data from the past to project them to current conditions (e.g. Peterson 2003, Araújo *et al.* 2005, Hijmans & Graham 2006, Gregory *et al.* 2009). A slightly different approach is to test a climate-driven model by removing the effects of potential confounding variables one at a time because the effect of each variable can then be partitioned. For example, Vallecillo *et al.* (2009) analysed the effectiveness of a model of bird distribution in relation to land-use change by testing it against another dataset with information on climate and topography as well as land-use. They subsequently analysed the efficiency of fires to predict local colonisation and extinction, showing that exclusion of such important variables as fire can dramatically change the predictions. Hockey *et al.* (2011) provided similar conclusions for South Africa.

Huntley *et al.* (2007) provided the most extensive effort so far to forecast the distribution of the entire European avifauna. This effort based on climate ensemble models provides many interesting insights, but also illustrates how such forecasting sometimes results in extreme situations such as habitats becoming suitable in faraway places like Iceland or Spitsbergen, when in reality dispersal would prevent colonisation of these areas. As well as dispersal, many other factors such as interspecific interactions may prevent such exercises from producing reliable scenarios that can be used in applied contexts such as conservation.

Observed changes in range margins

Ranges of many species of birds have changed during recent decades, as shown by studies in North America, Europe and Africa. In North America, the northernmost range margin of many species is limited by minimum winter temperature limits (Root (1988a,b), and similar patterns are found in Europe (Forsman & Mönkkönen 2003). In South Africa, by contrast, range margins have mainly changed in response to land-use, with little or no direct evidence of effects of climate change (Hockey *et al.* (2011). The north-temperate studies do, however, provide a direct link between climate and distribution, and in these regions we should therefore expect consistent range expansions with increasing temperatures, especially in winter and spring.

The evidence suggests that this is a ubiquitous and common phenomenon (Parmesan & Yohe 2003, Root *et al.* 2003, Hickling *et al.* 2006, Parmesan 2006). Surprisingly, however, published changes in range margins are often modest in magnitude and not statistically significant; this arises from large differences in response among species, with some moving in the "right" and others in the "wrong" direction. One study that did find clear effects was Thomas & Lennon (1999), who used atlas mapping data to show that among breeding birds in the British Isles, those species with southerly distributions advanced their range margins northwards by 1·18 km per year, while species with northerly distributions did not contract their range margins in the south. These estimates were obtained by adjusting for the fact that range margins and population sizes may change simultaneously. This is necessary because it would be unsurprising if a species expanded its range when its population size doubled, but completely surprising if a species expanded its range while simultaneously declining. The latter would provide much more convincing evidence for a role of climate change, making it crucial to control estimates of effects of climate for effects caused by changes in population size and hence dispersal to other parts of the range. Subsequent analyses for Finland showed an even larger advance of 2·69 km per year for southernmost range margins, but again no significant change for northernmost range margins (Brommer 2004). Likewise, analyses of changes in range margins in the US have shown consistent changes in southernmost range margins alone: in the US east of the Rocky Mountains, ranges have advanced by 2·35 km per year east of the Rocky Mountains (Hitch & Leberg 2007), and by 0·64 km per year for New York State (Zuckerberg *et al.* 2009).

These changes all appear relatively modest given the extreme flying ability of most birds, especially their annual migrations of often thousands of kilometres. How-

ever, the foregoing studies all used distributions as mapped by bird atlases; bird censuses, by contrast, may provide superior data for quantifying changes in range margins. Devictor *et al.* (2008) used breeding bird census data from France to estimate a mean shift northwards for the entire breeding bird community of 5·35 km per year, which is considerably larger than the estimates listed above. A possible explanation is that many species in France are close to their southernmost distribution limits, and therefore most susceptible to climate-related effects.

How general are the changes in range margins observed to date? To answer this question, it is useful to know the degree of variation and consistency in the findings of different studies across different regions. Several species were shared between the foregoing four studies of change in range margins, allowing Brommer & Møller (2010) to calculate how consistent findings were among studies. Surprisingly, there was no statistically significant consistency among studies of the same species (Brommer & Møller 2010), implying that if a species shifted north by, say, 10 km per year in the UK, it was unlikely to do the same in Finland. Similar conclusions were reached when controlling for change in range size. These results imply that changes in range margin will depend on idiosyncratic features of local populations, and that it will be very difficult to predict how range margins will respond to climate change.

Even if species are not very consistent in how their range margins change, different categories of species might be broadly consistent, owing to their shared ecological characteristics. Indeed, an analysis of Finnish breeding birds found that groups defined by feeding ecology, migration and habitat were consistent in how their range margins expanded in response to climate change (Brommer 2008). This analysis was subsequently broadened by searching for similar patterns across the four geographical regions listed above (Brommer & Møller 2010). This showed that for Finnish species with a southern distribution, feeding ecology predicted a small fraction of range expansion, especially in seed-eaters and species using aquatic habitats. In contrast, there were no such effects in the UK or the US. Analyses of the Finnish data revealed more change in range margins in insectivores and terrestrial herbivores, as well as in partial and short-distance migrants. Thus there is a certain amount of evidence for the importance of feeding ecology in determining range shifts.

However, other factors could also affect changes in range margins: these might include life history, dispersal distance, thermal range and brain mass (a surrogate for cognitive abilities). To date there is only scant evidence that such traits can predict a species' rate of change: analyses of data from Finland and the UK provided weak evidence that small brain mass was associated with larger range margin expansion, and yet weaker effects of adult survival rate and body mass (Brommer & Møller 2010).

Finally, population trends may have impacts on changes in range margins because an increasing population will produce more emigrants that will disperse elsewhere and thus contribute to range expansion. Brommer & Møller (2010) analysed range margin expansions in relation to population trends in the four studies listed above. There was evidence of a clear positive relationship for species with southern distributions in Finland, the UK and the US, implying that southern species with an increasing population expanded their range margins the most.

Many of the findings reported here suggest that ecological characteristics and population trends are only poor predictors of change in range margins. The majority of studies of change in range margins are based on atlas projects that often have changing definitions of breeding records, and the research effort in each census plot is often inconsistent, albeit with a trend for more effort over time. Thus the data used for range shift analyses may be less than ideal, giving rise to noisy results and conclusions. Clearly the use of extensive breeding bird censuses using standardised methods, as done by Devictor *et al.* (2008), will be the best way forward, especially if estimates for different species can be derived.

Dynamics at range margins

Expansions in range margins are of course made up by the movements of individual birds, but as yet we know very little about whether these individuals differ from the population as a whole. Which are these mobile individuals and what are their characteristics? Are they individuals with extrovert and exploratory personalities? Are they individuals predisposed to be highly dispersive? These questions still need answering.

We can however speculate about which geographical sections of populations are likely to be most affected by climate change. Clearly, some populations at the edges of distributions have changed, as shown by alterations in range margins, but we might further expect that greater fluctuations should occur in populations at the southern compared to the northern margins of a species' range. This is because it is at the south-

ern margins of populations that climate change should generally have been more severe due to increasing temperatures reaching threatening levels, pushing species closer to their extreme limits of heat tolerance. In support of this prediction, as noted above, Brommer & Møller (2010) found stronger evidence for changes in the range margins of species with a southern distribution, and this effect was consistent across studies in Finland, the UK and the US. Models based on future climate change scenarios ("consensus ensemble forecasts") for this century similarly predict that climate change will have particularly strong consequences for the loss of biodiversity in southern Europe, with gains in biodiversity at high altitudes and latitudes (Thuiler *et al.* 2011).

What is the mechanism behind these fluctuations? All organisms have a fundamental niche that reflects the environmental conditions under which they are able to thrive. The actual environmental space a species occupies is partly determined by tolerance to heat and other abiotic factors, and the results described above certainly do imply a link between temperature and population fluctuations, even though birds are homeothermic (body temperature relatively constant). The underlying mechanism relating temperature to population dynamics may be that fluctuations in food availability are greatest at the southern limit of breeding ranges (Pearce-Higgins *et al.* 2010).

Effects at the level of communities

Generalists and specialists

Birds vary enormously in their niche width and hence their degree of specialisation, and this should be expected to influence their susceptibility to climate change. A species' degree of specialisation can be quantified by its distribution across a range of predefined habitats recorded during standard bird censuses such a point counts (Julliard *et al.* 2003). For example, a specialisation index based on 18 habitats in France ranged from a value of 0·23 in the generalist Common Blackbird to 1·16 in the specialist Eurasian Skylark. In this study, specialists were more common in a given locality if the rest of the community was also specialised, and most species reached maximum abundance when the community in which they occurred had a specialisation index similar to their own index. Therefore, as habitats become degraded, habitat generalists come to predominate, and the overall level of specialisation of the community decreases. In France, specialists have been declining much more since 1990 than generalists, even when controlling statistically for other variables such as climatic requirements and life history, and this decline was probably caused by habitat degradation (Jiguet *et al.* 2007). This makes sense since most communities in environments influenced by humans are to a large extent composed of generalists, while specialists, owing to their peculiar habitat requirements, are poorly adapted to changing environments. Taken together, these results suggest that specialist species will be the most severely affected by climate change and consequent habitat degradation and domination of generalist species.

Impoverished communities

Climate change may affect different populations or species in different ways, with consequences for the composition of communities of birds (Stralberg *et al.* 2009). Extensive modelling has suggested that species richness may decline as a consequence of climate change (Huntley *et al.* 2007, Jetz *et al.* 2007). Changes in distribution of species derived from the European climatic bird atlas (Huntley *et al.* 2007) were used by Gregory *et al.* (2009) to predict large-scale patterns of population change for birds in Europe, and these predictions were subsequently tested against observed population trends of species with expanding and shrinking breeding ranges. The results showed that population trends of species benefiting from climate change and species suffering from climate change have grown increasingly more different over the last 20 years, again suggesting substantial climate-induced changes in community composition. In a similar vein, Pounds *et al.* (1999) reported strong declines in species richness for Monteverde in Costa Rica, in this case owing to reduced dry-season mist causing changes in altitudinal limits of montane specialist birds.

The thermal range of individual species will clearly affect such changes in community structure, but those species worst affected may be most likely to come from groups with particular food sources or life histories (Devictor *et al.* 2008). Climate change may particularly impact long-distance migrants that are generally insectivorous, through its effects on the abundance and diversity of invertebrates. Such pre-

dicted changes in communities can be confronted with observed changes in an attempt to test how well actual observations fit predictions. Lemoine *et al.* (2007) and Lemoine & Böhning-Gaese (2003) showed a declining abundance of migrants in the Lake Constance area as predicted from spatial variation in abundance across Europe, providing one of the few examples where observed community composition has been found to reflect the prediction, even when considering several other possible explanations for a decline in abundance of migrants.

Conservation implications of climate change

Which are the species that are particularly susceptible to climate change?

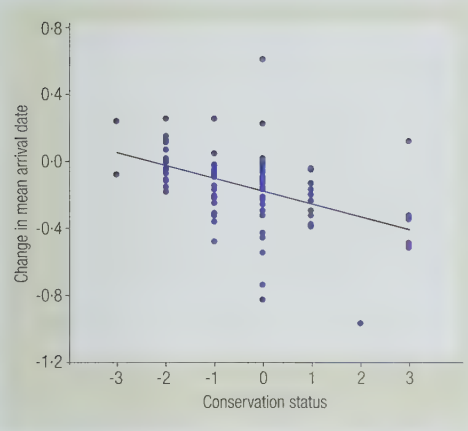


Figure 27
Change in arrival date (days per year) in relation to conservation status of European bird species. The line is the linear regression line.
Adapted from Møller et al. *(2008).*

Climate change clearly has important implications for conservation, given the expected (or indeed already observed) effects of climate change on population declines and risk of extinction. This is starkly illustrated by the finding that species that have failed to respond to climate change are precisely those that have shown the strongest recent declines in population size (Figure 27; Møller *et al.* 2008). These declines were specifically recent ones, subsequent to 1990, which is when climate change started to become most severe. This is strong evidence that it is specifically these species' absence of response to climate change that is responsible for their decline, rather than some other factor. Other possible factors that are commonly related to population declines in birds include habitat use (such as whether species occur in agricultural landscapes), the northernmost limit of a species' breeding ranges, and its body size, but none of these detracted from the climate change effect in Møller *et al.*'s (2008) study. We can take this analysis one step further by considering whether species that have shown such effects have any shared characteristics that put them at particular risk, such as use of agricultural habitats and long-distance migration.

Agricultural intensification is thought to be responsible for declines in abundance of temperate birds living in agricultural habitats (Fuller *et al.* 1995). However, very few studies have investigated the combined effects of climate change and agriculture on population trends of birds. Møller *et al.* (2008) showed a significant negative effect of agriculture for the period 1970–1990, but not after 1990 when response to climate change became the main statistical predictor of population trends. This is as expected because agricultural intensification was particularly strong during the first period (Fuller *et al.* 1995, Burfield & van Bommel 2004), although an alternative interpretation is that agricultural modification of bird populations during that period may have reduced populations so much that no further changes have happened.

Long-distance migratory birds have shown dramatic declines in recent years (Sanderson *et al.* 2006), but since long-distance migrants have also shown weaker responses to climate change (Lehikoinen *et al.* 2004, Lehikoinen & Sparks 2010, Végvári *et al.* 2010), it is interesting to try to partition the role of climate change from the role of other factors affecting population declines of long-distance migrants. This can be done by considering the two simultaneously in the same statistical model, which revealed that declines in populations of long-distance migratory birds were actually relatively weak when the response to climate change is taken into account (Møller *et al.* 2008). This suggests that climate change is the key factor. A study from the Netherlands also emphasised the role of climate over migration per se: long-distance migrants in forests declined more than those in marshes, owing to a stronger effect of climate on the seasonal food peak in forests than in marshes (Both *et al.* 2010). Further correlational support for an effect of climate was the fact that population declines were the strongest in Western Europe, where spring temperatures have increased the most.

A final factor that seems likely to affect a species' susceptibility to climate change is the latitudinal range of its distribution. Indeed, bird species with a northerly breeding distribution have shown greater population declines than species with a more southerly distribution (Julliard *et al.* 2003). More northerly species may be more susceptible to climate change owing to the greater negative effects of climate change on biological diversity (which may include, for example, their food supplies) at northern latitudes (Parmesan & Yohe 2003).

In order to improve our future understanding of the factors affecting the susceptibility of different species to climate change, it is important to consider how best to monitor the consequences of climate change for bird populations. The efficiency of bird monitoring programmes as means of studying bird populations has been analysed by relating interspecific variation in population trends (as assessed by monitoring programmes) to changes in potential breeding range between the late 20th and late 21st centuries, as forecasted by climate envelope models (Gregory *et al.* 2009). Spe-

cies that were predicted to increase the size of their breeding range increased in population size as shown by the European bird monitoring programme, whereas species predicted to decline in range size decreased in population size. Moreover, an index of the impact of climate change on overall trends in bird populations also increased rapidly during the last 20 years, when climate changed particularly rapidly. These findings are encouraging in the sense that they suggest that existing monitoring programmes are capturing biologically meaningful data on population trends. However, the recent acceleration in population declines, coinciding with the worsening of recent climate change, needs careful examination to tease apart the effects of climate change from those of other potentially confounding or interacting factors. This is because numerous other factors have also increased in severity during the last two decades, including intensification of agriculture, forestry and fisheries, and increased urbanisation and pollution. Indeed, two studies of seabirds have shown that significant interactions exist between the effects of climate change and other factors including fisheries (Barbraud *et al.* 2008) and agriculture (Møller *et al.* 2007). Given how many threats to the viability of bird populations have increased in the last 20 years just as climate has, caution needs to be taken in interpreting indices such as that described above. Ideally, an index of the impact of climate change should be developed that statistically controls for other potentially confounding drivers of population declines such as those listed above.

A partial attempt at disentangling these multiple confounding factors was made in a study of 61 species of rare breeding birds in the UK (Green *et al.* 2008). Population trends were correlated with trends in climate suitability (as estimated by climate envelope models), and this effect was shown to be statistically independent of several possibly confounding factors including proximity to the European breeding range, body mass, migration and habitat. However, several other variables that are well established to be important drivers of population trends in breeding birds (such as agriculture, forestry, fisheries, urbanisation and pollution) were unfortunately not investigated.

Overall, the relative role of climate change and other possible drivers of global change for bird populations is a major concern. Only a small minority of studies has considered both categories of drivers, so we know virtually nothing about their relative importance. One such study, by Jetz *et al.* (2007), analysed the relative impact of climate change and land-use change on global diversity of birds using the Millennium Ecosystem Assessment scenarios. Even under relatively benign environmental scenarios (taking into account both climate and land-use change), a staggering 400 species are projected to suffer a reduction in range by more than half by 2050, and no fewer than 900 by 2100. However, these dramatic predictions mainly arose from the effects of land-use change, with climate change having a substantial effect mainly at high latitudes. The species in danger of range loss are mainly endemics with narrow ranges in the tropics. However, these analyses may be considered overly optimistic because the geographic ranges of species were assumed to remain stationary over time, whereas in reality range margins are likely to shift owing to climate change. Likewise, the assumption that all bird species will have sufficient time to adapt to climate change seems particularly optimistic given the strong negative relationship between threat status and response to climate change (Møller *et al.* 2007).

These modelling uncertainties imply that we need to look for empirical evidence to assess the issue. Clavero *et al.* (2011) analysed whether climate change indicators can be influenced by changes in land-use that are in fact not directly driven by climate change. They did so by simultaneously examining how strongly indicators of climate change were related to land-use (with respect to land abandonment, fire and urbanisation) as well as to temperature. Surprisingly, the three land-use indices had as strong an impact on indicators of climate change as temperature. This means that changes in land-use can reverse, hide or even exacerbate apparent impacts of climate change if not controlled statistically. Clearly, many studies have been overly naïve by considering that a correlation between a single climate variable and a biological phenomenon would reflect a causal effect of climate alone, when in fact many other temporally varying factors may play an equally important role. These results call for caution in interpreting models that project changes in the abundance or distribution of species based on climate change alone, since they may not prove to be informative in identifying the most crucial conservation issues facing bird populations.

What can we do to mitigate the effects of climate change?

Given the grim outlook imposed by climate change exacerbated by the effects of numerous other global changes, what can we do to reduce the negative impact of climate

change on bird populations? The first objective must be to do rigorous and thorough research to identify the problems. Many amateurs have collected particularly valuable data in the form of ringing records of individual breeding birds over very long periods. Recently I made a compilation of such long-term studies of individually identifiable birds, which showed that there have been more than 200 such studies covering a time period of more than ten years. This is more than the number of comparably long-term studies of all other kinds of animals combined. Many of the studies reviewed in this essay have used such data, through collaborations between amateur and professional biologists. This emphasizes how such data are extremely valuable for analysing the effects of climate change, as well as for addressing many other fundamental scientific questions. There is scope for many more such studies.

Numerous amateurs and professionals contribute to national bird census programmes, one of the objectives of which is to study the effects of climate change on bird populations. Such long-term schemes are extremely valuable for monitoring populations and for generating information on the factors that constitute threats to birds, and therefore to numerous other kinds of animals and plants. There are many fewer such detailed population studies or monitoring programmes in the tropics and the southern hemisphere, and this lack of knowledge is a major obstacle to our efforts to assess and tackle problems of climate change.

There is no time for complacency, because there is a sizeable community of climate change sceptics who only wait for errors to be made. Too many studies show only a relationship between a biological variable and a single climatic variable, while not considering alternative explanations. Numerous global changes occur simultaneously, and each of these needs careful consideration and analysis. This is crucial to avoid making an open invitation to criticism and reducing the credibility of the scientific community at large.

Conclusions

Birds can be viewed as harbingers of climate change, and they are in a way all canaries in the coal mine of our common environment, experiencing dramatic and sometimes irreversible changes. Numerous other global changes have negative effects on birds and other organisms, and they are likely to interact synergistically with the effects of climate change. These combined threats make it much more difficult for birds to adapt phenotypically and genetically to global change.

A prominent question often raised is as follows: why care about birds when hundreds of millions of humans are starving, and hundreds of additional millions are about to appear into the world? Scientific insights that we learn from birds and other organisms may inform general mitigation of climate change. Climate change will impact on humans, but disproportionately so on poor people in developing countries. There are no simple or easy solutions to the problems created by climate change, because they are a consequence of short-sighted human decisions. We must all act at the personal, community, national and international levels to mitigate and reverse these trends. Only through common and concerted action by many people showing an interest in our common environment will it be possible to reverse the continuing decay of our planet, to the benefit of all living beings alike.

Anders Pape Møller

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Bibliography

The full references to the citations included herein can be found towards the back of the volume, in the General List of References.

Introduction to Volume 16

With the present volume we come to the end of our journey through all of the bird families and species in the world. However, HBW does not end here, as we explain below.

Taxonomically, the current volume has in some ways been the most complicated of all, especially in practical terms. The internal arrangements of many families throughout the series have been very complicated, but in this particular volume the complications mushroomed because they stretched across a number of families. The constituent parts of these families have been the subject of disagreement for many decades, but in recent times discussions have come to a head. Numerous studies over recent years, based mainly on molecular analyses, indicate that traditional classifications have treated several groups of species in the wrong families. Although some of these studies were published a good few years ago, most have taken place within the "lifespan" of HBW, and many have been published once most of our Volume 16 authors had already started working on their respective families (some since 1998); in fact, some changes already had implications for families in Volume 15. Although we have been making adjustments to some of the internal family arrangements right up into 2011, it was obvious to us early on that we could not keep chopping and changing the make-up of various families each time a new study was published—nor did we wish to rush into important changes of this sort as soon as they were published, before the ornithological community at large had had time to assess them. Clearly, it was essential for all the authors to know as early as possible which species each was to cover in his respective family—without this base, it was impossible for them even to start their work, and there was still plenty of scope for subsequent tweaking of the internal sequences. A few of the ground-breaking changes from traditional family assignations probably were well enough established to have been taken on board at that time, but we decided that ultimately it would be more confusing for everyone if we adopted just a few of the changes that were being spoken about in the mid-1990s, a sort of half-way house. It is worth noting, too, that some of the ideas that appeared promising around that time have since fallen out of favour.

The long and the short of all this is that we decided that it made most sense to stick to the guiding principles followed in the rest of the series and treat all the various groups and species in their traditional families, where the ornithological public in general would have least difficulty in locating them. As previously stated, HBW's prime purpose is to summarize and present information as a practical reference source, and while many may disagree with various parts of the traditional sequence, at least everybody knows roughly where to start looking for any given taxon. Emberizidae (*sensu lato*) is the only case in the series in which a considerable number of species are covered in what are, from a phylogenetic viewpoint, likely to be the wrong families.

It should be noted that throughout the series, the internal arrangements of families have always been agreed between the authors and editors. In a number of cases, the editors felt that certain proposals by authors were not appropriate for the overall consistency of the series, and we are extremely grateful to all authors over the entire series for kindly and patiently accepting our decisions, and all the shortcomings they may imply. It should also be made quite clear that, again throughout the series, we have done our best to accommodate any preferences expressed by authors regarding English names. However, again for reasons which we think are obvious, the final decisions have been made centrally in the interests of overall consistency throughout the series.

For the last foreword in our series of essays on ornithological themes we felt that one of the most topical subjects of our times could not be overlooked. To this end we decided that we needed a foreword dealing with global warming and its effects on birds. We are delighted to be able to present this essay by one of the subject's leading

researchers, Anders Pape Møller. We think this comprehensive overview brings a fine ending to the series...but wait! There is more to come, as we explain below.

As well as marking the end of the series, this book constitutes the last of the nine passerine volumes. As in the case of the last non-passerine volume, a practical plastic-coated reference card accompanies the volume. This is designed to act as an index to all of the families covered in these nine volumes, enabling readers to locate any of the families in this second part of the series. Different taxonomic views have led to wildly differing sequences, and this is particularly true in the case of the passerines. As a result, even those readers with a good knowledge of avian taxonomy may not always be too sure in which volume a particular group is covered, and it is hoped that the keys on this card will make this task a good deal easier and quicker. To recap on the Introduction to Volume 7 (the last of the non-passerine volumes), there are two ways of using the index. On one side, there is a visual scheme in HBW's taxonomic sequence, in which each passerine family is symbolized by one of its most representative members, followed by the volume and the page number on which the corresponding family section starts. On the other side of the card there is an alphabetical list of the scientific and English names of all of the orders and families covered in Volumes 8-16, as well as the English names of all species groups included in the families.

In addition to these key cards for the non-passerines and passerines, HBW clearly requires a comprehensive index to the entire series, a single source for locating both scientific and English names of all avian taxa dealt with in the series, from subspecies and species up to families and orders, so that a reader interested in any particular taxon can quickly discover on which page of which volume it is to be found. This index to the entire series obviously requires a large number of pages, far too many to add to the current, already-packed volume, so the overall index will appear in a separate, slimmer tome entitled *Special Volume: New Species and Global Index*. As the title suggests, in addition to the overall index, this volume will cover all those species described after the closing dates of their respective volumes. Each of these species will receive a standard HBW species account, along with a disribution map, illustration, and so on. In this way, HBW will ensure that it fulfils its original undertaking to illustrate and cover in detail all the species of birds of the world—with the logical and inevitable exception of those species that still remain to be described to science.

The volume will also include an illustrated chapter covering the notable developments in macrosystematic thinking that have taken place in recent times, discussing current and recent perceptions about the interrelationships of higher taxonomic groups. Much of the recent progress in this field has been made through molecular studies, and a great deal of it has been carried out in the years since HBW began, so this seems a particularly appropriate time for such a summary. Other features that will appear in this Special Volume are still at the planning stage. Full details will be released in due course, both about the contents of this Special Volume and about the various ways in which the HBW project will be maintained constantly up to date online.

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PASSERIFORMES

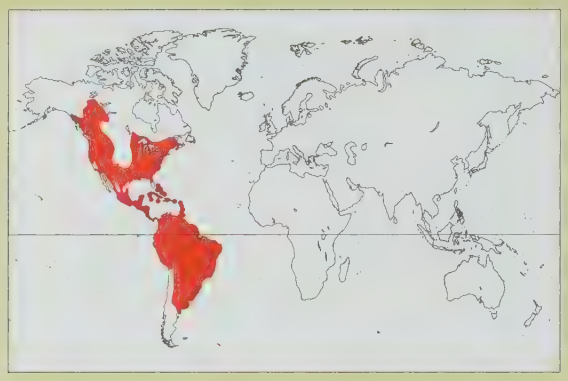
- Eurylaimi
  - Eurylaimidae (Broadbills)
  - Philepittidae (Asities)
  - Pittidae (Pittas)
- Furnarii
  - Furnariidae (Ovenbirds)
  - Dendrocolaptidae (Woodcreepers)
  - Thamnophilidae (Typical Antbirds)
  - Formicariidae (Ground-antbirds)
  - Conopophagidae (Gnateaters)
  - Rhinocryptidae (Tapaculos)
- Tyranni
  - Cotingidae (Cotingas)
  - Pipridae (Manakins)
  - Tyrannidae (Tyrant-flycatchers)
- Acanthisittae
  - Acanthisittidae (New Zealand Wrens)
- Menurae
  - Atrichornithidae (Scrub-birds)
  - Menuridae (Lyrebirds)
- Oscines
  - Alaudidae (Larks)
  - Hirundinidae (Swallows)
  - Motacillidae (Pipits and Wagtails)
  - Campephagidae (Cuckoo-shrikes)
  - Pycnonotidae (Bulbuls)
  - Chloropseidae (Leafbirds)
  - Irenidae (Fairy-bluebirds)
  - Aegithinidae (Ioras)
  - Ptilogonatidae (Silky-flycatchers)
  - Bombycillidae (Waxwings)
  - Hypocoliidae (Hypocolius)
  - Dulidae (Palmchat)
  - Cinclidae (Dippers)
  - Troglodytidae (Wrens)
  - Mimidae (Mockingbirds and Thrashers)
  - Prunellidae (Accentors)
  - Turdidae (Thrushes)
  - Muscicapidae (Old World Flycatchers)
  - Platysteiridae (Batises and Wattle-eyes)
  - Rhipiduridae (Fantails)
  - Monarchidae (Monarch-flycatchers)
  - Regulidae (Kinglets and Firecrests)
  - Polioptilidae (Gnatcatchers)
  - Cisticolidae (Cisticolas and allies)
  - Sylviidae (Old World Warblers)
  - Picathartidae (Picathartes)
  - Timaliidae (Babblers)
  - Paradoxornithidae (Parrotbills)
  - Pomatostomidae (Australasian Babblers)
  - Orthonychidae (Logrunners)
  - Eupetidae (Jewel-babblers and allies)
  - ...
  - ...
  - Pachycephalidae (Whistlers)
  - Petroicidae (Australasian Robins)
  - Maluridae (Fairy-wrens)
  - Dasyornithidae (Bristlebirds)
  - Acanthizidae (Thornbills)
  - Epthianuridae (Australian Chats)
  - Neosittidae (Sittellas)
  - Climacteridae (Australasian Treecreepers)
  - Paridae (Tits and Chickadees)
  - Remizidae (Penduline-tits)
  - Aegithalidae (Long-tailed Tits)
  - Sittidae (Nuthatches)
  - Tichodromidae (Wallcreeper)
  - Certhiidae (Treecreepers)
  - Rhabdornithidae (Rhabdornis)
  - Nectariniidae (Sunbirds)
  - Melanocharitidae (Berrypeckers and Longbills)
  - Paramythiidae (Painted Berrypeckers)
  - Dicaeidae (Flowerpeckers)
  - Pardalotidae (Pardalotes)
  - Zosteropidae (White-eyes)
  - Promeropidae (Sugarbirds)
  - Meliphagidae (Honeyeaters)
  - Oriolidae (Orioles)
  - Laniidae (Shrikes)
  - Malaconotidae (Bush-shrikes)
  - Prionopidae (Helmet-shrikes)
  - Vangidae (Vangas)
  - Dicruridae (Drongos)
  - Callaeidae (New Zealand Wattlebirds)
  - Notiomystidae (Stitchbird)
  - Grallinidae (Mudlarks)
  - Struthideidae (Australian Mudnesters)
  - Artamidae (Woodswallows)
  - Cracticidae (Butcherbirds)
  - Pityriaseidae (Bristlehead)
  - Ptilonorhynchidae (Bowerbirds)
  - Paradisaeidae (Birds-of-paradise)
  - Corvidae (Crows)
  - Buphagidae (Oxpeckers)
  - Sturnidae (Starlings)
  - Passeridae (Old World Sparrows)
  - Ploceidae (Weavers)
  - Viduidae (Whydahs and Indigobirds)
  - Estrildidae (Waxbills)
  - Vireonidae (Vireos)
  - Fringillidae (Finches)
  - Drepanididae (Hawaiian Honeycreepers)
  - Peucedramidae (Olive Warbler)
  - Parulidae (New World Warblers)
  - Thraupidae (Tanagers)
  - Cardinalidae (Cardinals)
  - Emberizidae (Buntings and New World Sparrows)
  - Icteridae (New World Blackbirds)

Class AVES

Order PASSERIFORMES

Suborder OSCINES

Family THRAUPIDAE (TANAGERS)



- Small to medium-sized passerines with medium-length wings, tail, legs and feet; plumage soft, or dense and plush-like; many species colourful, often with complex plumage patterns.
- 9–29 cm.



- Middle and South America, Caribbean, and marginally North America.
- Humid forest, light woodland, borders and shrubby savanna, rarely marshes, open savanna, shrub-desert and xeric scrub.
- 64 genera; 283 species; 788 taxa.
- 23 species threatened; none extinct since 1600.

Systematics

In 1969, an article by R. W. Storer entitled "What is a Tanager?" was published in the journal *The Living Bird*. In his opening paragraph Storer cited a statement written in 1886 by P. L. Sclater, who, while publishing a catalogue of tanagers, wrote the following: "In essential structure the Tanagers are closely allied to the Finches, and it is in any cases exceedingly difficult, if not impossible, to draw a line between the two groups... On the other hand, some of the tanagers have also nearly equally close relations with the Mniotiltidae [Parulidae] and the Coerebidae; and I do not think it is at present practicable to give any absolute characters which would serve to differentiate the birds of these three families in all cases." Storer then added: "Today, Sclater's statement is as valid as it was eighty-three years ago."

Storer, like his predecessor Sclater, groped for solutions, anything morphological or behavioural, or vocal that would unite this uneasy assemblage of birds. Lacking the analytical tools of modern DNA analysis, which would not be developed until two or three decades later, he ultimately made little real progress in furthering an understanding of the limits of the group of birds known as tanagers. Although many ornithologists suspected that tanagers were an artificially erected group with numerous genera that were unrelated to one another, it would be almost thirty more years, following the advent of modern DNA-sampling, before real progress would be made in defining the group. Among the first of these, in the 1990s, were the DNA–DNA hybridization studies of three "coerebid" genera, *Coereba*, *Diglossa* and *Cyanerpes*, by C. G. Sibley and J. E. Ahlquist, who concluded that all three belonged in the tribe Thraupini, which included a large number of tanagers and finches. More recently, using DNA-sequence data, K. J. Burns and a number of other researchers have begun to piece together an entirely new picture of tanager relationships, and some of their findings, and those of others, were startling. Important genera within the family, some that had been heralded as "classic tanagers", and so-called archetypical members of the family, failed their DNA tests. Investigations continue, but there now is strong evidence that about 20–25% of the genera traditionally regarded as tanagers are more closely related to other groups of birds than they are to "typical" tanagers. Moreover, the molecular-genetic analyses indicated that, classified among the emberizids, cardinalids, and the now completely dismantled family Coerebidae, were at least 30 genera that have proven to be much closer to tanager ancestral lines than to the families in which they have long been placed. Several well-known genera, long believed to be finches, among them *Phrygilus*, *Sicalis*, *Poospiza* and *Sporophila*, also proved genetically closest to thraupids. Further, the entire assemblage of coerebids, including *Coereba*, *Cyanerpes*, *Diglossa*, *Dacnis*, *Conirostrum* and *Chlorophanes*, having in the past been included in Coerebidae or spread among as many as three different families, including Thraupidae, have all been shown to align closely within the thraupids in ways not previously suspected by taxonomists, who had relied upon bill morphology and feeding behaviour as clues for relationships. Research continues to refine the limits of this



Few, if any, morphological features are common to all members of the tanager family, Thraupidae. Attempts to relate diet, bill shape and jaw musculature, and colour, pattern and texture of plumage, have failed to define the family. Some tanagers are small and quick, some large and sluggish; some are thin-billed and warbler-like, some heavy-billed and finch-like. The ***White-banded Tanager*** *bears a striking resemblance to certain shrikes* (Lanius) *of northern-temperate regions, which occupy partly open terrain similar to where this tanager is found.*

[*Neothraupis fasciata*, Das Emas National Park, Goiás, Brazil. Photo: Edson Endrigo]



Molecular-genetic studies have found that several genera previously assigned to other families really belong within Thraupidae, while other genera traditionally included within the tanager family belong elsewhere. For example, recent genetic data indicate that the ***Red-billed Pied Tanager*** *is probably not closely related to other thraupids, but no closely related family or sister-taxon has yet been identified. It is one of only two of the more than 250 species originally placed in the family to sport a brightly coloured bill.*

[*Lamprospiza melanoleuca*, Rio Roosevelt Lodge, Novo Aripuanã, Amazonas, Brazil. Photo: Edson Endrigo]

fascinating group of birds, but future arrangements of the tanager family will probably include 30–40% more species than contained in traditional classifications, and will include species that occupy essentially every major habitat in the New World tropics. As the taxonomic dust settles, one fact is becoming clear, namely that few avian families have been so universally misunderstood taxonomically, or have included so many taxa that have proved to be erroneously classified, as the tanagers and allied cardinalids and emberizids.

In the present treatment, tanagers are regarded as constituting a taxonomic family, Thraupidae. In the past, they have been treated sometimes as a tribe, Thraupini, and sometimes as a subfamily, Thraupinae, and one of these lower taxonomic designations could prevail in the future. Irrespective of ultimate classification, tanagers are part of a massive New World oscine radiation of nine-primaried birds that includes well over 800 species placed in some 200 genera. Historically, these species have been divided into five groups or assemblages, each being designated as a tribe, a subfamily or a family depending upon the classification scheme used. Popular books and lists usually show each of these groups as an individual family, for example Icteridae (New World blackbirds), Parulidae (New World warblers), Emberizidae (buntings and New World sparrows), Thraupidae (tanagers) and Cardinalidae (cardinals). When designated as tribes, the five groups are Icterini, Parulini, Emberizini, Thraupini and Cardinalini. Some checklists, such as the Sibley and B. L. Monroe world list, as well as most molecular-genetic research appearing in scientific publications, treat these groups as subfamilies or tribes. The "true" classification of these avian groups has long been the subject of debate among taxonomists, in addition to which the composition of these five groups, and their relationships to one another, remain unsettled. Unfortunately, comparative studies of external morphology, including jaw musculature, pelvic musculature and serology, cranial and palatal characters, and appendicular myology, have yielded only a few characters useful in defining relationships at the tribe, subfamily or family level, and the interpretation of these results is often controversial. Consequently, studies based on morphological relationships have led to conflicting taxonomies and little consensus. More recent molecular-genetic studies appear to have had better success in sorting out relationships at the macrosystematic levels and, more recently, at the species level as well.

Morphological studies have had greater predictive power when assigning taxa to tribes. For example, Icterini and Parulini possess distinctive bill and body morphologies that tend to be more easily distinguished. Problems arise, however, within Thraupini, Cardinalini and Emberizini. Traditionally, taxa were assigned to Cardinalini on the basis of the presence of a large, thick bill, but certain species of Emberizini and Thraupini also have a large, stout bill, leading some taxonomists to regard the Cardinalini as an artificial group composed of species that are probably either thraupine or emberizine. The taxonomic placement of many species based only on bill shape, which is now known to be one of the most highly labile of all avian characters, has remained controversial.

Significant progress in breaking this taxonomic "log jam" has come mainly since 1990, following the widespread use of

Although many tanagers are among the most colourful of all passerine birds, some are quite plain and modestly patterned. The plumage of the ***Brown Tanager*** *bears a close resemblance to that of the* Philydor *foliage-gleaners. Brown Tanagers are often found in mixed flocks with the very similar-looking Buff-fronted Foliage-gleaner* (P. rufum)*, and it has been suggested that the Brown Tanager has become adapted as a social mimic of this species. Its bill, however, is slightly thicker, swollen-looking and blackish in colour. The Brown Tanager belongs to a monotypic genus that is confined to the humid pre-montane and montane forests of south-eastern Brazil.*



[*Orchesticus abeillei*, Itatiaia City, Rio de Janeiro, Brazil. Photo: Edson Endrigo]



Rather like a jay (Corvidae) in appearance and behaviour, the ***White-capped Tanager*** *is one of the largest thraupids. The female is similar to the male, shown here, but her throat and chest are a darker, duskier and less conspicuous crimson. Despite numerous earlier suggestions to the contrary, morphological and genetic data support placement of this species within Thraupidae. The White-capped Tanager belongs to the monotypic genus* Sericossypha*; molecular-genetic studies suggest that this genus and the tanagers of the genus* Nemosia*, such as the Hooded Tanager* (Nemosia pileata)*, as seen in the next picture, are probably sister-taxa.*

[*Sericossypha albocristata*, Río Blanco, Colombia. Photo: Pete Morris]

molecular studies, and has continued to accelerate to the present day. One of the first molecular studies was the work by Sibley and Ahlquist on DNA–DNA hybridization, which began in the 1970s. For the first time, these authors placed in the tribe Thraupini a group of heavy-billed, finch-like birds that had historically been allocated to Emberizini. Additional work by J. Klicka, T. Yuri and others further refined the taxonomic boundaries of the New World nine-primaried oscines, dividing them into five separate clades, more or less equivalent to five tribes or, as in the present treatment, to five families, including the parulids, cardinalids, thraupids, emberizids and fringillids. Techniques for DNA analysis have continued to undergo refinement, and the mantle of obfuscation surrounding relationships within the tanagers, as well as in allied nine-primaried groups, is finally being stripped away. The ultimate goal, that of defining monophyletic lineages in each of the nine-primaried groups mentioned above, is at last close to being achieved. More than 120 years have passed since Sclater articulated his frustration at attempting to define taxonomic limits for the tanagers on the basis of external morphological characters. Now, a solution seems to be at hand.

In the light of rapidly developing taxonomic changes, one problem has been that of how to present the tanager family and allied groups. In the present handbook, in view of the extensive recent research, it has been considered both inappropriate and impractical, as well as potentially confusing for everyone, to be reshuffling various species from one family to another continually in attempts to reflect the most up-to-date perceptions of accurate taxonomic relationships, not only for the tanagers, but also for other avian families. As is apparent in the summary presented below, numerous genera and species have been traded back and forth among the nine-primaried songbird families, and this rearranging of taxa continues.

Consequently, the present treatment will continue to have a traditional appearance for the family. This conservative approach also avoids the complications of English names rendered inappropriate by the transfer of species with the name "Tanager" to other families and vice versa. This systematics section, however, summarizes recent molecular-genetic studies that now broadly outline a new framework of relationships for the tanagers. The remaining sections of the chapter, on the other hand, deal with species traditionally included within the tanager family, although those species now believed likely to belong elsewhere, such as those in the genera *Chlorophonia*, *Euphonia*, *Chlorospingus*, *Mitrospingus*, *Chlorothraupis*, *Piranga* and *Habia*, are, wherever possible, discussed separately.

Using molecular techniques, scientists have made great strides towards an understanding of thraupid systematics. Of particular importance is the molecular work conducted or directed by Burns, and also of notable value is the work of the following researchers: J. E. Ahlquist, A. H. Bledsoe, E. Bermingham, J. Fjeldså, J. García-Moreno, S. J. Hackett, N. K. Klein, J. Klicka, D. A. Lijtmeir, S. C. Lougheed, I. J. Lovette, W. M. Mauck, D. P. McDonald, D. P. Mindell, K. Naoki, R. A. Racicot, C. Rahbek, A. Sato, G. Seutin, C. G. Sibley, J. D. Webster, J. T. Weir and T. Yuri. The contributions of these scientists have, for the first time, enabled real progress to be made in constructing a comprehensive taxonomic framework for tanagers. Despite the employment of different molecular and analytical techniques, the results of these studies show broad agreement, a fact that lends confidence to these new phylogenies. When the findings of various studies do not agree, the problems often can be traced to insufficient taxon-sampling, which produces incomplete results. Earlier studies often were not sufficiently comprehensive, as too few representatives from a family or genus were examined. In phylogenetic studies, missing taxa can have important effects on the ultimate topological structure of a taxonomic tree.

The outline below summarizes important recent molecular-based taxonomic findings with regard to tanagers. Most of these findings are likely to be reflected in future sequential taxonomies, and these results should be kept in mind when reading subsequent sections of this family text, which are based on an older, traditional taxonomic framework.

First, recent genetic data indicate that the following genera, traditionally placed by most authors in Thraupidae, do not have close relationships to members of this family and almost certainly belong elsewhere, the placement of some remaining uncertain:

1) *Euphonia* and *Chlorophonia* are unrelated to any Thraupidae and should be placed in Fringillidae, perhaps as a subfamily.
2) *Chlorospingus*, together with the Caribbean genera *Spindalis*, *Nesospingus* and *Phaenicophilus*, may form a monophyletic clade sister to some parulid genera, although recent evidence



Although extremely diverse in their plumage colours and patterns, the tanagers are generally rather homogenous in their bare-part colours, horn, grey and blackish predominating. The male ***Hooded Tanager*** *is one of the few members of Thraupidae to have brightly coloured legs. The female's legs are a duller yellow but, in contrast to the male's all-black bill, she has a pale yellowish lower mandible. Both sexes have yellow irides. The congeneric Cherry-throated Tanager* (Nemosia rourei) *also has a yellow iris and pinkish-yellow legs. The iris colour of most tanagers is dark, varying from brown to reddish-brown.*

[*Nemosia pileata caerulea*, Fazenda Cupido, Sooretama, Espírito Santo, Brazil. Photo: Edson Endrigo]

suggests that *Chlorospingus* is closest to the emberizid genus *Arremonops*; none of these genera belongs with Thraupidae.

3) *Mitrospingus* should be removed from Thraupidae; its genetic affinities remain uncertain, but are possibly closest to Cardinalidae.
4) *Rhodinocichla*, the enigmatic thrush-tanager, is equivocal in its ancestral relationships; morphological data support its inclusion within Thraupidae, but genetic data reveal weak support for retention within this family.
5) *Piranga* appears now to be embedded within the cardinalids, and to form a well-supported clade with *Habia* and *Chlorothraupis*.
6) *Habia* appears now to be genetically closest to the cardinalids, and the current arrangement of the genus is polyphyletic; the Red-crowned Ant-tanager (*Habia rubica*) is more closely related to members of *Chlorothraupis* than are other *Habia* species, although sampling is still incomplete.
7) *Chlorothraupis* appears genetically closest to the cardinalids, forming a clade with *Piranga* and at least some *Habia*.
8) *Lamprospiza* is currently retained within Thraupidae, although its placement here has been questioned.
9) *Calyptophilus*, containing the two chat-tanagers, almost certainly does not belong in Thraupidae.

The twelve species in the genus Hemispingus *are mostly rather dull-coloured, and mainly restricted to the Andes. Taxonomic relationships within the genus have for long been a source of confusion. The* ***Orange-browed Hemispingus*** *may form a superspecies with the White-browed Hemispingus* (H. auricularis) *and the Black-capped Hemispingus* (H. atropileus), *and has been treated as conspecific with either or both of these. It differs from these species mainly in its broader, orange (rather than whitish) supercilium. The Orange-browed Hemispingus, however, may be most closely related to Parodi's Hemispingus* (H. parodii).

[*Hemispingus calophrys*, Cotapata National Park, La Paz, Bolivia. Photo: Joe Tobias]

Second, molecular-genetic research suggests that a number of genera previously placed variously in one or other of the families Emberizidae, Cardinalidae and Coerebidae, or at times provisionally in Thraupidae, almost certainly do belong in the family Thraupidae:

1) As already mentioned, the historically recognized family Coerebidae is no longer warranted, having been shown to comprise a group of disparate members within a larger radiation of tanagers and finches. *Coereba*, *Conirostrum*, *Oreomanes*, *Diglossa*, *Cyanerpes*, *Dacnis*, *Euneornis*, *Xenodacnis*, *Chlorophanes* and *Iridophanes*, all formerly placed, at various times, in Coerebidae, are now known to be closest to Thraupidae.
2) *Coereba*, previously placed in various families, shares a monophyletic ancestry that includes Galapagos finches and the Caribbean genera *Euneornis*, *Loxigilla*, *Loxipasser*, *Melanospiza* and *Melopyrrha*, all of which align well within the Thraupidae.
3) Galapagos finches of the genera *Certhidea*, *Platyspiza*, *Camarhynchus* and *Geospiza* appear genetically allied to Thraupidae, most closely to *Coereba*, *Tiaris* and several Caribbean genera.
4) *Tiaris* grassquits appear closest to Thraupidae and form part of a monophyletic group with *Coereba*, the Galapagos finches and several Caribbean genera; *Tiaris* itself is probably para-



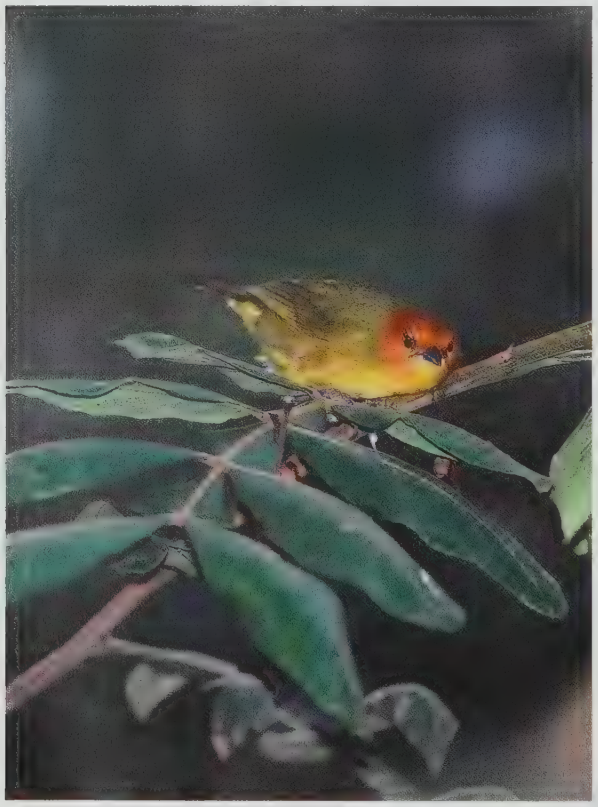


The genus Cnemoscopus, *of which the* ***Grey-hooded Bush-tanager*** *is currently the sole recognized member, is part of a clade of small tanagers of a mostly Andean radiation that also includes the* Hemispingus *tanagers. The Grey-hooded Bush-tanager has sometimes been placed in* Hemispingus *and is close to this genus in morphology, feeding behaviour and vocalizations. Despite its English name, it frequents forest trees, rather than bushes. The race* chrysogaster, *which differs from the nominate in size, plumage and eye, bill and leg colour, has been treated as a separate species.*

[*Cnemoscopus rubrirostris rubrirostris*, Guango, Ecuador. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]

phyletic and has previously been included within Emberizidae and Cardinalidae.

5) *Phrygilus*, a group of high-Andean and Patagonian species, appears now to belong in Thraupidae.
6) *Diuca*, comprising a pair of high-Andean and Patagonian species, is considered to belong in Thraupidae.
7) *Haplospiza*, an odd, bamboo-inhabiting species, is genetically closest to Thraupidae.
8) *Poospiza* mountain-finches of the high Andes are more closely allied to Thraupidae, especially to *Pyrrhocoma*, *Thlypopsis*, *Cypsnagra*, *Nephelornis*, *Hemispingus* and *Cnemoscopus*, than to Emberizidae; the genus *Poospiza*, as currently constituted, may itself not be monophyletic.
9) *Sicalis* yellow-finches are genetically allied with Thraupidae.
10) *Embernagra* pampa-finches almost certainly belong with Thraupidae.
11) *Volatinia*, a monotypic grassquit genus, aligns with Thraupidae and appears most closely related to members of the genus *Conothraupis*.
12) *Sporophila* seedeaters and *Oryzoborus* seed-finches belong with Thraupidae, and the two genera themselves possibly should be merged.
13) *Catamenia* seedeaters of the high Andes belong with Thraupidae and are evidently most closely related to the flowerpiercers (*Diglossa*), a high-Andean dacnis (*Xenodacnis*) and the Central American Peg-billed Finch (*Acanthidops bairdii*), the last currently placed in the family Emberizidae.
14) *Saltatricula*, an Argentinian finch currently included within Emberizidae, is more closely related to the Thraupidae than to any other group.
15) Both *Coryphospingus* and *Rhodospingus* finches, likewise treated within Emberizidae, are allied with Thraupidae and are closest to *Lanio*, *Eucometis* and *Tachyphonus*.
16) The *Paroaria* cardinals, currently treated as emberizids, appear to belong in Thraupidae.
17) *Diglossa* flowerpiercers, having been transferred by some authors from Thraupidae to Emberizidae, are now considered to be firmly allied with Thraupidae.
18) The Swallow Tanager (*Tersina viridis*), an enigmatic species previously placed either in Thraupidae or, sometimes, in a family of its own, is now known to be allied with Thraupidae and is closest to *Dacnis* and *Cyanerpes*.
19) *Saltator* is apparently genetically closer to the thraupids than to the cardinalids, but could possibly be sister to the latter, with which it is currently included; the genus *Saltator* as currently constituted is polyphyletic, with one member, the Rufous-bellied Saltator (*Saltator rufiventris*), most closely aligned with *Delothraupis* and *Dubusia* in Thraupidae.
20) *Parkerthraustes* appears most closely related to Thraupidae, and is not a cardinalid.
21) The monotypic Blue Finch (*Porphyrospiza caerulescens*) should be included in Thraupidae, rather than, as presently, in Emberizidae, and is sister to the Band-tailed Sierra-finch (*Phrygilus alaudinus*).



Another tanager genus that resembles the New World warblers (Parulidae) in appearance and behaviour is Thlypopsis. *The six small, delicately proportioned species in this genus form a tightly knit group, characterized by orange, rufous or chestnut colouring on the head of the male. Some, like the* ***Rust-and-yellow Tanager****, are relatively brightly coloured; others, such as the Buff-bellied Tanager* (T. inornata), *rather plain. The females are generally duller: the female Rust-and-yellow Tanager, for example, has a buffy-yellow forehead only tinged with rufous, and an olive crown.*

[*Thlypopsis ruficeps*, Machu Picchu Historical Sanctuary, Cuzco, Peru. Photo: Johannes Ferdinand]

22) The Yellow Cardinal (*Gubernatrix cristata*), currently included in Emberizidae, appears most closely related to Thraupidae.
23) The Coal-crested Finch (*Charitospiza eucosma*), currently included in Emberizidae, appears most closely related to Thraupidae.

The word *tangará* first appears in scientific writing in 1648, in G. Marcgraf's treatise on plants and animals. Some confusion arose when Linnaeus, transposing two letters, created the generic name *Tanagra* and applied it to euphonias; this also led to the creation of the family name Tanagridae. Both names were officially suppressed by the International Commission on Zoological Nomenclature in 1968. The correct name for the family as traditionally recognized became Thraupidae, derived from the Greek word *thraupis*, which was first used as a valid name by F. Boie in 1826; this word was based on the usage of Aristotle, who was referring to a kind of finch.

As mentioned above, tanagers represent part of an immense radiation of New World nine-primaried oscines. These comprise a group of birds that are fairly uniform in body shape, but with considerable variation in body size, the largest being almost ten times as heavy as the smallest, and with marked variation in habitat preferences, plumage patterns and colours, feeding behaviour and bill shape. Bill shapes, in particular, have been utilized extensively in the past as clues for classification, but recent phylogenetic studies have revealed that bill morphology is not a reliable indicator of ancestry. Partly as a result of an over-emphasis on bill shapes, which are subject to rapid evolution as feeding pressures change, the traditionally defined tanager family is not monophyletic and represents an artificial grouping of genera and species. Convergent evolutionary pressures often cause two or more taxa to look similar and appear to be related when they may, in fact, be quite unrelated. Since about 1990, studies of molecular genetics have helped to shed light on many of these thorny matters of relationships, and the family Thraupidae, as presently understood, includes various genera formerly placed in other families. Conversely, these studies reveal also that several genera previously classified as tanagers are unrelated to them, and should be transferred to Emberizidae, Cardinalidae or Fringillidae; for example, some authors have already transferred *Euphonia* to Fringillidae. As a result of these continuing rearrangements and exchanges, tanagers may eventually encompass some 350 to 400 species. Compared with traditional arrangements, this represents an increase of up to about 40%, and accounts for approximately 8–10% of all Neotropical avian species.

Tanagers are now the most diverse avian group for which phylogenetic relationships can be reconstructed. They are entirely New World in origin and distribution, and are largely non-migratory. Speciation rates vary, some lineages appearing relatively early, for instance in the middle Miocene, about 15 million years ago, whereas others are part of large recent radiations during the middle to late Pleistocene, dating only to about 0·5 million years



Fewer than half of the true thraupids exhibit strong sexual dichromatism, where the males are brightly coloured or boldly marked, and the females are plainer combinations of olive, brown or buff, with paler underparts. The female ***Chestnut-headed Tanager*** *is much duller than the male, with dull rufous and buff replacing the dark chestnut of his hood, a brownish-olive back, and greyish-buff underparts. Males, however, may take a considerable time to gain their full plumage. Immature males resemble females, and individuals are often seen with some grey in their plumage and a little chestnut on the head.*

[*Pyrrhocoma ruficeps*, Santa Rita de Caldas, Minas Gerais, Brazil. Photo: Geiser Trivelato]



Described only in 1976 from a specimen collected at Bosque Unchog, in the Peruvian Andes, the location of this picture, the ***Pardusco*** *was variously thought to be a primitive tanager or New World warbler (Parulidae), or genetically somewhere between the two. Investigations of cytochrome* b *sequence data indicate that it is close to the clade that includes the* Hemispingus, Thlypopsis *and* Pyrrhocoma *tanagers, among others. A very plain brown tanager, the Pardusco has few distinguishing marks and features other than its slender bill with a flesh-coloured lower mandible, and its yellowish soles. The sexes are similar.*

[*Nephelornis oneilli*, Bosque Unchog, Huánuco, Peru. Photo: Samuel Hansson]



Tanagers in the genera Trichothraupis, Tachyphonus, Lanio, Eucometis, Coryphospingus *and* Rhodospingus *form a large, monophyletic clade. Shared features, as illustrated by the* ***Black-goggled Tanager****, include sexual dichromatism, and a crest or patch of colourful feathers on the crown of the male. The yellow crown patch of the Black-goggled Tanager is usually concealed or, as here, shows as a narrow yellow stripe. Most of this clade of tanagers have a lowland distribution; the Black-goggled Tanager, however, has two geographically well-separated populations, one primarily lowland and the other montane.*

[*Trichothraupis melanops*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo]

ago or less. As a group, they exhibit a wider range of feeding adaptations than was previously realized. Once thought to comprise mainly fruit-eating species, or more omnivorous fruit-eating and insect-eating species, they are now known to include nectar-feeding *Diglossa* and several seed-eating genera, as well. Many have generalized diets that include various combinations of these food items. Specialization on seeds is significant, because no seed-eating group had previously been included in the family, and this behaviour provides evidence that tanagers have successfully colonized almost all major terrestrial habitats in the Neotropics.

One of the most striking features of tanagers is the variety of colourful plumages. Their colours are often brilliant, conspicuous and boldly contrasting. A few species, however, are dull and nondescript, even cryptic. About half are sexually dimorphic, the males having much brighter colours than do the females. In addition, tanagers vary in their nesting habitats, foraging strategies and tendency to migrate, and also in other aspects of behaviour. A considerable body of ecological and behavioural information is now available for many species of tanager, but what has been lacking until very recently is a rigorous phylogenetic framework for the group. Now, as a result of molecular studies, a nearly complete phylogeny is available, and this has permitted the construction of an evolutionary timeframe for the history and radiation of this remarkable group of birds.

Early classifications of tanagers were, in common with other avian groups, linear sequences based on features of plumage, various morphological characters, and geographical distribution. The purpose of these constructions was to reflect a general ancestry, beginning with presumed oldest genera and species and ending with more recently evolved members. Linear sequences, however, were never intended to recapitulate true phylogeny; they may include polyphyletic groups and they are heavily biased towards morphological similarities. They have remained controversial and subject to frequent revision. Molecular phylogenies, on the other hand, attempt to identify strictly monophyletic groupings, called "clades", by using binary branching trees (dendrograms). Nevertheless, the science of molecular phylogenetics, a genealogy-based system, is not without its critics, who point to the difficulty of defining clades, which can represent almost any taxonomic unit from two species to a family or even more, to the lack of a process for naming species, and to its dependence on inherited traits. Gradual improvements in molecular gene-sequencing has helped to clarify many controversial intrageneric relationships within tanagers and has uncovered surprising new ones, as well. In some cases, sequences of cytochrome *b* gene data, for example, have supported earlier sequential taxonomic predictions based on morphology, but in other cases they have not. Some examples of striking agreement between classic morphological taxonomy and cytochrome *b* data are the adjacent grouping of pairs of genera, including *Chlorophonia* and *Euphonia*, *Delothraupis* and *Dubusia*, *Hemispingus* and *Cnemoscopus*, *Hemithraupis* and *Chrysothlypis*, and *Dacnis* and *Cyanerpes*. The phylogenetics of these genera, and of groups whose relationships differ from those indicated in earlier taxonomic sequences, are discussed in the following paragraphs.

In their detailed studies of the world's birds based on analyses of DNA–DNA hybridization, Sibley and Ahlquist upset many long-cherished notions regarding avian relationships. They noted, for example, that several purported tanager taxa, including *Habia*, *Piranga*, *Chlorothraupis*, *Chlorospingus*, *Phaenicophilus*, *Spindalis*, *Nesospingus*, *Euphonia*, *Chlorophonia*, *Lamprospiza* and *Mitrospingus*, appeared not to be closely related to other members of the group that they termed Thraupini. Moreover, they found that some 60 other genera included in their studies did form a monophyletic clade of Thraupini. These and their many other studies ultimately formed the basis for what was at the time a controversial work, the Sibley and Monroe checklist, published in 1990. Since that landmark publication, many, though not all, of Sibley and Ahlquists's findings have been found to agree, at least broadly, with the results of more sophisticated recent molecular studies and analyses. The flood of publications emanating from molecular-genetic studies aimed at resolving the taxonomies of specific groups continues, and it seems that, at long last, Sclater's taxonomic conundrum may be solved. By the time the present volume appears in print, in fact, molecular biologists will almost certainly have a complete phylogeny of tanagers.

The early fossil record of tanagers is essentially non-existent, as it is for most oscine passerines, and it provides no help in determining origins, history or early relationships within the family. Furthermore, without the luxury of a fossil calibration for erecting a temporal framework within which to examine patterns and rates of diversification, biologists must turn to genetic-based





Most classifications recognize eight species of Tachyphonus, *which are slender, medium-sized tanagers with a narrow bill. The males are predominantly black, with patches of semi-concealed red or yellow in the crown. They also have white, yellow, buff or red at the bend of the wing, on the wing-linings, or in the form of epaulets or flank tufts. Several males also have a yellow or buff rump. The females of all species are olive to brownish and very unlike the males. The genus* Tachyphonus, *however, does not represent a monophyletic group. Three species, including the* ***Ruby-crowned Tanager*** *(above), appear to be more closely related to the tanagers of the genus* Ramphocelus *than to other* Tachyphonus. *All three lack the obvious crest that is present in all other species of* Tachyphonus, *such as the* ***Flame-crested Tanager*** *(below), and in habitat and behaviour are much more like* Ramphocelus. *The Ruby-crowned Tanager and the Brazilian Tanager* (R. bresilius) *are known to hybridize in captivity, providing more evidence of a close relationship between these two lineages. Though widespread, the Ruby-crowned Tanager is monotypic. In contrast, ten subspecies of Flame-crested Tanager are currently recognized, differing mainly in the colour of the crest and the size and colour of the male's throat patch. The race* brunneus, *shown here, has a longer and fuller crest than the nominate. But, given the amount and complexity of variation between some races and the relatively trivial differences between others, a full taxonomic review is probably warranted.*

[Above: *Tachyphonus coronatus*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo

Below: *Tachyphonus cristatus brunneus*, Mata de São João, Bahia, Brazil. Photo: Pedro Lima]

calculations. The use of a mitochondrial DNA (mtDNA) evolutionary rate of approximately 2% sequence divergence per million years has been utilized, but this rate is based on data for geese (Anatidae). Recent data have confirmed a more generalized rate for many birds, including some tanagers, of 2·1% sequence divergence per million years. Despite limitations and criticisms, mtDNA-sequence divergence is currently regarded as the most reliable marker for making inferences about historical time frameworks when supporting fossil data are unavailable.

Using a large clade of "core" tanagers, R. Sedano and Burns were able to examine historical diversification and biogeography of tanagers. Their group contained almost one-third of all tanagers, included species found at a range of elevations from sea-level to the tree-line, and contained representatives from 18 of 22 zoogeographical areas in Middle and South America and the Caribbean. Included in this core group were species in the genera *Anisognathus*, *Buthraupis*, *Bangsia*, *Calochaetes*, *Chlorochrysa*, *Chlorornis*, *Cissopis*, *Delothraupis*, *Dubusia*, *Iridosornis*, *Neothraupis*, *Paroaria*, *Pipraeidea*, *Tangara*, *Thraupis* and *Schistochlamys*, as well as *Stephanophorus*, *Wetmorethraupis*, *Diuca* and *Lophospingus*, the last two currently treated in Emberizidae. Their analysis identified the northern Andes as the most probable ancestral area of the group, with the most recent common ancestor of the group-members being a highland species. Their reconstructions indicate that 51 dispersal events occurred during the history of these core tanagers, the greatest number of early dispersal movements being out of the northern Andes, rather than into this area. The south-central Andean region also had more outward dispersals than inward ones, but this area experienced far fewer dispersal events than the northern Andes. Slightly more than half of all dispersals involved horizontal exchanges with other montane regions, whereas less than a quarter of exchanges were between the Andean highlands and the lowlands. Most speciation events occurred either within highland areas or within lowland areas, with relatively few exchanges between the two. When these highland–lowland exchanges did occur they were predominantly from the highlands to the lowlands, and not vice versa. When lowland-to-highland dispersals were identified they occurred late in the tanager phylogeny, well after many key dispersal events out of the Andes took place.

The biogeographical history of these core tanagers reinforced early ideas regarding the importance of the Andes in bird diversification, and the fact that there has been some exchange between highland and lowland areas. While Middle America has been the source of some non-tanager avian lineages, this was not, however, the case with the core tanagers. All evidence suggests that dispersal events occurred only from the Andes north-westwards into Central America, with subsequent diversification. Examples include the Blue-and-gold Tanager (*Bangsia arcaei*), Emerald Tanager (*Tangara florida*) and Silver-throated Tanager (*Tangara icterocephala*), and the most recent common ancestor of the Spangle-cheeked (*Tangara dowii*) and Green-naped Tanagers (*Tangara fucosa*). In addition, most Andean tanagers in the core group appear to have derived from other Andean tanagers, and not from adjacent lowland counterparts. Biogeographical reconstructions also indicate that core tanagers dispersed into the tepuis, although no unambiguous dispersal of core tanagers out of the tepuis could be identified.

With the general importance established of the Andes as a centre of diversification of core tanagers, the next piece of the puzzle involves matching dispersal events in geological time. Andean uplift occurred earliest in the southern region and followed a general south-to-north progression. Thus, mountain-building was completed earliest in the southern region, followed by the central region and, finally, the northern region, the last comprising mainly the present-day Andes of Colombia and Venezuela. After a slow rise for millions of years, the central Andes reached about half their present height. The final, much more rapid uplift was completed between about 10 million and 6 million years ago, whereas the eastern Andes of Colombia did not reach modern-day heights until about 5·5–3·3 million years ago. Molecular-clock calculations show core tanager diversification dates to about 5–4·1 million years ago, thus occurring after the final uplift of the central Andes, but remarkably coincident with the final orographic uplift of the northern Andes. The drivers of speciation at this point in history could have included mountain-building uplift, habitat changes, climatic cycles and tectonic activity, any or all of them providing opportunities for isolation and subsequent speciation. The analysis also indicates that speciation rates have gradually slowed following the final uplift period.

Extreme glacial cycles of the late Pleistocene have often been cited as important drivers of speciation, responsible for generating much modern-day diversity. Molecular-clock calculations, however, indicate that most speciation in this core tanager clade,



The shrike-tanagers of the genus Lanio *have a long, straight, heavy bill with a sharply hooked tip. There are four recognized species, two in Middle America and two, the* ***White-winged Shrike-tanager*** *and the Fulvous Shrike-tanager* (L. fulvus), *in South America. But, although they replace each other on either side of the Amazon River, the two South American species do not, as previously thought, form a superspecies: the Fulvous Shrike-tanager is more closely related to the Middle American species. Female shrike-tanagers tend to be of a uniform brownish colour, in contrast to the dramatic black and yellow or black and orange of the males.*

[*Lanio versicolor versicolor*,
Rio Roosevelt Lodge,
Novo Aripuanã, Brazil.
Photo: Edson Endrigo]





The males of the genus Ramphocelus *exhibit some of the most intense velvety blacks and reds to be found in nature. The Flame-rumped Tanager* (R. flammigerus) *and the* ***Lemon-rumped Tanager*** *(above) are usually treated as conspecific, despite their striking visual differences. The middle back to the rump and the uppertail-coverts of the two species are, respectively, flame-scarlet and lemon-yellow. Genetic differences between the two species are apparently minimal, and they interbreed freely in the western Andes of Colombia, where recent deforestation has permitted them to expand their ranges and to meet. The bill of both the Flame-rumped and the Lemon-rumped Tanagers is blue-grey, with a black tip in the case of Flame-rumped species. Other male* Ramphocelus *tanagers, such as the* ***Brazilian Tanager*** *(below), have a stout bill with a black upper mandible and tip, and the basal two-thirds of the lower mandible swollen and chalky white. This expanded white portion of the bill is conspicuous even at a distance, especially against the velvety black or red plumage. Female* Ramphocelus *tanagers have a bill that is thick but of a more normal shape, and their lower mandible is pale grey.*

[Above: *Ramphocelus icteronotus*, Panama. Photo: Mike Danzenbaker/ AGAMI.

Below: *Ramphocelus bresilius dorsalis*, Ubatuba, São Paulo, Brazil. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]





A recent molecular study found that the well-known and long-established tanager genus Thraupis *was not, as had previously been supposed, monophyletic. Six of the eight species sampled belong in the genus* Tangara, *while the remaining two, the Blue-capped Tanager* (T. cyanocephala) *and the* ***Blue-and-yellow Tanager*** *(above), are placed within a large clade of montane tanagers of several genera. These two species do not appear to be closely related to each other, but both are unusual in having an exceptionally long, linear geographical distribution, and displaying a high amount of geographical variation. The Blue-and-yellow Tanager is a mostly open-country tanager that becomes much brighter in plumage in the southern portion of its range. Its dullest race,* darwinii, *which also differs in song from the other races, is sometimes treated as a separate species. The* ***Golden-chevroned Tanager*** *(below) is one of the six* Thraupis *species embedded within* Tangara. *The six are one another's closest relatives; they are larger and plainer in plumage than previously recognized* Tangara *tanagers. Even before the transfer of these six species,* Tangara *was the largest Neotropical bird genus.*

[Above: *Thraupis bonariensis bonariensis*, São Lourenço do Oeste, Santa Catarina, Brazil. Photo: Rudimar Narciso Cipriani.

[Below: *Thraupis ornata*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo]



*The long, heavy bill of the **Blue-backed Tanager**, with its decurved culmen, is unique among the Thraupidae. The upper mandible is black, the lower mandible grey. The Blue-backed Tanager is also relatively unusual in having yellowish-orange legs. Females are duller than males, although the male's vivid blue plumage also becomes duller and greener on the back and rump as it wears. This species is confined largely to Guianan forests from extreme eastern Venezuela eastwards across Guyana and Suriname to French Guiana. There are also three tiny and presumably isolated populations in central Amazonian Brazil.*

[*Cyanicterus cyanicterus*, Manaus, Brazil. Photo: Ingrid Macedo]

as well as other tanager groups, took place prior to these Pleistocene events. Only a few lineages of core tanagers appear to have diversified within the last 800,000 years, when glacial cycles have been at their most extreme. The appearance of *Tangara* represents one of the more recent tanager speciation events, but with high levels of speciation occurring during the late Pliocene–early Pleistocene, even in this case most of the events still predate the middle Pleistocene. Recent northern Andean speciation events that do correspond with Pleistocene glacial cycles include a clade containing the Burnished-buff Tanager (*Tangara cayana*), Scrub Tanager (*Tangara vitriolina*) and Lesser Antillean Tanager (*Tangara cucullata*), and the separation of the Moss-backed Tanager (*Bangsia edwardsi*) and Gold-ringed Tanager (*Bangsia aureocincta*).

The relatively recent speciation and radiation of *Tangara* in the Andes is mirrored by *Sporophila* seedeaters, another historically recent tanager radiation that has been confined largely to areas south of the Amazon River. The majority of *Sporophila* are today still found south of the Amazon, and they are so minimally divergent genetically that a rapid radiation has probably occurred only within the last half-million years. The reasons for rapid diversification within *Sporophila* are obscure, but they could include successive marine ingressions and regressions, the use of specific habitats during short-distance seasonal movements or longer migrations, and adaptations to specific, patchy grassland habitats that were persistent. Factors that drove speciation in this group are, at least for the moment, buried in history.

Numerous core tanagers occur in Middle America, where they can be found in both the highlands and the lowlands. Phylogenetic gene trees indicate that these core tanagers originated from South American taxa, and not from ancestors in Middle America. Dispersal events into Central America occurred about 2·9 million years ago, a date that coincides with the general closing of the Panama isthmus, estimated to have taken place 3·5–2·5 million years ago. Variation in dates of speciation events indicates that land-bridge closure influenced some species more than it did others, but it was significant in the evolutionary history of birds, as well as mammals.

Tanagers are predominantly a South American group. More than 70% of the species occur in South America, and their greatest diversity is in low tropical latitudes, progressively fewer having spread northwards into Central America and southwards into the cone of southern South America as far south as Tierra del Fuego. Tanagers are also well represented in Trinidad, a continental island close to northern South America, to which it had a recent geological connection. There are fewer on nearby Tobago, which shares no such recent connection with the continent, despite its close proximity. Tanagers are also distributed on Caribbean islands, and their presence on many islands is likely the result of early dispersals from South America.

Tanager diversity peaks in the humid Andean foothills and lower montane zones. Fjeldså and Rahbek mapped tanager diversity across South America and found peaks of diversity in five regions: 1) south-western Colombia and adjacent north-west Ecuador; 2) south-eastern Ecuador; 3) Huánuco, in central Peru; 4) Apurímac and adjacent Cuzco, in south Peru; and 5) La Paz, in Bolivia. The next highest level of diversity occurs in the Atlantic Forest of Brazil and broadly in the Colombian and Venezuelan Andes, followed by the Planalto de Mato Grosso of Brazil west to the Bolivian border, and the Guiana highlands from southern Venezuela eastwards across the Guianas. Tanager species richness is generally lowest across much of the Amazon Basin. This seems counter-intuitive when one considers that popular knowledge inevitably emphasizes the enormous diversity of the Amazon region. Bearing in mind the enormous size of the region, however, the species richness of tanagers in Amazonia is not particularly high. About half of all tanagers in South America have very small ranges, estimated at less than about 50 equatorial 1°× 1° grid-cells, an area slightly larger than Ecuador. These species are heavily concentrated in the Andes, where their distributions are narrow and linear, with the highest density in the Colombian Andes and in northern Ecuador. Even when areas three times as large are included, such species are still clustered along the Andean cordillera. On the other hand, species with large distributions are found mainly in the Amazon Basin and the Guianan and Brazilian Shield areas.

Early taxonomic work on tanagers, as well as that on many other groups of birds, relied heavily on morphological characters, especially external characters associated with the bill and legs. As noted previously, bill morphology, in particular, has been over-emphasized as a taxonomically informative character for nine-primaried oscines, as bill shapes are strongly influenced by selection for particular feeding adaptations, can change rapidly, and may bear little relationship to ancestral lineages. Although modern molecular studies have helped to define the limits of tanagers in ways not possible when using phenological characters, other types of information that have been utilized successfully elsewhere in avian taxonomy either have not been helpful



The five Bangsia *tanagers are small and short-tailed, rather robust and chunky in build, and with a thick, stubby bill. Two members of the genus, the* ***Moss-backed Tanager*** *and the Gold-ringed Tanager* (B. aureocincta), *separated as recently as 800,000 years ago. Both are confined to the Chocó–Pacific slope region.* Bangsia *is sometimes subsumed in the mountain-tanager genus* Buthraupis, *but this is not supported by recent molecular-genetic studies. As well as their morphological differences, including their relatively uniform plumages, the* Bangsia *tanagers are less social and occur mostly at lower elevations.*

[*Bangsia edwardsi*, Mashpi Road, Ecuador. Photo: Robert Lewis]

or have not been explored for the Thraupidae. For example, nest architecture has proved to be a taxonomically useful character at the generic level, because it is conservative and can differ markedly among families and genera. Phylogenies based on a single suite of characters, however, are rarely used alone, without supporting data from other sources. The nest structure of tanagers is rather uniform across most genera (see Breeding), and may have limited taxonomic value.

Behavioural information offers additional taxonomic characters for analysis, but few detailed behavioural studies of tanagers have been undertaken. M. Moynihan, working mainly in Panama, documented behaviour patterns related to movements, aggression, and social and sexual aspects for two species of *Ramphocelus* tanagers and two species of *Chlorospingus* bush-tanagers, but little work has been conducted on other thraupid species and the relevance of behaviour as a taxonomic aid within the family is at present limited. The widespread use of digital video may encourage the examination of behaviour as a tool in taxonomy.

Vocal characters have been employed quite successfully as a taxonomic tool in defining the generic and species limits of birds, especially in the suboscine families Furnariidae (ovenbirds), Thamnophilidae (typical antbirds) and Rhinocryptidae (tapaculos). In these groups, unlike oscine passeriforms, the songs, calls, duets and other vocalizations of males and females are largely inherited, rather than learned, and are generally more stable. Tanagers, on the other hand, often have complex songs that are extremely high-pitched and difficult to record and analyse successfully. The vocal repertoires, and even the basic songs, of some species, such as the *Tangara* tanagers, are still unknown. Systematic cataloguing of tanager vocalizations is, at this point, in its infancy and, while vocal analysis has been used successfully for birds ranging from tinamous (Tinamidae) and some raptors, such as the *Micrastur* forest-falcons, to tyrant-flycatchers (Tyrannidae), and for some oscine groups, such as wrens (Troglodytidae), vireos (Vireonidae), various assorted warblers and others, it has thus far received rather minor attention with respect to tanagers.

Molecular phylogenetics are perhaps the single most important tool being used at present in attempts to determine the monophyly of groups and to assign relationships on the basis of genealogy. The following paragraphs discuss recently published information on the systematics of selected groups, as well as, in some cases, comments on their biogeographical histories.

Several tanager genera, notably *Hemispingus*, *Thlypopsis*, *Erythrothlypis* and *Chrysothlypis*, are small-bodied, thin-billed birds that resemble some parulid warblers. *Hemispingus* tanagers are so similar morphologically to *Basileuterus* warblers that there are few morphological features that constantly separate the two genera. Most species in both genera have a striped head pattern, plain upperparts and paler unmarked underparts, as well as a normal, square to slightly notched tail. The bill is relatively thin in both genera, although slightly heavier in *Hemispingus*. Moreo-



The four Buthraupis *species are large, social mountain-tanagers of high elevations, and having yellow underparts. The bill is short and stubby. Despite their sometimes spectacular appearance, some species, such as the* ***Black-chested Mountain-tanager****, can be quiet and hard to find. It moves slowly and methodically within dense foliage and sometimes sits quietly without moving for minutes at a time. The largest* Buthraupis *species, however, the Hooded Mountain-tanager* (B. montana), *is noisy and conspicuous, occurring in groups of up to ten birds which sometimes give simultaneous bursts of loud squealing notes.*

[*Buthraupis eximia eximia*, Chingaza National Park, Colombia. Photo: Ketil Knudsen]





The six Anisognathus *species are typical mountain-tanagers, with bold colourful plumage in both sexes. The* ***Santa Marta Mountain-tanager*** *(left) has a restricted range in Colombia, but the* ***Scarlet-bellied Mountain-tanager*** *(right), with four recognized races, is distributed along the Andes from Venezuela south to Bolivia. These two species, together with the Lacrimose Mountain-tanager* (A. lacrymosus), *were formerly placed in a separate genus,* Poecilothraupis.

[Left: *Anisognathus melanogenys*, El Dorado, Colombia. Photo: Pete Morris.

Right: *Anisognathus igniventris igniventris*, Carrasco National Park, Cochabamba, Bolivia. Photo: Daniel Alarcón]

ver, vocal duetting is reported for members of both, although it is much better developed in *Hemispingus*, in which group singing involving up to five or more individuals is a regular feature of the song display of several species. Members of both genera are found primarily in the lower or middle storey of forest, but a few species of *Hemispingus* spend much time on or close to the ground and numerous species are closely associated with *Chusquea* bamboo. A second group of parulid-like species includes *Erythrothlypis* and *Chrysothlypis*, each containing a single species. *Erythrothlypis* has sometimes been subsumed into the latter genus. The two species are rather similar in size, body mass and bill shape, and both are sexually dimorphic, but they differ markedly in plumage colour and pattern. Male Scarlet-and-white Tanagers (*Erythrothlypis salmoni*) are salmon-red and white, whereas male Black-and-yellow Tanagers (*Chrysothlypis chrysomelas*) are boldly patterned in black and yellow; thus, beyond general shape, the two look utterly different. Both are active, sprightly little tanagers that glean insects in foliage, but the Scarlet-and-white depends heavily on arillate fruits at times, and includes much small fruit in its diet, while the Black-and-yellow Tanager is more insectivorous. *Thlypopsis* comprises a third group of small, delicately proportioned, warbler-like tanagers that are similar to one another morphologically and are almost certainly monophyletic. They are restless, highly arboreal birds that search actively in foliage, mostly for insects, and take relatively little fruit. This small, tightly knit group includes one species widespread in lowlands and five montane species with mostly small, non-overlapping distributions. Although they recall warblers in behaviour, molecular studies support their placement within Thraupidae.

While several studies have focused on the evolution of tanagers in highland areas of the Andes and Central America, there has been, until recently, relatively little work on lowland groups. In 2009, however, Burns and Racicot published a phylogenetic examination of a large number of lowland tanagers and allies distributed from southern Mexico south to Argentina. This study was the first to examine phylogenetic relationships of tanagers across lowland Neotropical America and, in particular, to explore the importance of Middle America and the role of the Panamian land-bridge in the historical radiation of tanagers and its timing. Within the group that they examined were core species in mixed flocks, some species with crests, some with bright plumages and a majority with sexually dimorphic plumages, although, in the case of two species, the females were as brightly coloured as their male counterparts. These authors' results revealed a large, monophyletic clade of lowland tanagers that included all species of *Tachyphonus*, *Ramphocelus*, *Trichothraupis*, *Eucometis*, *Lanio*, *Coryphospingus* and *Rhodospingus*. The species in this group had not previously been suspected of forming a monophyletic clade, although some earlier studies had indicated that certain members were related to one another. Shared features of the group include a predominantly lowland distribution with the single exception of the Huallaga Tanager (*Ramphocelus melanogaster*), which is found mainly in the foothills; none occurred above 1700 m in elevation. Interestingly, most of the species were sexually dimorphic, with males much brighter than females, and several were crested or had semi-concealed patches of colourful feathers on the crown. The study also indicated, for the first time, that the two species in the genus *Coryphospingus* and the single species in *Rhodospingus* were more closely related to the tanagers than to the emberizids, where they had long been placed. It was noted also that, in addition to DNA corroboration, these species have bold red-and-black plumage, a relatively thin bill and a crest, characters more closely aligned with tanagers than with emberizids or finches.

One of the more surprising findings of the Burns and Racicot study was that the genus *Tachyphonus* did not, as constituted, represent a monophyletic group. Most classifications recognize eight species of *Tachyphonus*, which are rather slender, medium-sized tanagers with a narrow bill. The males are predominantly black, often with patches of semi-concealed red or yellow in the crown, and white, yellow, buff or red at the bend of the wing and on the wing-linings, or they have semi-concealed coloured pectoral tufts and flank tufts. Several males also have a yellow or buff rump. Females of all species are olive to brownish, and very unlike the males. Three species of *Tachyphonus*, however, appear to be more closely related to *Ramphocelus* than to other *Tachyphonus*. These are the White-lined Tanager (*Tachyphonus rufus*), Ruby-crowned Tanager (*Tachyphonus coronatus*) and Red-shouldered Tanager (*Tachyphonus phoenicius*), all three of which lack the obvious crest that is present to some extent in all other species of *Tachyphonus*. Furthermore, these three species, as with *Ramphocelus*, live in shrubby forest borders, second growth and semi-open habitats, where they stay low down. In habitat and



An unmistakable large and robust tanager with bright green plumage, a chestnut mask and orange bill, legs and feet, the ***Grass-green Tanager*** *is the sole species in the genus* Chlorornis. *The position of this genus has for long been the subject of debate. Although its plumage is quite distinct, the Grass-green Tanager resembles a* Buthraupis *mountain-tanager in its foraging and social behaviour and vocalizations. Recent molecular-genetic studies suggest that two members of* Buthraupis, *the Golden-backed* (B. aureodorsalis) *and the Black-chested Mountain-tanagers* (B. eximia), *are more closely related to* Chlorornis *than to other* Buthraupis *tanagers.*

[*Chlorornis riefferii riefferii*, Ecuador. Photo: Tui de Roy/ Roving Tortoise Photos]

behaviour, therefore, they are much more like *Ramphocelus* than like other *Tachyphonus*. Burns and Racicot also point out that the Brazilian Tanager (*Ramphocelus bresilius*) and Ruby-crowned Tanager are known to hybridize in captivity, another line of evidence indicating a close relationship of these two lineages. These researchers recommend that the taxonomy of *Tachyphonus* be revised, with two or three suggested possible alternatives. The first would be to place all species in the genera *Tachyphonus*, *Ramphocelus*, *Trichothraupis*, *Eucometis*, *Lanio*, *Coryphospingus* and *Rhodospingus* into a single enlarged genus, the name *Ramphocelus* having priority. A second alternative put forward by Burns and Racicot was the splitting of these seven genera into two clades, one under *Ramphocelus* and the second under *Lanio*, as these two genera are the oldest named and would have priority. A third and more complex possibility would be to retain traditional generic limits and to place the three monophyletic species of *Tachyphonus*, namely *T. coronatus*, *T. rufus* and *T. phoenicius*, within *Ramphocelus* because they are the sister-group of *Ramphocelus*. As the present *Tachyphonus* is not monophyletic, however, three new genera would need to be named for the remaining five species: one for the monotypic Tawny-crested Tanager (*Tachyphonus delatrii*) of lower Central America and western Colombia; another for the Fulvous-crested Tanager (*Tachyphonus surinamus*); and a third for the remaining three species. Other allied species, including *Eucometis*, *Trichothraupis* and *Rhodospingus*, would likewise require re-evaluation. Striking visual differences among members of these genera suggest that this last approach may be preferable.

Surprising also in the Burns and Racicot study were the high levels of intraspecific sequence divergence identified for some species. This is an area of investigation still in its infancy, and one destined to engender considerable interest and debate in the future. The Flame-crested Tanager (*Tachyphonus cristatus*), with ten named subspecies, was visually the most variable species examined by Burns and Racicot. They sampled only two individuals, one from Peru and the other from nearby Bolivia, and found a sequence divergence of 2·5%, a remarkably high level for two individuals that are separated geographically by a relatively short distance in which no physical barriers impede gene flow. Even higher levels were found in the White-shouldered Tanager (*Tachyphonus luctuosus*), another variable species: an individual from Peru differed from one in eastern Panama by 2·5%, but one from Honduras differed by 4·8% from the other two populations. Two Grey-headed Tanagers (*Eucometis penicillata*) in eastern Bolivia differed from each other by only 0·35%, but were 4·8% divergent from an individual in Panama. The importance of these findings is that, in each case, the individuals involved exhibited levels of genetic divergence that are as high as or higher than those found between many currently recognized species and many genera. Such findings, if extended to other taxa across South America, suggest that many populations may in reality consist of multiple, if somewhat cryptic, species-level evolutionary units. High divergence values were also obtained from other species, including, rather surprisingly, a Lemon-rumped Tanager (*Ramphocelus icteronotus*) in Panama and another in Ecuador that differed by 2·2%. Levels of sequence divergence between most other *Ramphocelus* species varied from 2·4% to 4%. The lowest values were those separating the Silver-beaked Tanager (*Ramphocelus carbo*) and the Huallaga Tanager, which differed by just 1·1%. Genetic divergence between two controversial species in Costa Rica and Panama, the west-slope Cherrie's Tanager (*Ramphocelus costaricensis*) and its Caribbean counterpart the Scarlet-rumped Tanager (*Ramphocelus passerinii*), was also relatively low, at 1·8%, the two having been split on the basis of molecular data. Sequence divergence between these two, however, is lower than that observed for most other birds in the Burns and Racicot study, reflecting the fact that the two populations are largely isolated on either side of the mountain range running through lower Central America. Not surprisingly, the sequence divergence within each species was even lower, at 0·1% and 0·6%, respectively.

Sequence-divergence data also provide insights into historical events, and often the results are not entirely predictable. There are, for example, four currently recognized species of shrike-tanager (*Lanio*), two in South America and two in Middle America. The four species are monophyletic and occur primarily in the subcanopy of humid lowland forest. Sexual dimorphism is marked, the males being mainly black and burnt-orange to yellowish, while the females are mainly dull rufous. Morphologically, these shrike-tanagers are characterized by the possession of a slender body, a long tail and a prominently hooked bill, and they represent a lineage that appeared early in the evolution of

the family, most likely in Amazonia. The two species pairs are well separated geographically by the Andes. The two South American species are separated by the Amazon River and its major tributaries, the White-winged Shrike-tanager (*Lanio versicolor*) being found south of the river and the Fulvous Shrike-tanager (*Lanio fulvus*) occurring on the north side and extending northwards through the Guianas. In terms of genetics, sequence divergence between these two is high, at 7·0%, higher even than that between some tanager genera, which range from 6·2% to 16·4%. Despite close proximity, and the fact that the two were previously regarded as forming a superspecies, they are not, however, each other's closest relatives. The Fulvous Shrike-tanager is more closely related to the two species in Middle America, despite the wide geographical separation from the latter. Furthermore, the two Middle American species, the ranges of which approach each other in Honduras but do not overlap, differ by only 0·9%, this notwithstanding marked plumage differences, in addition to range separation. Such results could not be predicted by an analysis of plumage and distribution alone, and are worthy of further study because of multiple speciation events, including a recent one in Central America.

In a separate study of genus-level monophyly and relationships among tanagers, published in 2010, Sedano and Burns examined a wide variety of highland and lowland tanagers. Included within this study was a group of species distributed primarily in the lowlands east of the Andes and southwards into the austral region. This group contained tanager species and numerous genera previously classified as cardinalids and emberizids. The study revealed an interesting and well-supported clade that included *Stephanophorus*, *Diuca*, *Neothraupis*, *Lophospingus*, *Cissopis*, *Schistochlamys* and *Paroaria*. There are relatively few morphological characters or geographical or behavioural clues that would immediately unite these groups of birds. Relationships among some of these genera had already been partially resolved in earlier molecular-genetic studies, but the work by Sedano and Burns indicated that all of them belonged together in a single clade. Two of these genera, *Diuca* and *Lophospingus*, have traditionally been regarded as emberizid finches, and *Paroaria* has been placed with the latter or, more recently, with the cardinalids. Sedano and Burns' findings suggested that all of these species unambiguously belong with the tanagers.

Tanagers in the genus *Hemispingus* comprise a group of some 15 species that are mostly rather dull-coloured and restricted to the Andes. Four of them are polytypic, the Superciliaried Hemispingus (*Hemispingus superciliaris*) being composed of seven subspecies. Taxonomic relationships within the genus and, in particular, their relationship to certain *Basileuterus* warblers have long been a source of confusion. A partial mtDNA-gene study by García-Moreno, J. Ohlson and Fjeldså revealed that the genus is monophyletic, most of the diversity within it having evolved prior to the strong Pleistocene climatic cycling that began about 800,000 years ago. These researchers proposed a phylogeny containing three major clades: one with mostly greenish birds with a



Stephanophorus *is one of a number of monotypic genera found exclusively in the humid Atlantic Forests of south-eastern Brazil, adjacent eastern Paraguay and north-eastern Argentina. Although a colourful dark blue-violet when it perches in the open in a good light, the* ***Diademed Tanager*** *most often appears rather blackish. The white crown patch, however, is usually visible and the red tuft is also conspicuous. Diademed Tanagers favour dense, low cover, into which they are quick to dive when alarmed. To human eyes the sexes appear similar, but a study of museum skins that investigated ultraviolet wavelengths visible to birds revealed the existance of a "cryptic dichromatism".*

[*Stephanophorus diadematus*, Itatiaia City, Rio de Janeiro, Brazil. Photo: Edson Endrigo]





The five Iridosornis *tanager species are confined to the Andes. The* ***Golden-collared Tanager*** *(left) and the* ***Golden-crowned Tanager*** *(right) are found at or near the tree-line, the remaining three species at lower elevations. In a pattern typical of many Andean tanagers, the Golden-crowned Tanager now occurs in a number of widely separated populations at high altitudes.*

[Left: *Iridosornis jelskii bolivianus*, Manu Road, Peru. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com.

Right: *Iridosornis rufivertex caeruleoventris*, Los Nevados National Park, Colombia. Photo: Pete Morris]





In size and body shape Tangara *tanagers are remarkably uniform, being small arboreal species with a stout, moderate-length bill, a tail of average length and a rather small but sturdy body. But there the similarities end:* Tangara *tanagers are remarkable for the diversity of their colourful and sometimes complex plumage patterns. In the majority of species, such as the* ***Golden Tanager*** *(above), the sexes are essentially identical, although males are usually slightly brighter. The nine races of the Golden Tanager are notable for their complex plumage variation, but the female is always duller than the male. In about 20% of* Tangara *tanagers, however, the females differ to varying degrees, sometimes substantially, from their mates. In the* ***Chestnut-backed Tanager*** *(below), for example, the entire crown, nape, side of head, mantle and back of the male are rich rufous-chestnut, but the female, apart from a rufescent crown and nape, is a dull greyish-green above. In fact, she is essentially identical to the female Black-backed Tanager* (T. peruviana), *with which the Chestnut-backed Tanager has been considered conspecific, the two then being regarded as partially localized morphs of a single species.*

[Above: *Tangara arthus sophiae*, Cock-of-the-Rock Lodge, San Pedro, Cuzco, Peru. Photo: Roland Seitre.

Below: *Tangara preciosa*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo]

prominent eyebrow (*trifasciatus*, *atropileus*, *auricularis* and *calophrys*); a second with mostly grey, warbler-like birds (*superciliaris*, *verticalis* and *xanthophthalmus*); and a third with mostly ochraceous birds (*rufosuperciliaris*, *goeringi*, *piurae*, *frontalis* and *melanotis*). Subsequent analysis of mtDNA sequences by Burns indicated that *Hemispingus* is, itself, part of a clade of small tanagers of a mostly Andean radiation that includes also species of *Cnemoscopus*, *Pyrrhocoma*, *Thlypopsis*, *Nephelornis* and *Cypsnagra*. Most species in these genera are rather nondescript, although a few *Thlypopsis* are brightly coloured. Most are confined to the Andes, the few exceptions being *Pyrrhocoma*, which is a Brazilian species of south-east Atlantic Forest, *Cypsnagra*, which occurs in south-central Brazilian grasslands, and a few species of *Thlypopsis*. The Pardusco (*Nephelornis oneilli*), a recently described species endemic to central Peruvian elfin woodland, is unusual in that its nondescript plumage offers few clues to its relationships. Initially it was believed to be a primitive tanager or possibly a New World warbler. The cytochrome *b* gene data obtained by Burns placed it squarely within the present tanager clade and showed that it was unrelated to any parulid warblers included in the analysis. In general, early sequential taxonomies also tended to group these genera close to one another, and many also placed *Chlorospingus* close to *Hemispingus*. This latter relationship, however, was not borne out by the present DNA-sequence data, which suggested that the two genera were only distantly related. In fact, as will be seen below, *Chlorospingus* appears to be most closely related to some members of the Cardinalidae and is not closely related to the tanagers.





*The northernmost race of the **Golden-hooded Tanager** (above) occurs from the Caribbean slope of south-eastern Mexico southwards. The colours are richest in this northern race and become gradually paler, being palest in the southernmost subspecies* (fanny) *of eastern Panama, Colombia and western Ecuador. The Golden-hooded Tanager is relatively unusual for a* Tangara *species in being an infrequent or only transitory member of mixed-species flocks. The **Yellow-bellied Tanager** (below) is more typical in being frequently found in flocks including other* Tangara *species. (Some* Tangara *tanagers are found more often in groups with other members of their genus than with their own species.) A small, heavily spotted green tanager with a bright yellow belly, the Yellow-bellied Tanager gets its spotted appearance in part from the greenish-blue edges of the otherwise black feathers of its back, wings and tail. The feathers of its head and neck are, similarly, black with bright emerald-green edges.*

[Above: *Tangara larvata*, Panama. Photo: Mike Danzenbaker/ AGAMI.

Below: *Tangara xanthogastra phelpsi*, Canaíma National Park, Sierra de Lema, Bolívar, Venezuela. Photo: David Southall]

One surprising result of a recent molecular study by Sedano and Burns was the phylogenetic placement of *Thraupis*, a well-known and long-established genus composed of nine species. It seems that the genus as currently constituted is not monophyletic as has long been supposed, but that it should be split between two genera: six species embedded in the genus *Tangara*; and two, the Blue-and-yellow Tanager (*Thraupis bonariensis*) and Blue-capped Tanager (*Thraupis cyanocephala*), placed within a large clade of montane tanagers that includes *Buthraupis*, *Anisognathus*, *Iridosornis* and others; the Glaucous Tanager (*Thraupis glaucocolpa*) has not yet been analysed. Complicating the matter, however, is the fact that the Blue-and-yellow and the Blue-capped appear not to be closely related to each other. Members of the first group are each other's closest relatives and are embedded deep within *Tangara*, despite being considerably larger in length and weight than other *Tangara* and generally being plainer in plumage. With an additional six species transferred to *Tangara*, this group of birds, already the largest in the New World tropics, would become even larger.

DNA-based molecular phylogenetics reveal a distinctive clade that includes *Chlorornis*, *Dubusia*, *Buthraupis*, *Delothraupis*, *Anisognathus*, *Calochaetes* and one *Thraupis*, all of which are found only at high elevations in the Andes. These genera, in turn, are part of an even larger clade that includes *Bangsia*, *Iridosornis*, *Wetmorethraupis*, and *Pipraeidea*. Members of all of these genera are also found at higher elevations in the Andes from Venezuela south to Bolivia, with the exception of the single species of *Wetmorethraupis*, which occurs mainly in a foothill region.



Although brilliant colour is often seen as the defining feature of the genus Tangara, *a few of the species are notably plain. Dullest of the whole genus is the aptly named* ***Plain-colored Tanager****, which is mainly lead-grey, dull blue and blackish, except for the bright blue of its lesser upperwing-coverts; these, however, are usually concealed. The immature bird is even duller and plainer than the adult. Race* languens, *shown here, has a decidedly paler, more plain grey head and upperparts compared with the nominate, and the throat and chest are slightly paler grey.*

[*Tangara inornata languens*,
Canal Zone, Panama.
Photo: Greg & Yvonne Dean/
WorldWildlifeImages.com]

All species are notable for their bold, colourful plumages and lack of sexual dimorphism. These clades broadly correspond to more traditional taxonomic lineages but relationships within and between genera in DNA-based phylogenies frequently differ from more traditional taxonomies. For example, in 1970, Storer placed members of *Bangsia* in the genus *Buthraupis* and then positioned *Wetmorethraupis* next to *Buthraupis*, but newer DNA phylogenies reveal that neither *Bangsia* nor *Wetmorethraupis* is sister to *Buthraupis* and indeed they are not particularly closely related. In another example where old and new taxonomies differ, some authors in the past have argued that *Dubusia* and *Delothraupis* should be merged, but cytochrome *b* data indicate that these two genera are sister-taxa and that both should, or could be maintained. Also, the phylogenetic position of the monotypic *Chlorornis*, a large green-bodied, orange-billed tanager, has long been debated, and it has usually been listed as being of uncertain affinity. In 1886, Sclater considered it a finch in the genus *Saltator*, and in 1990 Sibley and Ahlquist, using data derived from DNA–DNA hybridization, believed that it was a sister-taxon to *Catamblyrhynchus*. Still other authors have noted similarities between the foraging behaviour of *Chlorornis* and that of *Buthraupis*. In recent molecular work, Burns and co-workers found that their cytochrome *b* data placed *Chlorornis* as sister to a clade containing the Golden-backed (*Buthraupis aureodorsalis*) and Black-chested Mountain-tanagers (*Buthraupis eximia*) but, surprisingly, not the widespread Hooded Mountain-tanager (*Buthraupis montana*). This last species, they found, might form a clade with the other three species, although they did not find strong molecular support for this. Furthermore, another species, the Masked Mountain-tanager (*Buthraupis wetmorei*), which was originally described in the genus *Tephrophilus*, proved to be only distantly related to other *Buthraupis*, a finding that corroborated the suspicions of the original describer.

The taxonomy of the mountain-tanager portion of the phylogenetic tree is further complicated by the presence of two species of *Thraupis*, namely the Blue-capped and Blue-and-yellow Tanagers, both of which are related to this clade but are not closely related to each other. These two *Thraupis* are unusual in that they have exceptionally long, linear geographical distributions and display a high amount of geographical variation. In yet another complication, the Vermilion Tanager (*Calochaetes coccineus*) also may belong with this clade of mountain-tanagers. Although traditionally placed near *Ramphocelus*, because of its glossy red-and-black plumage, and also near *Piranga*, because of its shape as well as some plumage similarities, *Calochaetes* more closely resembles some mountain-tanagers in habitat, behaviour and vocalizations. In addition, the sexes of *Calochaetes* are alike in plumage, a characteristic in which they are closer to mountain-tanagers than to *Ramphocelus* and *Piranga*, both of which are sexually dimorphic. Given these complications, Sedano and Burns suggest that, to accommodate so many species in a monophyletic arrangement, the simplest taxonomic



Recent genetic data indicate that, despite superficial similarities in appearance and diet, Chlorochrysa *tanagers are not particularly closely related to* Tangara. *The bill is longer and thinner than that of* Tangara, *but the most striking difference is in the legs, which are unusually strong and heavy because of their very active and acrobatic method of foraging. The male* ***Glistening-green Tanager*** *has a tuft of shining greyish-olive feathers behind his eye (usually inconspicuous, but clearly visible here), with a more conspicuous tuft of bright orange feathers immediately behind that. The orange feathers are thickened and club-like at the tips.*

[*Chlorochrysa phoenicotis*,
La Planada Nature Reserve,
Colombia.
Photo: Luis Mazariegos]



The genus Dacnis *was previously regarded as part of a separate family, Coerebidae, but later placed in Thraupidae on the basis of similarities in skull anatomy. Dacnises are sexually dichromatic, the males being blue and the females greenish. The eight races of the* ***Blue Dacnis*** *differ mainly in the tone of blue (lighter or darker) of the male plumage and the colour of the head and back of the female. Both sexes of the Blue Dacnis have pinkish legs, and their irides are red to reddish-brown. Around half of the* Dacnis *species have red or yellow irides. The bills of* Dacnis *tanagers are among the thinnest and sharpest in the family.*

[*Dacnis cayana paraguayensis*, Itatiaia City, Rio de Janeiro, Brazil. Photo: Edson Endrigo]

solution may be to unite this entire mountain-tanager clade, along with *Pipraeidea* and *Calochaetes*, in a single large "super" genus under the oldest applicable name, *Iridosornis*. Such a large and unwieldy generic grouping, however, may not gain acceptance until further corroborating work is undertaken, including an examination of the geographical variation in the two species of questionable *Thraupis*, the Blue-capped Tanager and the Blue-and-yellow Tanager.

The genus *Tangara*, with approximately 50 species, is the most species-rich genus in the entire New World, and it now seems destined to become larger still with the likely addition of several species currently placed in *Thraupis*. For the most part, it is composed of small birds of relatively uniform morphology and behaviour. All are confined to Neotropical latitudes and are perhaps best known for their often bold and colourful plumage patterns. Many are restricted in distribution and have specific habitat requirements, but they also are typically found together in sympatry with several other *Tangara* species. In the Andes, eight species are regularly sympatric and occasionally up to ten occur together; species occurring together in the Amazon are only slightly fewer. Several studies in the late 1990s supported the placement of the genus with other tanagers, but Burns and Naoki were the first to examine relationships within the genus. Using data from cytochrome *b* and ND2 genes, these researchers provided the first phylogenetic analysis of the diversity in this interesting genus, and addressed questions regarding its biogeographical history. Despite its large size, *Tangara* has been found to be monophyletic and composed of two distinct clades, these clades, in turn, being composed of about 12–13 species groups that generally correspond to those recognized in traditional taxonomies. Thus, genetic data supported the conclusions of earlier workers, who relied on plumage colour and pattern, distribution and behaviour.

In a reconstruction of the distributional history of *Tangara*, Burns and Naoki showed that the group, for the most part, originated in the northern Andes, and the two present-day clades that they identified were the result of an early split that occurred in that region. In addition, many speciation events subsequent to this split took place in the northern Andes. These researchers concluded that the northern Andes were clearly the major site of early speciation within *Tangara*, but that subsequent dispersal into other Neotropical regions increased diversity in the group. For example, dispersal followed by speciation occurred in two Amazonian groups. Repeated dispersals southward in the central Andes were followed by speciation, which similarly took place within a lower Central American group (Chiriquí–Darién, in Panama) and in two Atlantic Forest groups. One modern-day Atlantic Forest group, which includes the Green-headed Tanager (*Tangara seledon*), Seven-colored Tanager (*Tangara fastuosa*), Brassy-breasted Tanager (*Tangara desmaresti*) and Red-necked Tanager (*Tangara cyanocephala*), represents an assemblage of closely related species that is believed to have arisen from an early ancestor in the Atlantic region, and not from repeated colonization into the area from the outside. Although many similar speciation events occurred outside the northern Andes, this region has continued to be a source of such events, including a relatively modern species group that includes the Golden-eared Tanager (*Tangara chrysotis*), Saffron-crowned Tanager (*Tangara xanthocephala*), Flame-faced Tanager (*Tangara parzudakii*), Blue-whiskered Tanager (*Tangara johannae*), Golden Tanager (*Tangara arthus*), Silver-throated Tanager and Emerald Tanager, these last two having subsequently spread into Central America, and the Green-and-gold Tanager (*Tangara schrankii*), which has subsequently spread across Amazonia.

Molecular studies have not, to date, reliably identified a sister-taxon to *Tangara*, although the genus is part of a larger monophyletic clade that includes a group of "core" tanagers and numerous related tanager genera. Thus, the closest living relatives of *Tangara* remain uncertain. Also of interest in the Burns and Naoki study was the repudiation of the long-standing assumption that *Chlorochrysa* is closely related to *Tangara*. On the basis of size and plumage similarities, *Chlorochrysa*, which includes three of the most brilliantly coloured of all tanagers, has been traditionally placed next to *Tangara* in linear sequences. Some taxonomists have suggested that *Chlorochrysa* be subsumed into *Tangara*, but none of the phylogenetic analyses has identified *Chlorochrysa* as being sister to *Tangara*. This is not particularly surprising, because the plumage of all three *Chlorochrysa* species differs in being exceptionally glossy and glistening, the tibio-tarsus and adjacent leg musculature are larger and heavier than those of *Tangara*, and the bill of all three is proportionately longer and thinner. Corresponding to these anatomical differences, the foraging behaviour of *Chlorochrysa*, which is acrobatic and frequently includes episodes of hanging upside-down, is decidedly unlike that of *Tangara*.



*The **Yellow-tufted Dacnis** is often treated as conspecific with the Black-faced Dacnis* (Dacnis lineata). *As well as being geographically separated, however, the two differ in plumage, particularly the bright yellow breast, belly and undertail-coverts of the Yellow-tufted, which are white on the Black-faced Dacnis, and the yellow pectoral tuft from which the Yellow-tufted Dacnis gets its name. Both species have yellow irides. The two races of Yellow-tufted Dacnis are themselves widely separated, the nominate being found in northern Colombia, and* aequatorialis *on the Pacific slope in western Ecuador.*

[*Dacnis egregia egregia*, Río Alicante, Maceo, Antioquia, Colombia. Photo: Rodrigo Gaviria]

Previous linear sequences of *Tangara*, based on non-molecular characters, have usually grouped the Paradise Tanager (*Tangara chilensis*) with the Green-headed Tanager and Seven-colored Tanager on grounds of plumage similarities, but this treatment was not supported by molecular data. These relationships suggest that the striking similarity in plumage of the Paradise and Seven-colored Tanagers is the result of convergence. In the studies made by Burns and Naoki, the Paradise Tanager appeared to be most closely related to the Opal-rumped Tanager (*Tangara velia*) and Opal-crowned Tanager (*Tangara callophrys*). On the other hand, the Seven-colored and Green-headed Tanagers belong to the monophyletic sister-clade that also contains the Red-necked and Brassy-breasted Tanagers, a grouping that receives some support from their coincident distributions in the Atlantic Forest of eastern Brazil.

Several species of *Tangara* exhibit marked geographical variation in plumage colour and sometimes also in plumage pattern, and well over 100 subspecies in the genus have been described on the basis of this variation. With this in mind, Burns and Naoki examined levels of cytochrome *b* intraspecific sequence divergence in *Tangara*. Numerous factors can affect levels of sequence divergence, and these sometimes vary widely, although most species show levels of variation at or below 1%. Species presenting levels of variation higher than this often are those for which subspecies are described. Burns and Naoki found that, for many *Tangara*, sequence variation was indeed about 1% or less. This was the case for individuals from one and the same population, for those from adjacent island populations, for individuals from the same slope of the Andes, and for individuals from nearby populations, for instance on the east Andean slope and the adjacent Amazonian lowlands. They noted that for two species, namely the Blue-necked Tanager (*Tangara cyanicollis*) and Beryl-spangled Tanager (*Tangara nigroviridis*), which had populations on both the east and the west slopes of the Andes, the amount of sequence divergence was somewhat higher, at respectively 1·8% and 1·0%, but still within the range typical for individuals of the same species.

Five species of *Tangara* studied by Burns and Naoki showed constantly higher levels of sequence variation than was expected. For three of these, the Metallic-green Tanager (*Tangara labradorides*), Golden Tanager and Bay-headed Tanager (*Tangara gyrola*), the Andes appear to act as a barrier to gene flow. Examples of Metallic-green Tanagers from western Ecuador differed from those in north-eastern Peru by 6·6%, the highest observed for any *Tangara* and well above the level of divergence found for other accepted species of *Tangara*. For example, the Paradise, Opal-rumped and Opal-crowned Tanagers occur sympatrically in part of Amazonia without interbreeding, but they differ from one another by an average sequence divergence of 3·9%. Burns and Naoki observed similarly high levels of divergence, 3·6%, between east and west Andean slope populations of Golden Tanagers, and even higher levels of 4·6% between populations of



Like Dacnis, Cyanerpes *species have brightly coloured legs. The **Red-legged Honeycreeper** is the largest in the genus, and its slender, pointed and decurved bill, an adaptation to nectar-eating, can be up to 25 mm long. Most of the species in this genus also have a long bill. The exception is the Short-billed Honeycreeper* (C. nitidus). *Its bill is just 10 mm long, with an almost straight lower mandible and the upper mandible only slightly decurved near the tip. Male Red-legged Honeycreepers are very unusual among tropical bird species in that the male has a post-breeding "eclipse" plumage resembling that of the female.*

[*Cyanerpes cyaneus holti*, Aracruz, Espírito Santo, Brazil. Photo: Edson Endrigo]

Bay-headed Tanagers east of the Andes and those in Central America. Levels of variation within each of these groups of Bay-headed Tanagers was much lower, at about 1%, an indication that Central American populations and those east of the Andes have been isolated for a long time but that gene flow has been maintained within each population. Two allopatric populations of Spotted Tanagers (*Tangara punctata*), one from the Andes and the other from Amazonia, exhibited a sequence divergence as high as 6·0%, and two allopatric populations of Turquoise Tanagers (*Tangara mexicana*), one in Amazonia and another isolated in south-eastern Brazil, showed 4·1% divergence. In both cases, the high level of divergence indicates a long history of separation.

Burns and Naoki also found that some currently recognized species are separated from their closest relatives by unusually low levels of sequence divergence. Notable were the Black-capped Tanager (*Tangara heinei*) and Straw-backed Tanager (*Tangara argyrofenges*), which had a divergence of as little as 0·4%, a level of differentiation typically observed only within species. An explanation of such minimal differentiation despite significant plumage differences and non-overlapping distributions requires investigation. A third species, the Silver-backed Tanager (*Tangara viridicollis*), is similarly only weakly differentiated, by no more than 1·7%, from the previous two and also has an allopatric distribution. In their investigations, Burns and Naoki turned up other species groups with low levels of sequence divergence, including the morphologically similar Burnished-buff, Scrub and Lesser Antillean Tanagers. This clade represents a recent speciation in *Tangara* estimated to have occurred about 800,000 years ago, near the beginning of the middle Pleistocene. Pairwise-sequence-divergence data for these three taxa revealed a difference of only 1·4%. The low level of differentiation in the Lesser Antillean Tanager is somewhat surprising given its isolation on Caribbean islands, but less so that in the Scrub and Burnished-buff Tanagers, which are locally sympatric in Colombia. Current sympatry, however, may be the result of human-engendered habitat alteration or natural overlap. More recently, the Green-capped Tanager (*Tangara meyerdeschauenseei*), a fourth similar species, was described from scrub in a small, isolated highland site in south-eastern Peru. Despite its similarity to the other three, sequence data indicated that it differed by 3·8%, and it appears to be sister to the group. These four species are similar in plumage pattern and colour, and all occur in open and semi-open habitats rather than forest. Another equally recent split involved two members of the genus *Bangsia*, namely the Moss-backed and Gold-ringed Tanagers, both confined to the Chocó–Pacific slope region.

The sequence-divergence data obtained by Burns and Naoki revealed also that some *Tangara* tanagers whose status as full species has been questioned in the past are well differentiated genetically from their closest relatives. The geographically isolated Spangle-cheeked Tanager of the Chiriquí Highlands, in Costa Rica and western Panama, and Green-cheeked Tanager of the Darién Highlands, in eastern Panama, were often treated as two geographically isolated populations of a single species because they are rather similar in their plumage colour and pattern. Sequence-divergence data indicated that the two differed by 6·9%, well above typical values found among reproductively isolated species. In another example, the Masked Tanager (*Tangara nigrocincta*), found east of the Andes, and the Golden-hooded Tanager (*Tangara larvata*), found west of the Andes and in Middle America, have sometimes been regarded as representing a single species because they have similar overall plumage patterns. Pairwise-sequence-divergence data for these two taxa, however, showed that they differed by 4·4%, indicating that the two are well differentiated. Perhaps surprisingly, the Golden-hooded Tanager was genetically closest to the Blue-necked Tanager, another "hooded" species of primarily montane distribution. The three taxa have sometimes been considered to form a superspecies.

Finally, the enigmatic Golden-collared Honeycreeper (*Chlorophanes pulcherrimus*) has sometimes been placed in a monotypic genus *Iridophanes* and sometimes in the genus *Tangara*. Some authors also have noted similarities between it and the Green Honeycreeper (*Chlorophanes spiza*). It differs from *Tangara* in bill shape and colour, in having red eyes, and in its feeding behaviour. The molecular phylogenies of Burns, Hackett and Klein showed that the species is not part of a monophyletic group with *Tangara*, but appears to be a sister-taxon to the genus *Chlorophanes*. These scientists recommended that "*Tangara pulcherrima*", as it was then known, be reassigned preferentially to the genus *Chlorophanes*, a reasonable taxonomic solution for this long-debated taxon.

Turning now to the Swallow Tanager, this unusual species has traditionally been placed in a monotypic genus because it is



The two Heterospingus *species are rather large, heavily built tanagers, with a long heavy beak hooked at the tip. The two have been considered conspecific, but have significant plumage differences. While both are predominantly black with a yellow rump and white pectoral tufts, the male* ***Scarlet-browed Tanager*** *has a white brow line broadening into a prominent and slightly raised scarlet tuft, which is lacking on the female. The sexes of the duller, more leaden-grey Sulphur-rumped Tanager* (H. rubrifrons) *are alike. Both species often move faster than the mixed-species flocks with which they frequently forage, but the Scarlet-browed Tanager may also move sluggishly or perch motionless and erect for short periods.*

[*Heterospingus xanthopygius berliozi*, Ecuador. Photo: Marc Guyt/AGAMI]

morphologically and behaviourally distinct. It differs from other tanagers in building cup-nests in horizontal cavities in banks and cliffs, in holes in trees and in man-made structures. The Swallow Tanager also has an unusual palatal structure, some distinctive skeletal features, exceptionally long wings, and a bill that is rather flat and is unusually wide basally. It is frequently found in variably sized single-species flocks and is migratory or nomadic. These distinctive features have, in the past, been cited by various taxonomists as justification for placing this unusual species in its own family, in a separate subfamily, or in a separate tribe. All of these earlier morphology-based studies seem to have missed the mark. Sibley and Ahlquist's data from DNA–DNA hybridization were the first to suggest that *Tersina* was a tanager, possibly a sister-taxon to *Tangara*, a remarkable finding not previously suspected. The cytochrome *b* data obtained by Burns strongly supported this result, indicating that *Tersina* was, indeed, a tanager, and not a sister to the rest of the family, and that it should be included with the tanagers. The remarkable suite of morphological differences between *Tersina* and other tanagers seemed not to translate into comparable genetic change, a situation very unlike that found in *Euphonia* and *Chlorophonia*. The amount of sequence divergence between *Tersina* and other tanagers was, in fact, similar to that between other genera of tanagers. As pointed out by Sibley, the numerous unusual morphological features of *Tersina* seem, instead, to be associated with its specialized feeding behaviour and have evolved much more rapidly than have corresponding changes in mtDNA. Burns found that cytochrome *b* gene data placed *Tersina* with the honeycreeper genera *Cyanerpes* and *Dacnis*, the three forming a monophyletic group with strong support. While the bill shapes of *Cyanerpes* and *Dacnis* differ markedly from that of *Tersina*, the three genera have similar plumage features, including sexually dimorphic plumages in which the males are blue and the females are greenish. The inference is that, while plumage features may be conservative and slow to change, bill shapes that facilitate feeding behaviour may be more plastic and more readily subject to rapid changes.

Early taxonomists placed a number of genera of small, nectar-feeding, New World songbirds in a separate family under the name Coerebidae. In 1951, in an examination based on the anatomy of nectar-feeders, W. Beecher argued that the genera *Diglossa*, *Cyanerpes*, *Chlorophanes*, *Iridophanes*, *Hemidacnis* (= *Dacnis*), *Euneornis*, *Xenodacnis* and *Oreomanes* were in reality nectar-adapted tanagers, with similarities the result of convergent adaptations for nectar-feeding. He also concluded that the three genera *Coereba*, *Conirostrum* and *Ateleodacnis*, the last later subsumed into *Conirostrum*, were in fact parulid warblers adapted for nectar-feeding. As a result of his study, he argued that the Coerebidae should be disbanded, and he recommended the placing of some honeycreeper genera in a tribe within Thraupidae and some genera in a separate tribe within Parulidae. His work was largely accepted in systematic arrangements, but decades later other taxonomists disagreed with his conclusions and split various genera among the families Coerebidae, Emberizidae and Thraupidae. More recently, Sibley and Ahlquist, who included only two of these genera, *Cyanerpes* and *Diglossa*, in their analyses of DNA–DNA hybridization, placed all former members of Coerebidae in a tribe Thraupini within a subfamily Emberizinae, which formed part of a greatly enlarged Fringillidae. The overall result has been little general agreement on the phylogenetic relationships of Neotropical honeycreepers.

Various molecular studies included some members of the Coerebidae, but Burns, Hackett and Klein, in 2003, were the first to include all ten members of the original Coerebidae, as well as numerous other genera, in a sequence study of the mitochondrial cytochrome *b* gene, thus greatly expanding the coverage of nectar-feeding species. Their analysis indicated that the Coerebidae did not form a monophyletic group. In addition, none of the former Coerebidae was closely related to the New World warblers, a finding that contradicts the early conclusions of Beecher and others but generally agrees with the DNA–DNA hybridization studies of Sibley and Ahlquist, who found that all of the Coerebidae were closely related to the species that they included in Thraupini, corresponding to the present-day Thraupidae. In addition, recent cytochrome *b* gene data indicate that many Neotropical honeycreepers form well-supported clades with certain tanagers and finches, the finches themselves being tanagers. The conclusion to be drawn from the lack of monophyly in Coerebidae is that recognition of this family is no longer warranted. The molecular data strongly suggest that nectarivory must have arisen multiple times during the long evolutionary history of tanagers and their allies. Furthermore, in general, species of Coerebidae



The three Hemithraupis *species are small, rather slender-billed and active tanagers, which in appearance and behaviour resemble New World warblers (Parulidae). In this genus, and the closely related* Chrysothlypis, *the upper mandible is dusky grey and the lower mandible pinkish or yellowish. The eleven subspecies of* ***Yellow-backed Tanager*** *currently recognized differ mainly in the intensity of their yellow colour and the extent of black mottling on the sides of the male. Some races are only weakly defined.*

[*Hemithraupis flavicollis insignis*,
Guapimirim,
Rio de Janeiro, Brazil.
Photo: Edson Endrigo]



Chrysothlypis *contains a single species, the* ***Black-and-yellow Tanager****. This genus is closely related to* Hemithraupis. *Unexpectedly, both of these genera of parulid-like tanagers are also closely related to the large, heavy-billed* Heterospingus. *Another genus containing a single warbler-like species,* Erythrothlypis, *has sometimes been subsumed into* Chrysothlypis. *The Scarlet-and-white Tanager* (E. salmoni) *is similar in size, body mass and bill shape to the Black-and-yellow Tanager, and both are sexually dimorphic, but they differ markedly in plumage colour and pattern, behaviour and food preferences.*

[*Chrysothlypis chrysomelas titanota*, Taús, Costa Rica. Photo: Julio E. Sánchez]

did not segregate into monophyletic groups based on bill shape or feeding behaviour. Instead, species with markedly different bill sizes and shapes often proved to be each other's closest relatives. In a striking example of this, the Bananaquit (*Coereba flaveola*), a species with a thin, sharply pointed and slightly decurved bill, appears to be the sister-taxon of the Yellow-faced Grassquit (*Tiaris olivaceus*), a species with a thick, stubby and conical bill and currently placed in Emberizidae.

Two nectar-feeding members of the former Coerebidae, the Bananaquit and the Orangequit (*Euneornis campestris*), the latter confined to Jamaica, belong to a clade of species that build covered nests. This clade includes also some seed-eating genera of "Darwin's finches" and species in the genus *Tiaris*, all currently placed in Emberizidae. The striking differences in bill morphology and feeding behaviour found within this group of closely related species have evidently taken place with little genetic divergence among the species. On the basis of these morphological differences, members of this clade have in the past been placed in three separate families.

Similarly, the systematic position of *Conirostrum* in relation to other taxa has had a confused history. In the past, authors have placed this genus variously in Coerebidae, Parulidae and Thraupidae. T. Schulenberg believed that *Conirostrum* was close to *Oreomanes* on the grounds of plumage colour and pattern, body shape, and the occurrence of hybridization between *Oreomanes* and the White-browed Conebill (*Conirostrum ferrugineiventre*). Recent molecular phylogenies support the contention that the two genera form a monophyletic group. The genus *Conirostrum* itself, however, is not monophyletic with respect to *Oreomanes*, and further work is awaited before the systematic status of *Conirostrum* can be more fully resolved.

Perhaps the best-known New World nectar-feeders are the flowerpiercers in the genus *Diglossa*. All members were originally described in this genus, but some species were at one time separated in *Diglossopis* on the basis of plumage characters, having overall blue plumage, with little or no sexual dimorphism, and a smooth, rather than scaled, forehead. *Diglossopis*, however, proved to be polyphyletic, with at least one member, the Indigo Flowerpiercer (*Diglossa indigotica*), more closely related to some *Diglossa* than to those placed in *Diglossopis*, and the latter genus is no longer recognized. Genetically, *Diglossa* is monophyletic and appears to form a large monophyletic clade with representatives of at least ten other genera, namely *Acanthidops*, *Catamenia*, *Conirostrum*, *Haplospiza*, *Idiopsar*, *Melanodera*, *Oreomanes*, *Phrygilus*, *Sicalis* and *Xenodacnis*. Some of these are also sister to *Diglossa*, although the exact membership of these sister-groups is not fully resolved. Among the 18 species of *Diglossa*, four superspecies groups were postulated some 40 years ago by F. Vuilleumier. These four, based on, respectively, *D. lafresnayii*, *D. carbonaria*, *D. baritula* and *D. albilatera*, have subsequently been supported by the molecular-genetic studies of Mauck and Burns,

In the past, authors have placed the genus Conirostrum *variously in Coerebidae (the former honeycreeper family) and Parulidae (the New World warblers), but molecular-genetic data indicate that it belongs in Thraupidae. The* ***White-browed Conebill*** *is generally found between 3000 m and 3600 m and in the vicinity of the tree-line, and five other members of the genus are also highland species. The four lowland* Conirostrum *species were originally placed in the genus* Ateleodacnis, *and some taxonomists argue that they should be returned to it, as they are morphologically distinct from the highland species.*

[*Conirostrum ferrugineiventre*, Cotapata National Park, La Paz, Bolivia. Photo: Daniel Alarcón]





Only one tanager species, the ***Giant Conebill****, is regularly found above the tree-line. It inhabits a unique* Polylepis *woodland that grows at elevations higher than the normal timber-line. The monotypic genus* Oreomanes *is sometimes subsumed in* Conirostrum*, and the Giant Conebill has hybridized with the White-browed Conebill* (C. ferrugineiventre)*, shown in the previous picture, suggesting a close relationship. No subspecies of Giant Conebill are recognized here; bill length increases and plumage becomes paler from north to south, but facial plumage varies independently of geographical location, often within a single population.*

[*Oreomanes fraseri*, Papallacta, Ecuador. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]

although the amount of interspecific variation within the *carbonaria* superspecies was very low and comparable to that usually found within a single species.

On the basis of a biogeographical reconstruction of the ancestors of all flowerpiercers, the Andes are inferred to be the region where the group originated. Specifically, the northern portion or the northern and central portions of the Andes are the most important regions. This is reflected in modern distributions, many species having ranges that include the northern Andes. Events such as uplift and other tectonic activity, climate change and climatic cycles are all likely to have played roles in the diversification of the family, although the linking of specific events or cycles, except in the broadest terms, remains an elusive goal of molecular biogeographers. The timing of speciation events for flowerpiercers spans several million years, dating back as early as 15 million years and as recently as about 400,000 years. Of approximately 17 speciation events inferred for flowerpiercers, the five most recent occurred during the Pleistocene, between about 1·5 million and 0·4 million years ago; five more speciation events can be placed within the Pliocene, roughly between 5 million and 2 million years ago; and the remaining seven date from the early and middle Miocene, stretching back to between 15 million and 6 million years ago. Historically, both the central and the northern portions of the Andes reached about half of their present elevation some 10 million years ago, by which time *Diglossa* speciation was already under way. The central portion of the Andes underwent a final rapid uplift, reaching its present height between about 10 million and 6 million years ago, somewhat before the last main uplift of the northern end of the Andes, which took place between about 7 million and 4 million years ago. Some parts of the northern Andes experienced a rapid final uplift as recently as 5 million to 2 million years ago. These dates correspond well with a variety of *Diglossa* speciation events. Such events, however, have continued to take place even more recently, several having occurred during the late Pleistocene, when glacial episodes were prominent. In particular, during the last 800,000 years, glacial episodes were extreme and are believed to have been important in influencing speciation events. The *carbonaria* superspecies is an example of a recent *Diglossa* speciation event that was driven by Pleistocene glaciation cycles; the earliest speciation event for this group is dated to about 475,000 years ago (with a margin of error dating to between 785,000 and 207,000 years ago). It represents one of a growing number of examples now identified in which rapid plumage divergence has not been accompanied by similar rapid mtDNA divergence. In the *carbonaria* superspecies, sequence divergence is equal to or even less than that found in many species.

While most of these speciation events occurred within the Andes, there were two dispersal events out of the Andes, one to Middle America, either to the Madrean Highlands or to the Chiriquí-Darién Highlands, and another to the tepui highlands of southern Venezuela. The dispersal into Middle America is inferred to have occurred between about 12 million and 5 million years ago, which is considerably earlier than the final closure of the Panamanian land-bridge connection between Central and South America. Molecular studies of the distribution of species before and after the land-bridge closure, however, are at present too few for any statements regarding general patterns to be made. To date, evidence suggests only that some species crossed prior to closure, and others at or after closure. The analysis by Mauck and Burns indicates a dispersal from the Andes to the tepuis, but does not show dispersal movements away from the tepuis. The dispersal of a *Diglossa* ancestor to the tepuis occurred between about 10 million and 6 million years ago, and the two species presently found in the tepuis were shown to have separated about 6 million years ago. Interestingly, the two exhibit only relatively weak evidence of monophyly, and Mauck and Burns leave open the possibility of a second independent dispersal from the Andes to the tepuis. The tepuis represent an extremely old rock formation, and erosion has been under way since the Cretaceous period. It is uncertain, however, to what extent the tepuis have changed since the first inferred ancestral flowerpiercer reached the area, and it is equally uncertain if the tepuis were significantly more extensive at this point in history and if this may have enabled successful dispersal and colonization. If the calculations of Mauck and Burns are reasonable, it is clear that the important glacial episodes of the Pleistocene occurred far too late to explain flowerpiercer dispersal to the tepuis.

While a strongly hooked bill is regarded as a characteristic morphological feature of the genus *Diglossa*, the size of the bill hook, as well as the size of the bill, varies considerably in modern *Diglossa*. The longest bill and the smallest hook in relation to

bill size are found in the Masked Flowerpiercer (*Diglossa cyanea*), and the smallest bill and proportionately the largest hook are possessed by the Slaty (*Diglossa plumbea*) and Cinnamon-bellied Flowerpiercers (*Diglossa baritula*), two Middle American species which are also among the smallest flowerpiercers. Mauck and Burns postulated an initial divergence in flowerpiercer evolution in which bill and hook sizes began to diverge, but they argued that the change in bill-and-hook size has not been a simple progression. Instead, combinations of bill sizes and hook sizes have continued to evolve and change through history. Within the phylogeny of the genus *Diglossa*, a large bill hook and a small bill hook evolved many times in lineages not closely related to each other, indicating that bill morphology is malleable to evolutionary pressures. The diversity in hook size, as well as in bill size and length, has allowed up to about six species to co-exist locally at some Andean sites. Where multiple species of *Diglossa* are sympatric, bill and hook sizes differ markedly, resulting in distinctive partitioning of food resources. Overlapping species also typically differ in micro-habitat choices and in degrees of sociality, among other things.

An examination of phylogenetic-tree branches indicates that nectar-feeding lineages in tanagers arose three times and possibly more. One lineage includes *Dacnis* and *Cyanerpes*, a second includes *Diglossa*, *Oreomanes* and *Xenodacnis*, and a third lineage involved *Chlorophanes* and possibly others. *Coereba* and *Euneornis* may involve yet another lineage. In the second lineage, a close relationship among the three genera may not be easily predicted on the basis solely of bill morphology and feeding adaptations. These three genera share some plumage similarities, but *Diglossa* species, at least in the case of the smaller ones, are primarily nectar-feeders with a hooked bill and with a few species partially adapted for feeding on small fruits, whereas *Oreomanes* is a bark-searching insect-eater with a thin sharply pointed bill, and *Xenodacnis* is a partial nectarivore with a sharply pointed bill. The three differ remarkably in bill morphology. The possession of similar plumage patterns but different bill shapes, as seen in these three genera, mirrors a similar pattern found in *Tersina*, *Dacnis* and *Cyanerpes*.

Galapagos finches, often referred to as Darwin's finches, have long been acclaimed for their importance in evolutionary theory, but their origin has only recently been examined by means of rigorous phylogenetic procedures. An analysis of mitochondrial DNA from the cytochrome *b* gene indicated that the group is monophyletic, and presented as its sister a clade of six Caribbean species, comprising four of *Tiaris*, and one each of *Loxigilla* and *Melanospiza*, all of which build domed nests and all of which are closely aligned with tanagers. At the same time, of 13 species identified as closely related to Darwin's finches eleven proved to occur in the Caribbean, including eight island endemics; together with Darwin's finches, they form a domed-nest clade. This evidence from nest architecture, as well as genetic data, weakens the long-held view that a South American ancestor was the source of the Galapagos birds. Additionally, the taxa in the Caribbean group display remarkably low genetic diversity, suggesting that, instead of being relics of formerly widespread ancestors, or birds that managed to arrive from a variety of adjacent areas, they represent a group of closely related and recently evolved taxa. They may have originated more recently than other taxa in South America, and they may have been more successful in colonizing newer islands, as well as having a greater likelihood of dispersing. Notwithstanding the recent findings from molecular-genetic analyses, all of these finches are currently included within the family Emberizidae (see page 428), although their true placement appears to be in Thraupidae.

Other recent molecular work places several high-Andean and Patagonian genera, all at present included in Emberizidae, with Thraupidae. These genera, *Phrygilus*, *Diuca*, *Haplospiza*, *Poospiza*, *Sicalis*, *Embernagra* and *Catamenia*, spring from relatively recent radiations into open, largely treeless habitats above the tree-line in the Andes and on the Patagonian steppes. The addition of these genera increases the diversity of habitats which tanagers are known to occupy, and represents a marked expansion from earlier, more traditional family classifications with species predominantly in humid forest habitats and few or none in xeric regions and treeless zones. Now, the habitats range to xeric scrub in the Galapagos, high-elevation grasslands in the Andes and arid grassland and shrub-steppe in Patagonia.

Although *Euphonia* and *Chlorophonia* have long been regarded as tanagers, all molecular-genetic studies have suggested that the two genera form a monophyletic clade outside the Thraupidae. Importantly, these two genera differ from tanagers in several other significant ways, including the possession of a specialized diges-



Recent molecular-genetic data indicate that the ***Tit-like Dacnis****, with its thin, sharply pointed bill adapted to insectivory and nectaring, is closest to the flowerpiercers of the genus* Diglossa*, but also to the finch-billed and seed-eating* Haplospiza *and* Catamenia*, and the bamboo specialist* Acanthidops*. The last three genera are currently placed in Emberizidae. While the male Tit-like Dacnis is essentially all dark blue, the throat and underparts of the female are a deep cinnamon-buff, colouring she shares with* Oreomanes*, some* Conirostrum *and some* Diglossa*. Other common colours of species in these genera include blues and greys, supporting the idea of a close relationship among them.*

[*Xenodacnis parina bella*, Ecuador. Photo: Glenn Bartley]





The flowerpiercers (Diglossa) *have a downward-curved hook on the upper mandible of the beak that enables them to rob flowers of nectar without pollinating them. The upper mandible is used to hold the corolla of a flower while the bird pierces the flower with its lower mandible. The size of the hook, as well as the size of the bill, varies considerably. The* ***Moustached Flowerpiercer*** *(above) is a large flowerpiercer with a bill proportionately longer, straighter and less obviously hooked than that of smaller members of the genus. The longest bill and the smallest hook in relation to bill size are found in the* **Masked Flowerpiercer** *(below). The smallest bills and proportionately the largest hooks are possessed by the Slaty Flowerpiercer* (D. plumbea) *and the Cinnamon-bellied Flowerpiercer* (D. baritula), *which are also among the smallest flowerpiercers. A relatively large hook and a relatively small hook evolved multiple times in unrelated lineages. Up to six species of flowerpiercer can co-exist locally at some Andean sites, the differences in bill and hook sizes enabling food resources to be partitioned. Flowerpiercers originated in the Andes, with a single dispersal event from the northern Andes to Central America, and another single dispersal event from the northern Andes to the tepuis. The Masked Flowerpiercer, along with the Deep-blue* (D. glauca), *Bluish* (D. caerulescens) *and Indigo Flowerpiercers* (D. indigotica), *has sometimes been placed in a separate genus,* Diglossopis, *on grounds of some important anatomical features. Recent molecular-genetic data, however, indicate that these four species do not form a monophyletic group.*

[Above: *Diglossa mystacalis albilinea*, Manu National Park and Biosphere Reserve, Peru. Photo: Ketil Knudsen.

Below: *Diglossa cyanea cyanea*, Ecuador. Photo: Tui de Roy/ Roving Tortoise Photos]



Molecular-genetic data indicate that the ***Plushcap*** *probably belongs among the tanagers. Its relationships are uncertain, and it has also been placed in a subfamily of Emberizidae (buntings and New World sparrows), and in its own single-genus, single-species family, Catamblyrhynchidae. Its stubby bill is thick and swollen. Like* Hemispingus *tanagers, the Plushcap is closely associated with dense undergrowth in montane forest, mainly where* Chusquea *bamboo is present, and its song is reminiscent of that of several* Hemispingus *species.*

[*Catamblyrhynchus diadema diadema*, Tapichalaca Biological Reserve, Zamora-Chinchipe, Ecuador. Photo: Doug Wechsler/ VIREO]

tive track and the building of a covered nest. In both, the stomach is reduced to little more than a thickening of the digestive track and is adapted for digesting soft fruit pulp but not the much harder and potentially toxic accompanying seeds, and for quickly passing seeds and other indigestible material through the gut. The covered nest also sets these two genera apart from all except a tiny fraction of tanagers, and nest architecture appears to be a conservative genetic behaviour that is not likely to change over short periods of time. Both genera are also remarkably similar in skeletal morphology. Cytochrome *b* molecular data suggest that *Chlorophonia* and *Euphonia* form a distinctive, monophyletic clade well separated from all Thraupidae, as well as from Parulidae. Genetic distances between tanagers and *Chlorophonia* and *Euphonia* were found to be, in fact, greater than those between parulid warblers and tanagers. Recent work suggests that the two genera are closest to Fringillidae and should not be included within Thraupidae.

Again on the basis of cytochrome *b* data, Burns found that the three Caribbean genera *Spindalis*, *Nesospingus* and *Phaenicophilus*, all traditionally placed in Thraupidae, formed a paraphyletic basal grouping compared with other tanagers and, thus, were not closely related to tanagers. The close relationship of these three genera to one another was not surprising, but the close relationship of *Chlorospingus* to these three was unexpected. Previous linear classifications had not identified the four genera as being closely affiliated, in part because *Chlorospingus* is continental and montane, whereas the other three genera are Caribbean and occur in both lowland and highland areas. Nevertheless, a few plumage characters are shared by all four genera. For example, the plumage of all four is olive-green to olive-brown and yellowish. In addition, *Spindalis* and *Phaenicophilus* have the head distinctively striped black and white, a pattern mirrored in the Sooty-capped Bush-tanager (*Chlorospingus pileatus*) in Costa Rica, and to a lesser degree in the form of postocular spots and marks in several other *Chlorospingus*. Female and juvenile plumage similarities in some of the Caribbean genera also have been noted.

In contrast to numerous plumage similarities between *Chlorospingus* and the three Caribbean genera, the sizes of these two groups differ dramatically. Average weights for *Spindalis*, *Phaenicophilus* and *Nesospingus*, respectively 31·2 g, 29 g and 36 g, are about 50% larger than that for *Chlorospingus*, which is 21·7 g. While all species of *Chlorospingus* are confined to montane regions from Mexico south through the Andes to northern Argentina, *Spindalis*, *Phaenicophilus* and *Nesospingus* are largely restricted to islands, where their larger sizes may have evolved for a variety of reasons associated with island distributions, including absence of predators, food resources and lack of competition.

Over and above the relationship with these three Caribbean genera, recent evidence now suggests that *Chlorospingus* may be closest to some New World sparrows of the genus *Arremonops*. The group of taxa habitually combined as the Common Bush-tanager (*Chlorospingus ophthalmicus*) is by far the most complex in the genus and is the one most in need of taxonomic revision. Five distinct clades have been identified within the Mexican population alone. Moreover, several Panamanian and Andean groups have been identified that may represent distinct species, including birds from parts of Venezuela and adjacent northern Colombia, such as the subspecies *venezuelensis*, *eminens*, *exitelus*, *flavopectus*, *trudis* and others, which are characterized by the fact that they have a blackish or grey, not brownish, crown, an essentially unspotted white throat, and no white postocular spot, and the dark-eyed form *argentinus* and others from the far southern portion of this group's range.

Chat-tanagers (*Calyptophilus*) have long been regarded as thraupids, but the phylogenetic relationships of the various Hispaniolan populations of this genus to tanagers or other groups remain ambiguous. Recent molecular investigation based on sequences of mitochondrial ND2 DNA and three nuclear intron loci has provided support in resolving the taxonomic status of the seven extant populations of *Calyptophilus*. Separated montane populations may have differentiated prior to the joining of the two paleo-islands that form present-day Hispaniola. These populations, however, do not have a long history of isolation, and the question is that of whether they represent one large polymorphic population or two taxonomic species.

Finally, there is the matter of the true affiliations of the genera *Piranga*, *Habia* and *Chlorothraupis*. Although *Piranga* species are often regarded as "classic" tanagers, several independent molecular studies have convincingly indicated that members of this genus are not thraupids and more properly belong among the cardinalids, where they likely are sister to a well-supported clade that includes *Cardinalis*, *Caryothraustes*, *Periporphyrus* and *Rhodospingus*, almost all of which are characterized by the possession of a black mask, though this is quite



Another species of uncertain affinities, the ***Black-backed Bush-tanager*** *is regarded by some authorities as belonging in the family Emberizidae, possibly being closest to the* Atlapetes *brush-finches. Others see it as closest to the* Chlorospingus *bush-tanagers, and molecular-genetic data indicate that it probably does belong in Thraupidae. It is a high-elevation species, found in dense, wet forest and in patches of stunted and* Polylepis*-dominated woodland up to the tree-line. It has been recorded as high as 4000 m in Ecuador.*

[*Urothraupis stolzmanni*, Los Nevados National Park, Colombia.
Photo: Pete Morris]

small on some species. The eleven species of *Piranga* are sexually dichromatic, with males brightly coloured and typically having red in the plumage. Three *Piranga* also have a small black mask, although the group appears to have diverged quite early from its sister-group, and the mask, as a morphological character, may have been lost by an ancestor of the remaining members of the genus. The geographical distribution of *Piranga* is centred on Mexico and Central America, and three species are endemic there. *Piranga* is composed of a clade containing the Red-hooded Tanager (*Piranga rubriceps*), White-winged Tanager (*Piranga leucoptera*) and Red-headed Tanager (*Piranga erythrocephala*), and another clade containing the Summer (*Piranga rubra*), Western (*Piranga ludoviciana*), Scarlet (*Piranga olivacea*) and Flame-colored Tanagers (*Piranga bidentata*) and the Northern (*Piranga hepatica*), Highland (*Piranga lutea*) and Lowland Hepatic-tanagers (*Piranga flava*). The placement of one species, the Rose-throated Tanager (*Piranga roseogularis*), currently remains uncertain.

Piranga, along with *Habia* and *Chlorothraupis*, forms a large, well-supported clade that seems to be unrelated to the tanagers and clusters within "Cardinalini". The placing of these genera within Cardinalini differs from all previous historical and modern taxonomies. Additionally, the ant-tanagers forming the genus *Habia* appear to be a polyphyletic group also unrelated to tanagers, with the Red-crowned Ant-tanager sister to all *Chlorothraupis*. This polyphyly is evident also in the plumages of ant-tanagers, some of which exhibit marked sexual dichromatism, with males mostly red and females, such as the female Red-crowned Ant-tanager, having dull yellowish and olive plumage much like monochromatic *Chlorothraupis*. In some other species of ant-tanager, females do not differ greatly from males, but are duller.

Morphological Aspects

True Thraupidae comprise a morphologically fairly diverse group of species that are not easily summarized in broad generalizations. Those known to be true tanagers (see Systematics) range from small, quick species, such as the *Conirostrum* conebills and *Diglossa* flowerpiercers, to larger and more sluggish mountain-tanagers in *Buthraupis*. The family, broadly, comprises part of a larger group of nine-primaried songbirds, so designated because, with the exception of a few vireos, they have the outermost, or tenth, primary of the wing tiny and concealed. All of the nine-primaried songbirds, apart from some emberizine finches, are found in the New World. Genetically, tanagers as a group are aligned within this nine-primaried oscine assemblage, but taxonomists have found few, if any, morphological features that are common to all members of the family. Sclater, writing in 1886, noted that many tanagers could be characterized by the presence of a small notch near the end of the upper mandible. The notch was prominent in some species but scarcely apparent in others, and as a diagnostic feature it was ultimately of little value. Modern DNA-sampling has now shown that some genera in which the notch is prominent are evidently unrelated to the Thraupidae. Attempts to relate diet, bill shape, jaw musculature, and colour, pattern and texture of the plumage proved equally frustrating in defining the family. Failing to find morphological clues, Storer, in 1969, concluded "I believe that... the traditional lines between the tanagers and the finches and the tanagers and wood warblers will prove untenable, and different alignments between the genera will better show phylogenetic relationships." His statement proved remarkably prescient.

Ultimately, a complete reorganization of the tanager family will surely follow further DNA-sampling, something that continues to the present and is radically altering our concept of this and other avian families. What has emerged so far is a collection of species that, because of diverse plumages and remarkable variations in bill size, shape and function, may at first glance appear to have little in common with one another. No single morphological trait, or combination of physical traits, seems to define a tanager other than shared genetic ancestry. Yet, even as the family is reorganized, with several well-known and long-standing genera now being removed to other families, and numerous emberizid genera and a few cardinalids entering Thraupidae, one feature that does come to mind whenever one thinks of tanagers is the remarkable evolution of colourful plumages within the family. Bright colours are not unique to tanagers, of course, nor are all tanagers colourful. Some are, in fact, rather plain or have a modest plumage pattern, and that seems particularly true of numerous emberizid genera recently found to be genetically allied with the thraupids. Nevertheless, some of the largest and best-known genera of tanagers, including *Tangara*, *Buthraupis*,



The euphonias are strongly sexually dimorphic, the males being brilliantly coloured and the females mostly olive above and yellow beneath, as illustrated by this ***Violaceous Euphonia*** *pair. This species is a small member of its genus, but with a relatively heavy bill. Although for long regarded as tanagers, molecular-genetic data, morphology and some aspects of behaviour all suggest that the 27 species in the genus* Euphonia *belong elsewhere. Along with* Chlorophonia, *to which they seem most closely related,* Euphonia *species have a very specialized digestive tract and build covered nests.*

[*Euphonia violacea aurantiicollis*, REGUA Nature Reserve, Guapiaçu, Rio de Janeiro, Brazil. Photo: Edson Endrigo]

Bangsia, *Anisognathus*, *Iridosornis*, *Cyanerpes* and *Dacnis*, are extraordinarily colourful, and can be counted among the most colourful of all passerine birds. It is surely this feature that comes to mind when amateur and expert alike think of tanagers.

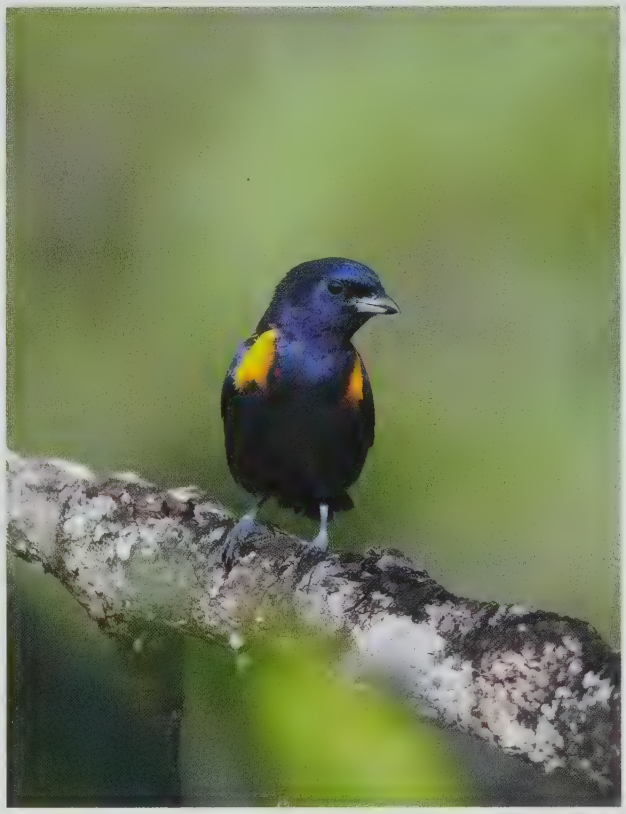
Pre-eminent with regard to colour are members of the genus *Tangara*, the 49 species of which represent not only the largest generic grouping of birds in South America, but also arguably the most colourful. This genus is set to become even larger with the addition of species formerly placed in *Thraupis*. In size and body shape *Tangara* tanagers are remarkably uniform, being small arboreal species with a stout, moderate-length bill, a tail of average length, and a rather small but sturdy and compact body. None has elongated plumes or tufts or an erectile crest or other unusual adornments, although one species, the Golden-eared Tanager, is capable of expanding its elongated ear-coverts. What *Tangara* do possess, collectively, is a breathtaking diversity of complex, often quilt-like colour patterns almost unrivalled in the avian world. In some, such as the Bay-headed Tanager and Blue-and-black Tanager (*Tangara vassorii*), the pattern is colourful but simple, while in others, such as the Green-and-gold Tanager, Saffron-crowned Tanager and Red-necked Tanager, the pattern is both colourful and complex. Although colour is perhaps the defining feature of the genus, a few of the species are notably plain. Dullest of the group is the aptly named Plain-colored Tanager (*Tangara inornata*), but the Scrub Tanager, Green-capped Tanager and a few other "minimalists" present relatively little bright colour or contrasting pattern in the plumage.

Within *Tangara*, every colour combination and hue of the rainbow is represented, and in a few species, most notably the Seven-colored Tanager and Paradise Tanager, almost every colour in the spectrum can be found on bold display. In others, the patterns are among the most complex to be found in nature, combining streaking, spotting, sharp geometric shapes, as typified by the trapezoidal black neck patch of the Golden Tanager, and bold but intricate, almost tapestry-like patterns on the mantle, as illustrated by the Emerald Tanager and Golden-eared Tanager. If *Tangara* tanagers are remarkable for their exceedingly colourful and complex patterns, their mostly higher-elevation and larger-bodied counterparts, the mountain-tanagers and allies, including *Buthraupis*, *Anisognathus*, *Chlorornis*, *Dubusia*, *Delothraupis*, *Iridosornis* and *Bangsia*, are almost equally colourful, although generally garbed in less complex colour patterns. Predominant in several of these genera are large block-like patches of yellow, blue, gold, rufous, moss-green and black. One species, the Scarlet-bellied Mountain-tanager (*Anisognathus igniventris*), combines red, sky-blue and black in a memorable display of colour, especially obvious when seen in flight.

Colour reaches its greatest intensity and saturation in the genus *Ramphocelus*, a group of mostly lowland tanagers in which males exhibit some of the most intense, velvety blacks, glistening reds and dark maroon-reds to be found in nature. In most species of *Ramphocelus* these intense reds and blacks are further enhanced by an enlarged, gleaming white lower mandible that is swollen and especially prominent at its proximal end. Numerous other genera of tanagers are brilliantly coloured or present arresting combinations of black and white, red, tawny or yellow in a seemingly endless array of patterns.

The displays of tanagers are, in general, not well documented except for the studies by Moynihan of two species of *Ramphocelus* and two *Chlorospingus* bush-tanagers (see General Habits). Among those described, however, display is rather unremarkable, and it does not appear that the brilliant colours and patterns that characterize the family have evolved primarily for display purposes in the way in which they have with manakins (Pipridae) and cotingas (Cotingidae) and various Old World groups. Several tanagers in the genus *Tachyphonus* puff out bold white shoulder epaulets in aggressive postures towards conspecifics. Other species of *Tachyphonus* may expand their white or yellow pectoral tufts and white or tawny flank-tufts in striking sexual displays towards females. Several *Tachyphonus* tanagers have concealed and colourful crown patches that can be erected, and others have flat, semi-concealed crests that range from flame-red to yellow, or combinations of both, and these can, at times, be expanded dramatically. These bold displays of colour by *Tachyphonus* are visible primarily in sexual and aggressive displays. At other times, the colourful crown and underwing patches are scarcely noticeable. The only true tanager with a more or less permanent crest is the Grey-headed Tanager, although even with this species the crest is not especially large and is often held semi-depressed. Ant-tanagers, which are now believed to be much more closely allied to cardinalids than to the true tanagers (see Systematics), have a flat crest which can be erected, and both Crested (*Habia cristata*) and Sooty Ant-tanagers (*Habia gutturalis*) sport a well-developed, contrasting red crest.









Many male euphonias share a basic plumage of blue upperparts and yellow underparts, with or without a yellow forehead and crown. Similarly patterned species often replace one another geographically and may form superspecies. The ***Purple-throated Euphonia*** *(above left), a small euphonia with a yellow forehead, glossy blue-black back and bright yellow underparts, may form a superspecies with the Scrub* (E. affinis), *Yellow-crowned* (E. luteicapilla) *and Trinidad Euphonias* (E. trinitatis). *There are greater differences between the* ***Golden-sided Euphonia*** *(above right), with its almost wholly dark glossy blue plumage, and the Rufous-bellied* (E. rufiventris) *and Chestnut-bellied Euphonias* (E. pectoralis), *but all share the golden-yellow pectoral patch. The* ***Blue-hooded Euphonia*** *(below left) forms a superspecies with the Golden-rumped* (E. cyanocephala) *and Antillean Euphonias* (E. musica). *A few species, such a the* ***Olive-backed Euphonia*** *(below right), differ from the majority in having drab female-type plumage.*

[Above left: *Euphonia chlorotica serrirostris*, Aguaragüe National Park, Tarija, Bolivia. Photo: Daniel Alarcón.

Above right: *Euphonia cayennensis*, Montagne des Chevaux, French Guiana. Photo: Tanguy Deville.

Below left: *Euphonia elegantissima vincens*, Costa Rica. Photo: Michael & Patricia Fogden.

Below right: *Euphonia gouldi praetermissa*, Costa Rica. Photo: Michael & Patricia Fogden]

True tanagers exhibit a wide range of bill shapes, perhaps as diverse as in any Neotropical family, including the Furnariidae, although a majority of tanagers are equipped with a typical, multipurpose bill of average length and stoutness. This "average" bill, which is useful for capturing insects and for mashing or gulping fruits and small berries, is by far the most common bill type in the family. It characterizes many tanager genera, including *Schistochlamys*, *Cissopis*, *Neothraupis*, *Conothraupis*, *Lamprospiza*, *Tachyphonus*, *Ramphocelus*, *Thraupis*, *Bangsia*, *Buthraupis*, *Anisognathus*, *Iridosornis*, *Delothraupis*, *Tangara* and others. In some of these genera, in particular *Ramphocelus*, the bill is, on average, slightly thicker, and is then associated with the habit of mashing larger fruits and berries before consuming them. In others, such as high-elevation mountain-tanagers, which eat many small berries and also search for insects on mossy branches, the bill is stout but rather short for the size of the bird, and also may be associated with the practice of mashing fruit. Across the many species of *Tangara*, bill size and thickness represent, perhaps, an average for the family, being not too thick or too thin, and not too long or too short, a "goldilocks" compromise well suited for grasp-



Like the euphonias, to which they are most closely related, the five Chlorophonia *species almost certainly belong in the finch family Fringillidae. Chlorophonias are stockier than euphonias and the adult males are predominantly light green. They are less sexually dimorphic than the euphonias. The female* ***Blue-crowned Chlorophonia****, for example, is of a similar glistening emerald-green to that of the male, and has a similar turquoise-blue crown patch and narrow nuchal band of light blue, though both areas of blue are less extensive than on the male.*

[*Chlorophonia occipitalis*, Photo: Roland Seitre]

ing and gulping and sometimes also mashing small berries, as well as for capturing small insect prey on a wide variety of substrates, ranging from foliage and slender bare twigs to large bare or moss-covered branches.

Members of the small genus *Chlorochrysa* closely resemble *Tangara* in size and shape and in possessing brilliant colours, although the colours of *Chlorochrysa* are predominantly rich emerald-greens and sapphire-blues that glisten, satin-like, in the sun. The bill is similar to that of most *Tangara*, with which they commonly associate, but is always thinner. Like *Tangara*, they eat both small berries and insects, but they include more insects and fewer fruit items in their diet than *Tangara* tanagers. The thinner bill is well adapted for capturing insects. Where *Chlorochrysa* differ most dramatically from *Tangara*, as well as from other tanagers, is in leg structure. *Chlorochrysa* species search for insects by hanging from the undersides of leaves or leaf clusters, flying from one terminal clump to the next, or sprinting quickly along mossy limbs and out to terminal foliage, where they can be seen as they hang down or cling, belly up, beneath leaves, a form of behaviour rarely observed for any *Tangara*. Not surprisingly, in *Chlorochrysa* the feet and tarsometatarsus, as well as the leg musculature surrounding the tibiotarsus, are unusually strong and heavy relative to overall size, indeed among the most robust of any member of the family. Recent genetic data also indicate that, despite superficial similarities in appearance and diet, *Chlorochrysa* are not particularly closely related to *Tangara*.

While there has been strong selection for a generalist bill shape among species that take a mixed diet of fruit and insects, those species having a diet biased towards insects or towards nectar exhibit greater specialization in bill shapes. Those which depend upon seeds or nectar show even more extreme modifications in bill shape. A small and proportionately thin bill is associated with the gleaning of surfaces such as leaves and twigs for insects and secondarily for small berries, and can be found in many species, including those in the genera *Chrysothlypis*, *Erythrothlypis*, *Cnemoscopus*, *Hemispingus*, *Pyrrhocoma* and *Hemithraupis*, all of which are small and active, eat relatively little fruit, though *Erythrothlypis* consumes many *Clusia* arils, and spend much time in searching for insect prey. Among insect-eating tanagers, the thinnest bills are possessed by species of *Conirostrum* and *Thlypopsis*, which are small, highly active birds that spend most of their time gleaning in foliage for insects and take relatively few berries. Tanagers in the genus *Dacnis* and *Chrysothlypis* are only slightly heavier-billed, and they supplement intensive searching and insect-gleaning in canopy foliage with feeding visits to trees and shrubs with small berries. At the other end of the bill-size spectrum are the shrike-tanagers in the genus *Lanio*, which possess a rather long, heavy and straight bill with a conspicuous hooked tip. Shrike-tanagers often take prey from bark or foliage in fast, aerial sweeps and dives or, from a perch, make quick strikes or pecks at foliage, often capturing relatively large prey, which they can subdue or control by means of the sharp bill hook.

Where bill shapes differ most dramatically from the generalist one found in so many tanagers is in the small-bodied species that include varying amounts of nectar, small fruits and tiny cryptic insects in their diets. A thin, sharp-pointed bill is associated with the taking of nectar and tiny insects from flowers and the gleaning of tiny insects from leaves and flowers and sometimes sallying short distances into the air, and is found in such genera as *Dacnis* and *Xenodacnis* and *Conirostrum*. A much longer but similarly thin, sharp and slightly decurved bill again is associated with gleaning and probing in flowers, and is found in *Chlorophanes*; the two species in this genus also include some fruit in the diet. A long, slender and dramatically decurved bill, found especially in males of the *Cyanerpes* honeycreepers, being only slightly shorter and less decurved in females, is associated with specialized ways of consuming fruit, insects and nectar. The long, decurved bill enables the honeycreeper to reach into the narrow cracks of ripening arillate fruit husks and extract the rich arils before larger-billed birds can reach them, and these honeycreepers use the long bill also to grasp tiny insects hidden in cracks in bark and twigs and in vines.

A short, wide bill shaped almost like that of a swallow (Hirundinidae) is found on the Swallow Tanager, an enigmatic species that, at times, captures flying insect prey in aerial sallies in the open, as well as within tree canopies. The Swallow Tanager's bill is unique among tanagers, but does not represent the most extreme modification within the family. The most highly modified bill morphology in Thraupidae can be seen in the flowerpiercers in the genus *Diglossa*, which have both the upper and the lower mandibles slightly upturned and with a sharp hook at the tip of the upper mandible. In addition, the lower mandible is short and sharply pointed, and the tongue, with an inverted

Sole member of the genus Nesospingus*, the* ***Puerto Rican Tanager*** *is a drab, stout-billed island endemic. When first described, this species was tentatively included in the bush-tanager genus* Chlorospingus*, before being assigned to its own genus. Along with* Chlorospingus *and two other Caribbean island genera,* Spindalis *and the* Phaenicophilus *palm-tanagers,* Nesospingus *is part of a clade that is less closely related to other tanagers than to several New World warbler (Parulidae) genera, including* Dendroica, Basileuterus *and* Vermivora*. Average weights for the three island genera are around 50% greater than for* Chlorospingus.

[*Nesospingus speculiferus*, Puerto Rico. Photo: Adrian & Jane Binns/ VIREO]







Nine species of Chlorospingus *are recognized here, but relationships within the genus urgently require study. The race* olivaceiceps *of the* ***Ashy-throated Bush-tanager*** *(left) may represent a separate species, and so may the Central American race,* hypophaeus, *of the* ***Yellow-throated Bush-tanager*** *(right). Of 26 races of the Common Bush-tanager* (C. ophthalmicus) *currently recognized, some are at least as distinct as some taxa in the genus that are regarded as full species.*

[Left: *Chlorospingus canigularis canigularis*, Chicaque, Colombia. Photo:Jussi Vakkala.

Right: *Chlorospingus flavigularis flavigularis*, Reserva Natural de las Aves Arrierito Antioqueño, Anorí, Antioquia, Colombia. Photo: Roland Seitre]

U-shape in cross-section, when pressed against the mandible forms a tube that aids the bird in rapidly extracting nectar from tiny holes punched into the bases of the corollas of tubular flowers. This bill shape is most pronounced in the smaller species in the genus, especially the Cinnamon-bellied, Slaty, Rusty (*Diglossa sittoides*), Merida (*Diglossa gloriosa*) and White-sided Flowerpiercers (*Diglossa albilatera*), all of which obtain a substantial amount of their nourishment by piercing flowers. Flower-piercing behaviour and extreme bill modification are less evident in the three largest flowerpiercers, the Masked, Bluish (*Diglossa caerulescens*) and Moustached Flowerpiercers (*Diglossa mystacalis*), all of which have a bill that is straighter and with a less prominent hook at the tip.

Although recent molecular-genetic analyses suggest that *Chlorophonia* and *Euphonia* are most closely related to the fringillids (see Systematics), both genera have long been regarded as tanagers and both exhibit several interesting morphological adaptations related to their specialized feeding habits. Members of both genera feed predominantly on small, soft berries and supplement this diet with tiny insects and spiders (Araneae). They possess a short, stubby bill well suited for plucking and mashing small berries, biting pieces of larger fleshy fruit, plucking epiphytic mistletoe berries (Loranthaceae), pulling berries from fruiting spikes of Araceae plants, such as *Philodendron*, *Rhodospatha* and *Monstera*, and even hovering to pluck small berries. Members of both genera also have relatively short pliable digestive tubes with little more than a thickening where the stomach should be. Such "weak" stomachs easily digest soft fruit pulp, but do not digest or scar toxic seeds embedded in the fruit. Mistletoe berries, a case in point, are a favourite food of many species in both genera, but their seeds are highly toxic. The soft handling of these potentially lethal seeds leaves even the slimy protective layer around the seed intact as it quickly and harmlessly passes through the bird's gut. The sticky seeds are then voided intact in long strings that adhere to each other like strings of clear, miniature pearls and are wiped off against twigs or limb surfaces, where they remain stuck in potential germination sites.

In the last decade and a half, molecular-genetic studies have further suggested that *Chlorospingus*, *Piranga*, *Habia*, *Chlorothraupis* and *Mitrospingus* are unrelated to thraupids (see Systematics). Members of these genera have a notably strong, heavy bill, used for capturing large insects and handling a wide range of fruit sizes. The bill of *Chlorothraupis* is the stoutest and most robust of the group and shows a clear indication of a notch on the cutting edge of the upper mandible, a discredited taxonomic character once used to define the family. *Chlorothraupis* species, with their strong bills, also feed on insects of a wide range of sizes and even take anoles and other small vertebrates.

The Thraupidae have conservative wing shapes and lengths, most falling close the norm in wing shape and in length of primary extension for nine-primaried oscines. Their wing shapes generally reflect their sedentary status and lack of aerial foraging. Nonetheless, most species are good fliers, and some have large territories that include substantial open spaces, requiring an ability to fly rapidly between distant foraging sites and resting or nesting sites. The Fawn-breasted Tanager (*Pipraeidea melanonota*) is the only true tanager having a long primary extension, and it also is one of a small number that are partly migratory. The Hooded Mountain-tanager and a few other high-elevation tanagers of the Andes occasionally execute short aerial excursions accompanied by intense bursts of song. These flights, usually on a circular flightpath, may take the bird some 20–100 m out over a mountainside forest canopy, but none of the species concerned shows any unusual morphological structure, such as a long primary extension, that could be associated with this infrequently observed behaviour. Black-and-white Tanagers (*Conothraupis speculigera*) are now believed to be cross-Andean migrants, breeding on the west slope in Ecuador and north-western Peru, but spending a few months each year on the east slope and in nearby lowlands. Their migratory movements, though poorly understood, probably involve relatively short distances, and these tanagers do not have an unusually long primary extension.

There is a striking lack of modification also in the outer primary feathers among tanagers, including those now being reassigned to other families and the various emberizid and cardinalid genera recently shown to be genetically most closely related to thraupids (see Systematics). While wing-feather modification is commonplace in the Tyrannidae, Pipridae and Cotingidae and is usually associated with display routines, such modifications, involving narrowed or shortened or recurved outer primaries, or abnormally thickened inner secondaries, are seldom seen in oscine passerines and are almost non-existent in tanagers.

Fewer than half of the true thraupids exhibit strong sexual dichromatism, whereby the males are brightly coloured or boldly









The eleven species of Piranga *are sexually dichromatic, with males brightly coloured and typically having red in their plumage, while the females and immature birds have mainly brown, yellow or olive plumage. The immature male* ***Summer Tanager*** *at first resembles the female but its head and shoulders may be mottled with red. The amount of red in the plumage steadily increases, although males up to three years old may still have some greenish patches. The immature female often has a dull, orangish wash on her belly. The Summer Tanager does not change its plumage seasonally, unlike another migratory species which breeds in North America, the Western Tanager* (P. ludoviciana), *which has a duller non-breeding plumage. One* Piranga *species, the Red-hooded Tanager* (P. rubriceps), *is less strongly sexually dimorphic, the female having much brighter plumage than in other* Piranga *species, though still duller than the male. Molecular studies have convincingly indicated that members of the genus are not thraupids and more properly belong among the cardinals. The distribution of the* Piranga *species is centred in Mexico and Central America. Four species, the Summer, Western and Scarlet Tanagers* (P. olivacea) *and the Northern Hepatic-tanager* (P. hepatica), *occur in North America north of Mexico.*

[*Piranga rubra rubra*, Galveston County, Texas, USA. Photos: Brian E. Small]

marked and the females show plainer combinations of olive, brown or buff to buffy yellow with paler underparts. Genera in which all, or almost all, of the species are strongly dichromatic include *Conothraupis*, *Creurgops*, *Thlypopsis*, *Tachyphonus*, *Lanio*, *Ramphocelus*, *Dacnis*, *Cyanerpes*, *Chlorophanes*, *Heterospingus*, *Hemithraupis*, *Chrysothlypis*, *Conirostrum*, *Xenodacnis* and some *Diglossa*. Less pronounced sexual dichromatism occurs in *Compsothraupis*, *Sericossypha*, *Nemosia*, *Trichothraupis*, *Pipraeidea* and *Chlorochrysa*, and in one species of *Bangsia*. In the largest group of tanagers, the genus *Tangara*, the sexes of a majority of the species are essentially identical, although males are usually slightly brighter. In about 20% of *Tangara*, the females differ to varying degrees, sometimes substantially, from their mates. Included in this group are the Burnished-buff, Lesser Antillean, Chestnut-backed (*Tangara preciosa*), Black-backed (*Tangara peruviana*), Green-capped, Black-capped, Sira (*Tangara phillipsi*), Silver-backed, Straw-backed and Black-headed Tanagers (*Tangara cyanoptera*), most of which are more closely related to one another than to other tanagers, and occur in dry or semi-open or lightly wooded terrain. Minor plumage differences between the sexes can be found in a few other species, including the Green-and-gold Tanager and the Emerald Tanager.

Most tanagers have a juvenile plumage that differs from that of the adult. In many, if not most, cases, this plumage resembles that of an adult but is decidedly duller and often much plainer, and initially may be almost devoid of any pattern or colour other than dull greys, browns and buffs. It is worth noting, too, that plumage sequences of tanagers have not been studied in detail. Plumage sequences are perhaps better known for the northern, migratory species of *Piranga*, a genus now thought to be better placed in Cardinalidae (see Systematics), than for any true tanagers. So far as is known, no true tanagers begin to breed when still in juvenile plumage, although young in a juvenile or subadult plumage frequently act as helpers at the nests of their parents (see Breeding). Some male euphonias, now genetically aligned with the Fringillidae (see Systematics), may breed in a subadult plumage that resembles that of the female, but differs from the latter in having a small black face mask. The pervasiveness of breeding by subadult male euphonias remains unknown, as does their breeding success rate compared with that of their adult counterparts.

While many true tanagers have bright plumage colours and bold patterns, they are, as a group, rather homogenous with regard to their bare-part colours. Any analysis of bare-part colours is largely limited to the range of colours recorded on specimen labels, to an examination of such colours visible in photographs, and to notes recorded by field observers. Each of these techniques is fraught, to some extent, with uncontrollable variation in light, interpretation of colour and, in the case of specimens, rapid post-mortem colour change. With these limitations in mind, a few generalizations are possible. Bare, coloured eyerings or other patches of coloured bare skin are not present in any species of tanager traditionally included in the family. The iris colour of most tanagers is dark, varying from brown to reddish-brown, but in a few genera, notably *Dacnis* and *Diglossa*, about half of the species have red or yellow irides and all of these are small-bodied species that feed partly on nectar and occur primarily in the canopy or middle levels of forest and wooded areas. One or two species in each of the genera *Conirostrum*, *Cissopis*, *Conothraupis*, *Hemispingus*, *Nemosia*, *Pipraeidea* and *Buthraupis* also have red, yellow or white eyes, but an obvious link between the evolution of eye colour and gender or environmental or behavioural features has not been demonstrated. Both species of *Mitrospingus* have grey eyes and several species of *Chlorospingus* have white or grey or yellow eyes, although both of these genera now properly belong with the cardinalids (see Systematics).

The bill colour of most tanagers varies from light horn-grey to blackish, often with the lower mandible paler, and it is generally homogenous within a genus. In a few genera, including *Hemithraupis*, *Chlorophanes* and *Chrysothlypis*, the upper mandible is dusky grey and the lower mandible yellowish. The bill of most *Tachyphonus* is relatively slender, with the upper mandible and tip blackish and the remainder of the lower mandible contrastingly light bluish-grey. Despite the fact that numerous tanagers have colourful plumage, only two of the more than 250 species originally placed in the family sport a brightly coloured bill. Adult Red-billed Pied Tanagers (*Lamprospiza melanoleuca*), as the English name suggests, have a bright red bill, and adult Grass-green Tanagers (*Chlorornis riefferii*) have a bright orange bill. One of the most distinctive bill patterns in the family is found in members of the genus *Ramphocelus*, the males of which have a bill that is stout, the upper mandible and tip black, with the basal two-thirds of the lower mandible obviously expanded, as if swollen, and contrastingly chalky white in colour. This expanded white portion of the bill is conspicuous, even at a distance, and especially so against the velvety black or red plumage on the



Two members of Piranga, *the* ***Red-headed Tanager*** *and the White-winged Tanager* (P. leucoptera), *are about one-third smaller than the rest, and have sometimes been placed in a separate genus,* Spermagra. *But recent DNA work does not support such treatment; it found that these two species form a clade with one of the largest in the genus, the Red-hooded Tanager* (P. rubriceps). *These three species all occur at higher elevations and are resident, rather than migratory. The Red-headed and White-winged Tanagers, and also the Rose-throated Tanager* (P. roseogularis), *have shorter and less pointed wings than other* Piranga *species.*

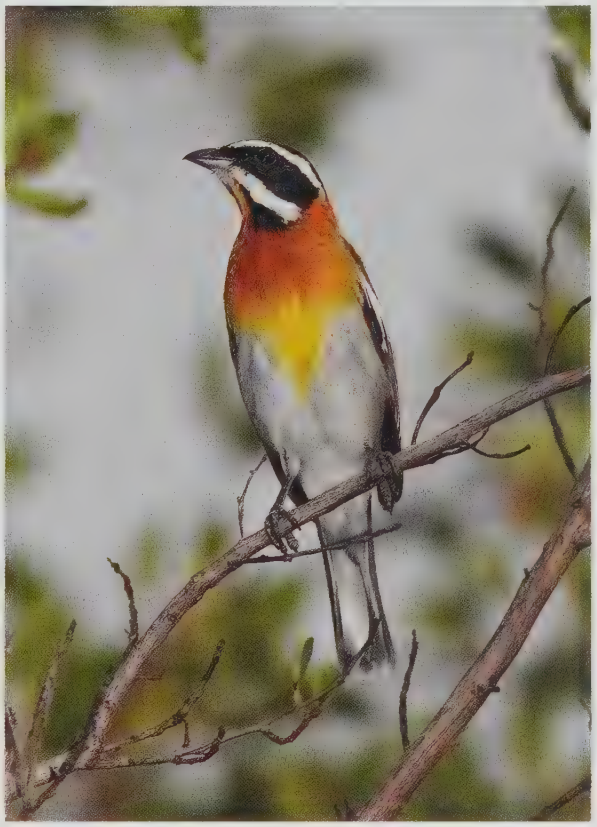
[*Piranga erythrocephala candida*,
Mazatlan Highway,
Mexico.
Photo: Pete Morris]

head of most species. On females of *Ramphocelus* the bill is thick but more normal in shape, and the lower mandible is pale grey, rather than chalky white.

Only a few species in this family of rainbow plumages also have brightly coloured tarsi. These include the Grass-green Tanager, with orange-red legs closely matching its bill colour and in striking contrast to the deep green plumage and chestnut mask, and the Hooded Tanager (*Nemosia pileata*), the male of which has notably bright yellow legs. In the honeycreeper genus *Cyanerpes*, males and, to a lesser extent, females have bright, almost candy-coloured red or yellow legs, or, in the case of the Short-billed Honeycreeper (*Cyanerpes nitidus*), pinkish-red legs. Both sexes of the Blue Dacnis (*Dacnis cayana*) and the Bicolored Conebill (*Conirostrum bicolor*) have pinkish legs. Bright tarsal colour is concentrated mainly in three related genera, *Cyanerpes*, allied *Dacnis* and *Conirostrum*, and may offer an additional clue to ancestral lineages. The tarsi and toes of most other tanagers are generally grey or horn or blackish, a few species having the tarsus paler or tinged yellowish or greenish-grey.

It is difficult to make generalizations about sexual dimorphism in tanager plumages. Some genera exhibit marked sexual differences in plumage, whereas in others dimorphism is slight or absent, or, as in the case of *Tangara*, obvious dimorphism is confined to only a few species. In general, smaller species, especially insectivores of lowland and lower montane elevations, are more likely to show marked sexual dimorphism in plumage than are species of larger body size and higher elevations, although there are exceptions. There has been no rigorous examination of these patterns.

Distinct juvenile plumages are worn by many, perhaps most, tanagers, but the sequences of plumages have not been worked out in a systematic manner. Even basic designations regarding age-classes are poorly known, and plumages labelled "juvenile" and "immature" should be regarded, in part, as conveniences for the purpose of discussion. In many, if not the majority of, tanager species, regardless of whether the adults are sexually dimorphic, or are bright or dull in colour, the young fledge in a modest-looking plumage. Among sexually dimorphic species, young are likely to resemble females for up to a year, as with *Ramphocelus*, or possibly longer, before acquiring an adult breeding plumage. Males of *Tachyphonus* and *Lanio* species undergo a post-juvenile moult resulting in a plumage that is mixed black and brown, and looks like neither the adult nor the juvenile. In the case of male Yellow-backed Tanagers (*Hemithraupis flavicollis*), a second annual moult is apparently required in order to achieve breeding plumage. Young of species which are not sexually dimorphic also are likely to begin life in a dull, inconspicuous plumage that is quite unlike that of the adults, although in most cases it is not known for how long these plumages are retained. The sexes of most adult *Tangara* tanagers are essentially identical, or females are slightly duller in plumage than males, but the juveniles leave the nest in a notably dingy greenish to greyish-brown plumage quite unlike that of their gaudy, multicoloured parents, and one that is confusing to field observers. Typically, when juvenile



In 2000, the Stripe-headed Tanager, with eight recognized subspecies, was split into three monotypic species, the Jamaican (Spindalis nigricephala), *Hispaniolan* (S. dominicensis) *and Puerto Rican Spindalis* (S. portoricensis), *and a fourth polytypic species, the* ***Western Spindalis****. As well as being geographically separated, the four newly recognized* Spindalis *species differ in morphology, plumage and vocalizations. The genus is confined to the Greater Antilles, except for the race* benedicti *of the Western Spindalis, which is part of the "West Indian" component of the fauna of Cozumel Island, off the Yucatán Peninsula.*

[*Spindalis zena pretrei*, Cayo Coco, Cuba. Photo: Claude Nadeau]



Like Piranga *and* Chlorothraupis, *the genus* Habia *appears to be genetically closer to the cardinalids than to the tanagers. The* ***Red-crowned Ant-tanager*** *is more closely related to* Chlorothraupis *than are other* Habia *species. Some* Habia *ant-tanagers, such as the Red-crowned Ant-tanager, are markedly sexually dichromatic: the males are mostly red and the females dull yellow, brown and olive. In other species, such as the Black-cheeked Ant-tanager* (H. atrimaxillaris), *females do not differ greatly from males but are duller. Ant-tanagers have a flat crest, which can be erected.*

[*Habia rubica vinacea*, Panama. Photo: Mike Danzenbaker/ AGAMI]



The Chlorothraupis *species are relatively large and robust, with a strong, heavy bill, and uniform, rather dingy green or olive plumage, with few distinctive field marks. Along with* Piranga *and* Habia, *they appear to belong with the cardinalids rather than the tanagers. All four are found in the undergrowth and lower storeys of very humid lowland and pre-montane forest. The* ***Ochre-breasted Tanager*** *is confined mostly to a narrow elevational band along the western base of the Andes, closely corresponding to a belt with the highest rainfall in the Western Hemisphere.*

[*Chlorothraupis stolzmanni dugandi*, Río Canandé Reserve, Esmeraldas, Ecuador. Photo: Doug Wechsler/ VIREO]

Tangara are in this plumage, they travel and forage with their parents for up to several months and, at this stage, are best recognized by identifying the adults present with them. Similarly, immature Black-faced Tanagers (*Schistochlamys melanopis*) are olive-green, very unlike the boldly black-and-grey adults, and they retain this plumage for at least a year and possibly two years. Immature White-banded Tanagers (*Neothraupis fasciata*), Blue-and-yellow Tanagers and many others spend an unknown period of time, running to months or possibly years, in a plumage that differs markedly from those of the adults.



One of the most unusual moult patterns, involving a post-breeding, or "eclipse", plumage, is exhibited by the male Red-legged Honeycreeper (*Cyanerpes cyaneus*). Adult males of this species are brilliant blue, with an azure cap and black wings and tail, while females are olive-green above and paler below. In a series of moults, young males gradually acquire adult plumage, but thereafter, following each breeding season, the males moult into a plumage similar to that of the female, but retain the black wings and tail. This moult sequence is rare among tropical species, and corresponds more closely to that of some temperate-latitude breeding birds such as northern waterfowl and migratory northern parulid warblers. First reported by A. F. Skutch in Costa Rica, this green postnuptial plumage of the male Red-legged Honeycreeper is acquired by a complete feather moult. Later, H. Sick, in Brazil, reported that this honeycreeper's striking colour change back to the blue plumage of the breeding season was due not to another moult, but to feather abrasion. Each tricoloured body feather has an olive-green tip, a blue centre and a black base; as the green feather tips abrade, the blue centre of the feather begins to show, revealing the new breeding plumage. The sequence of moults, eclipse plumages, and the possibility of feather wear in the genus *Cyanerpes* seems worthy of further investigation.

The most ambitious collection of weights and measures of the tanagers yet published is that by M. L. Isler and P. R. Isler in their monograph on the family, but these authors did not separate their data for males and females. For many less common species, and even some commoner ones, few weights, segregated by sex, are available.

The following data, taken by S. L. Hilty from live birds and specimens from the western Andes of Colombia, mainly along the River Anchicayá, in the department of Valle, are some of the very few weight data separated according to sex. This sample indicates that sexual dimorphism in size is minimal among tanagers, the males being on average similar to or very slightly heavier than the females. For seven species of *Tangara*, the details were as follows: for the Silver-throated Tanager, 13 males averaged 20 g in weight and five females 19·6 g; the average for six males of the Emerald Tanager was 15·9 g and for three females 16·3 g; of 23 individuals of the Rufous-throated Tanager (*Tangara rufigula*), 14 males averaged 20·5 g and nine females 19·8 g; seven male Bay-headed Tanagers had an average weight of 21·7 g and three females 21·6 g; five male Golden Tanagers

Molecular-genetic data indicate that the two Mitrospingus *species may be unrelated to any other Thraupidae genus. But, although they may be closest to Cardinalidae, no closely related family or sister-taxon has yet been identified and their true affinities are uncertain. Apart from the differing colours of their backs, the* ***Dusky-faced Tanager*** *and the Olive-backed Tanager* (M. oleagineus) *are very similar in appearance, but differ in vocalizations and behaviour. The song of the Dusky-faced Tanager is emphatic, but that of its congener weak and easily overlooked. Dusky-faced Tanagers are noisy, excitable and active when foraging, while Olive-backed Tanagers are quiet and sluggish.*

[*Mitrospingus cassinii costaricensis*, Costa Rica. Photo: Julian Hough]

had a mean weight of 19·9, the figure for six females being 20·7 g; the mean weight of four male Grey-and-gold Tanagers (*Tangara palmeri*) was 34·6 g, and that for four females was 30·2 g; finally, four male Blue-necked Tanagers had an average weight of 16·7 g, while the mean for three females was 17·5 g. Data for other thraupids include weights of 17 Scarlet-and-white Tanagers, of which the eleven males had a mean weight of 6·5 g and the six females 5·9 g; and, for the Lemon-rumped Tanager, four males weighed an average of 39·1 g and three females 35 g. Details are available for several additional species now generally not regarded as being true tanagers (see Systematics). These are the Orange-bellied Euphonia (*Euphonia xanthogaster*), 19 males of which averaged 13·6 g and 18 females 13·1 g; the Yellow-throated Bush-tanager (*Chlorospingus flavigularis*), seven males of which averaged 74·6 g and three females 69·5 g; and the Ochre-breasted Tanager (*Chlorothraupis stolzmanni*), twelve males of which had a mean weight of 42·6 g and seven females an average of 39·5 g.

The two Phaenicophilus *palm-tanagers form a superspecies, the Grey-crowned Palm-tanager* (P. poliocephalus) *replacing the* ***Black-crowned Palm-tanager*** *in the southern peninsula of Haiti and the immediately adjacent south-western Dominican Republic. There is a narrow zone where the two hybridize. The immature Black-crowned Palm-tanager has a grey crown. This, together with the smaller body size of the Grey-crowned species and its greater tendency to form groups, has led to the suggestion that it is a paedomorphic derivation of the Black-crowned Palm-tanager.*

[*Phaenicophilus palmarum*, Sierra de Bahoruco National Park, Dominican Republic. Photo: Doug Wechsler/ VIREO]



Habitat

As may be expected for any family as large and diverse as Thraupidae, its members are found in a wide range of terrestrial habitats. The majority of tanagers inhabit humid forest or lightly wooded areas, a few species occurring in drier, open grassy areas with scattered bushes and small trees. There are, however, a few terrestrial habitats in which the family, as presently constituted, is absent or not well represented, these including desert and semi-desert scrub, open savanna, southern beech (*Nothofagus*) forest and rocky tundra-like *páramo* and *puna* grasslands above the tree-line. Recent molecular-genetic studies, however, are revising even this long-standing view. Numerous emberizid genera, among them *Phrygilus*, *Catamenia*, *Diuca*, *Haplospiza*, *Poospiza* and *Sicalis*, appear to be more closely affiliated with the thraupids (see Systematics), and their inclusion within the tanager assemblage would indicate that many groups have successfully radiated into open and semi-open lowland and highland habitats. These include dry to arid scrub, dry and humid semi-open and open high-elevation tree-line zones, open high-elevation habitats such as *páramo* and *puna*, and in Patagonia grassland and shrub-desert. Other emberizid and cardinalid genera now believed to be much more closely allied to tanagers include *Embernagra*, *Volatinia*, *Sporophila*, *Oryzoborus*, *Saltatricula*, *Coryphospingus*, *Tiaris* and *Paroaria*, and these groups are found predominantly in lowland savanna, marshes, humid to dry scrubby areas, wooded borders and desert scrub, habitats where tanagers would otherwise have been scarce or absent. Still other groups, among them the Galapagos finches and a cluster of Caribbean genera including *Euneornis*, *Loxigilla*, *Loxipasser*, *Melanospiza* and *Melopyrrha*, have similarly been shown to be probably closest to thraupids in ancestral affinities; these are found in a variety of dry to humid

Genetic and morphological data support the continued inclusion of the ***Rosy Thrush-tanager*** *in Thraupidae. It is sometimes thought to be closer to the mockingbirds and thrashers (Mimidae), but it has also been suggested that the resemblances are convergent adaptations to a similar habitat niche. The five races occur in a series of small, isolated populations from western Mexico south to northern Venezuela. The races vary in coloration in a "leap-frog" pattern, with grey-backed populations in Mexico and South America, and an intervening black-backed population (race* eximia, *shown here) in lower Central America.*

[*Rhodinocichla rosea eximia*, El Valle, Coclé, Panama. Photo: Doug Wechsler/ VIREO]







Except when they are breeding, some tanagers are found in wide-ranging flocks of their own species. The excitable and noisy ***Paradise Tanager*** *(above) is very gregarious and often found in a single-species group of 3–15 individuals or more. But it also associates with mixed flocks of species that feed in the canopy. While many tanagers that join mixed flocks do so as pairs or small family groups, the Paradise Tanager is found in much larger groups and may make up 30–50% of the flock. Paradise Tanagers regularly associate with Green-and-gold Tanagers* (Tangara schrankii). *The two species may forage together, either accompanying mixed flocks or travelling independently of them. They move in and out of slower-moving mixed flocks, sometimes remaining for only a few minutes before flying off. In contrast, the* ***Swallow Tanager*** *(below) is almost always found in single-species groups, and is only infrequently and loosely associated with mixed-species flocks or feeding associations around fruiting trees. Individual Swallow Tanagers or groups perch well up in trees or on high exposed treetop perches, in a distinctive upright posture, often for extended periods of time. A detailed study in the 1950s in Venezuela found that, except while breeding, they spent about half the daylight hours inactive, two hours in foraging and three to four hours in social activity. While breeding, they gathered late in the afternoon on the tops of casuarina trees to catch insects for their young. This was a strongly social activity, the birds remaining in a flock even when moving to other treetops.*

[Above: *Tangara chilensis chilensis*, San Isidro Lodge and Reserve, Ecuador. Photo: Dustin Huntington/ VIREO.

Below: *Tersina viridis viridis*, São Carlos, São Paulo, Brazil. Photo: Haroldo Palo]

island habitats, as well as in harsh arid conditions in the Galapagos Islands, zones where tanagers of previous classifications would have been scarce or completely absent.

On the other hand, several genera long regarded as tanagers, including *Euphonia*, *Chlorophonia*, *Piranga*, *Mitrospingus*, *Chlorospingus* and *Habia*, are now poised to be transferred, or have already been transferred, to other families. The moving of these groups out of Thraupidae, however, does not affect general remarks about habitat preferences of species within the family. The rest of this section is based on the family as traditionally constituted, but it also contains comments on departing species as well as on potential future incomers in the wave of taxonomic change currently affecting the family. Readers should be aware that forthcoming taxonomic revisions will almost certainly alter some aspects of the following discussion.

Tanagers are widespread across South America, from the lowlands to the tree-line. The highest diversity occurs in the Andes, but only one species, the Giant Conebill (*Oreomanes fraseri*), is regularly found above the tree-line and it inhabits a unique *Polylepis* woodland that grows at elevations higher than the normal timber-line. A few species, most notably the Blue-and-yellow Tanager, range southwards into dry regions of northern and central Argentina, and an even smaller subset occurs in dry, shrubby habitats of extreme northern Chile, but none reaches the southern beech forests of southern Argentina and Chile. In the Amazonian region, the number of species of tanager co-existing at single sites is generally lower than in the Andes, and the same is true in Central America, although almost 30 species can be found regularly in the former Canal Zone area of Panama. The number of species in the family generally declines northwards into Mexico. Four species of *Piranga*, namely the Summer, Scarlet and Western Tanagers and the Northern Hepatic-tanager, occur in North America north of Mexico, as does the vagrant Western Spindalis (*Spindalis zena*), but all four of the species are now believed to be much closer to cardinalids than to thraupids; this is probably also true of the spindalis, leaving the White-collared Seedeater (*Sporophila torqueola*), presently in Emberizidae but almost certainly a thraupid, as the only resident breeding species of tanager north of Mexico. A few other current emberizid species about to be reclassified as tanagers, including two species of *Tiaris* grassquit, and the Bananaquit, already transferred to Thraupidae, occur as accidentals in southern Florida, but none breeds there.

Tanagers are generally most diverse in regions of humid and wet forest and forest borders, occurring in reduced numbers in dry and semi-open regions. Several species have readily adopted human-altered environments, especially in urban areas, parks, gardens, farms and ranchland, so long as there are trees and shrubs. Tanagers, whether considered in the traditional sense or in light of the many probable new taxonomic revisions, are an important avian component of almost all wooded habitats across Middle and South America. They presently comprise about 7–9% of the total avian diversity in the Amazonian lowlands. This figure increases slightly in the foothills, peaking at about 10–16% of the species diversity in cool middle-Andean elevations between about 900 m and 1800 m; thereafter, their representation levels off or declines slightly with increasing altitude up to the tree-line. Several genera, including *Hemispingus*, *Buthraupis*, *Anisognathus*, *Iridosornis*, *Diglossa*, *Conirostrum* and a few monotypic genera, are well represented at high elevations up to the tree-line, but their distributions all end at the upper limit of tree growth. Thraupid representation also declines in dry rainshadow valleys of the Andes and in dry, semi-open lowland habitats: tanagers accounted for no more than 5·7% of the avian diversity in a dry intermontane valley near Tambo, in Bolivia, for barely 4% in a dry-forest coastal site near Tucacas, in Venezuela, and for less than 3% in ranchland in Apure, also in Venezuela. In dry and progressively more open habitats in Argentina and Chile their representation also declines southwards, eventually only one or two species persisting as seasonal breeders or visitors. The pattern is similar in Central America, with areas of humid forest supporting the greatest number of species, dry forest harbouring fewer species, and overall diversity declining as one moves northwards.

Recent genetic findings (see Systematics) will significantly change the complexion of the family. It also will change many of the figures mentioned above. While a definitive thraupid taxonomy is not yet a reality, it is close to becoming one, and it is possible to glimpse what lies ahead. What seems sure to emerge is a family still dominant in Andean cloudforests and in Amazonia, although with the loss of a few well-known genera, including *Euphonia*, *Chlorophonia*, *Chlorospingus*, *Mitrospingus*, *Chlorothraupis* and *Habia*, and perhaps others; a family also much better represented in semi-open regions in the Neotropical lowlands, above the tree-line in the Andes, across



In common with most small passerines, the ***Chestnut-bellied Euphonia*** *performs stereotyped wing-flicking and tail-flicking movements when about to fly, as these birds are doing. The Rufous-bellied Euphonia* (Euphonia rufiventris)*, which forms a superspecies with the Chestnut-bellied Euphonia and is very similar in behaviour, often also flicks its tail to one side while foraging. Like many other euphonias, the Chestnut-bellied Euphonia is usually seen singly or in pairs, and sometimes in small groups. The Rufous-bellied Euphonia is even less frequently seen other than in pairs or singly, though both of these euphonias are regular members of mixed-species flocks.*

[*Euphonia pectoralis*, Itatiaia National Park, Rio de Janeiro, Brazil. Photo: Edson Endrigo]



*Long-billed birds such as this **Purple Honeycreeper** can have practical difficulties in reaching their neck and upper breast and back while preening. In general, longer-billed species spend more of their grooming time in scratching with their feet than do shorter-billed congeners. The Trinidadian race, shown here, has a significantly longer bill than the nominate. Purple Honeycreepers are restless and nervous birds, constantly fidgeting and wing-flicking, often barely pausing to rearrange a few feathers as they go.*

[*Cyanerpes caeruleus longirostris*, Trinidad. Photo: George M. Jett]

the entire cone of southern South America, and in the Caribbean and the Galapagos Islands. Genetic evidence is pointing to a thraupid radiation that has been successful in colonizing not only core tropical forested habitats, but also a variety of marginal, semi-open and island habitats. Ancestral lines have radiated into colder, semi-open Andean highlands above the timber-line, as inhabited by, for example, *Phrygilus*, *Poospiza*, *Catamenia* and *Sicalis*, into semi-open habitats in humid lowlands, such as those occupied by, for instance, *Sporophila*, *Oryzoborus* and *Volatinia*, and a variety of marginal, dry and arid scrub and semi-open habitats, including those colonized by *Diuca*, *Embernagra*, *Saltatricula*, *Coryphospingus* and *Rhodospingus* on the South American mainland, with a number of genera that have been equally successful in colonizing marginal habitats in the Caribbean and Galapagos. If current preliminary findings continue to be validated, one of the more surprising changes to traditional taxonomies will be that a significant proportion of all the passerines in the Galapagos may trace their ancestral lines to a tanager radiation, rather than an emberizid one. Curiously, for all the likely success of thraupid lineages in colonizing marginal high-Andean habitats and the farthest reaches of Patagonia, the presence of any tanager, even as a seasonal visitor, in North America north of Mexico now seems remote. However, there is a small population of the probably thraupid White-collared Seedeater (see Systematics) in southern Texas.

Tanagers are amongst the groups of birds most closely associated with Andean cloudforests, at least in popular image. In these cool, perpetually misty and moss-draped forests regularly some 25 to 46 species occur syntopically in an ever-changing species mosaic from Venezuela south to Bolivia, and these figures will not change greatly even with the dramatic taxonomic reorganization occurring within the family. In the Andes, two areas are paramount for tanager diversity: the western slope of the western Andes in Colombia and north-western Ecuador, and the eastern slope of the Andes from Colombia south to Bolivia. It is in these broad areas that the family reaches its greatest diversity, and a significant part of this extraordinary diversity is the result of radiation within a single genus, *Tangara*.

The number of syntopic species of tanager in the Andes of southern Venezuela, the coastal mountains of south-eastern Brazil and the humid lowland forests of Amazonia is only slightly smaller than that in the Andes from Colombia southwards. For example, 35 species of tanager have been recorded at the Explornapo Lodge near the River Napo, in north-eastern Peru, while a 1-km² site at Cocha Cashu, in the Manu Biosphere Reserve of southern Peru, contained 40. In west-central Brazil, 35 species have been recorded at Alta Floresta, in Mato Grosso. Away from humid and wet forests in Amazonia and the Andes, the diversity at single sites falls. In the Guianan lowlands from eastern Venezuela eastwards to French Guiana, the number of tanagers at single sites declines to about 15–30. A similar decline occurs in Venezuela north of the Orinoco and in dry northern coastal regions of Colombia. The average single-site diversity of tanagers in Panama and Costa Rica is about 15–20 species, similar to that in the Guianas, and northwards through Central America the decline continues, and this pattern is unlikely to change much with taxonomic revisions. The entire country of Mexico holds barely 30 species of tanager, and most of these are found in the humid south-eastern lowlands. A similar decline occurs from Amazonian Brazil southwards into Argentina. The humid Atlantic Forests of south-eastern Brazil and adjacent eastern Paraguay and north-east Argentina, however, harbour many tanagers and several endemic genera, such as *Compsothraupis*, *Orchesticus*, *Orthogonys*, *Pyrrhocoma* and *Stephanophorus*. In highland Atlantic Forest, as in the Andes, it is the diversity of *Tangara* that is most striking, with up to five species found together at some sites. Single-site totals for the family also are high, on average about 25–30 species, although generally lower than at Andean sites.

Most broadly defined habitats are, on close inspection, composed of a number of micro-habitats utilized to varying degrees by birds. The Amazon Basin, for example, does not comprise a single sweeping rainforest habitat from end to end, but a complex mosaic of habitats and micro-habitats encompassed within a broadly defined region. It also is affected by rather dramatic regional differences in annual rainfall, and the distribution of this rainfall through the year. Tanagers occur virtually throughout this matrix of habitats, some using many habitats, while others are more narrowly constrained. Few, however, appear to be as specialized in habitat preference as are many suboscine taxa. Habitats within the Amazon Basin, in the broadest terms, consist of *terra firme* forest, floodplain forest known as *várzea*, swamp-forest known as *igapó*, several types of white-sand forest and scrub, river edges, river islands and their associated successional vegetation stages, oxbow lakes, treefall light-gaps, palm forests, morichales (stands of vegetation dominated by the moriche palm, *Mauritia flexuosa*), vine forests, sites with a high density of fig



Preening is a bird's main defence against ectoparasites such as lice. Foraging habits can influence the load of parasites that a species carries. The ***Scarlet-and-white Tanager****, which feeds in the outer foliage of trees and shrubs, is likely to have a lower level of infestation than a bird that gleans arthropods from the bark. Studies in the Brazilian Atlantic Forest have also found that ectoparasites tend to be more prevalent on birds that join mixed flocks regularly than on those that do so only occasionally.*

[*Erythrothlypis salmoni*, El Danubio, Buenaventura, Valle del Cauca, Colombia. Photo: Roland Seitre]

trees (*Ficus*), the last mainly in floodplains, and bamboo patches, black-water rivers and white-water rivers, among others. Any one or all of these habitats can vary separately or in concert with regard to seasonal distribution and quantity of rainfall and in micro-climate factors that affect everything from the extent of epiphytic growth in the canopy to openness of the understorey. Some forest types differ dramatically from immediately adjacent ones, while others differ in less obvious ways from nearby vegetation types. The underlying soils also strongly influence the type of vegetation that is present, and scientists are only beginning to comprehend this influence on overall diversity. The diversity of forest types and associated micro-habitats is an important contributor to overall species diversity within the Amazon Basin. These factors, together with the sheer size of Amazonia, the important historical climatic changes and numerous immense rivers acting as isolating mechanisms, have contributed to the raising of the species diversity in Amazonia above that which is supported in the Guianan lowlands and lower Central America. The large number of habitats found within relatively small areas provide more opportunities for habitat and resource specialization, and



Comfort behaviour such as sun-bathing may help to control ectoparasites, either killing them directly or exposing them to preening as they try to escape from the heat. It may also kill feather-degrading bacteria. A number of tanager species, including the ***Green Honeycreeper*** *have also been observed anting, which possibly involves the use of formic acid produced by the ants (Formicidae) to control parasites, although it has been suggested that it also stimulates the skin and gives the birds pleasure. Green Honeycreepers "ant" in trees, rather than on the ground.*

[*Chlorophanes spiza spiza*, Trinidad. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]



*This **Brazilian Tanager** is scratching its head by the indirect method, bringing its foot up over its wing. This is probably typical of thraupids as a whole; in a related family, the Cardinalidae, so far as it is known, all species use the indirect method. Like scratching, the roosting habits of tanagers have received little attention. However, tanagers that roost in pairs seem to be always slightly separated from each other; and Palm Tanagers* (Thraupis palmarum)*, which roost as pairs within groups of 10–75 birds, also seem to maintain a distance, probably because otherwise ectoparasites could pass between them.*

[*Ramphocelus bresilius dorsalis*,
Carlos Botelho State Park,
Sete Barras,
São Paulo, Brazil.
Photo: Haroldo Palo]

hence for greater numbers of species to co-exist without directly competing, than would be possible in less complex environments. Some avian families, such as the ovenbirds, the thamnophilid antbirds and the tyrant-flycatchers, have been particularly successful in exploiting this variety of habitats.

Tanagers are found in most, if not almost all, terrestrial habitats in the tropical lowlands, but until the taxonomy of the family is more clearly understood the full spectrum of habitat utilization within the family cannot be properly analysed. Nevertheless, a few patterns do emerge among genera believed to be true tanagers. Species of *Ramphocelus* tanager, for example, occur mostly in shrubby forest borders, disturbed areas and second growth of various ages, one of them, the Masked Crimson Tanager (*Ramphocelus nigrogularis*), usually inhabiting shrubby borders along watercourses and swampy areas. Shrike-tanagers, along with several species of *Tachyphonus* and the Yellow-backed Tanager, follow mixed-species foraging flocks in the subcanopy of humid forest; dacnises, honeycreepers and *Tangara* species form their own flocks in canopy and emergent forest trees and, from time to time, also join more diverse mixed flocks. Red-billed Pied Tanagers forage mainly in emergent trees in tall primary forest, whereas Guira Tanagers (*Hemithraupis guira*) and Hooded Tanagers forage in a variety of secondary and thinned woodland habitats and in semi-open areas with scattered trees. *Thraupis* tanagers occur in disturbed areas, river edges, parks, gardens and semi-open areas in dry to humid regions, and also wander across the tops of canopy trees in tall lowland forest. The genera *Schistochlamys*, *Neothraupis* and *Cypsnagra* occur in a variety of semi-open grasslands with scattered bushes and small trees in the lowlands. Although *Sporophila* seedeaters, *Sicalis* yellow-finches and some other genera have not previously been recognized as tanagers, recent molecular evidence suggests that they are best treated as thraupids, rather than as emberizids (see Systematics). Several of these genera are found in marshes and open grassland, thus indicating that, within lowland tropical latitudes, tanagers have spread into virtually all major habitats.

Similar habitat-partitioning is evident in highland habitats in the Andes. One highland species, the Blue-capped Tanager, occurs in second growth and disturbed areas, while all except one member of the genus *Thlypopsis* are found in scattered shrubby vegetation in high and often dry valleys. Several other Andean genera are closely associated with humid pre-montane or higher-elevation montane forest and borders, where they forage mostly above the understorey. This group includes the genera *Creurgops*, *Cnemoscopus*, *Calochaetes*, *Bangsia*, *Buthraupis*, *Anisognathus*, *Chlorornis*, *Dubusia*, *Delothraupis* and *Iridosornis* and many *Tangara* species. Other predominantly Andean genera are more closely associated with dense undergrowth and bamboo in pre-montane or montane forest; they include *Hemispingus*, *Catamblyrhynchus* and the enigmatic *Urothraupis*. *Diglossa* flowerpiercers, another Andean group with an ancestral radia-



*Anecdotal evidence suggests that bathing takes place more frequently in hot lowlands than in cool montane habitats, especially late in the afternoon on hot, sunny days. The **Grey-headed Tanager** seeks out habitats where standing water is available: in Amazonia, the nominate race (shown here) occurs mainly in the undergrowth of swampy* várzea *forest and other poorly drained wooded sites, and when in drier habitats this species is usually found near watercourses.*

[*Eucometis penicillata penicillata*,
Atlantic Rainforest, Brazil.
Photo: Cassiano Zaparoli]

tion northwards into the highlands of Middle America and the tepuis of eastern Venezuela, occur mostly in humid shrubby or bushy areas, forest borders and stunted tree-line woodland. *Conirostrum*, unlike many thraupid genera, is less easily categorized. Active and warbler-like in appearance, about half of its members are confined to, or occur in, such disparate lowland habitats as mangroves, *Cecropia* trees on new Amazonian river islands, dry forest, gallery woodland and second-growth woodland in humid areas, while the remainder are found at high elevations in shrubby areas and humid forest borders in the Andes. The Cinereous Conebill (*Conirostrum cinereum*) is exceptional, as it has both a lowland population and highland populations. From south-western Ecuador south to western Chile it occurs in arid scrub at sea-level, but it ranges upwards in arid to moderately humid scrub to the tree-line or higher in the Andes, thus spanning a range of elevations and habitats far greater than any congener. In the north of its range it occurs only in wooded borders and shrubs in the highlands.

Of the genera no longer believed to belong with the true tanagers (see Systematics), most are found in humid forest or wooded borders. For example, one or more *Chlorospingus* bush-tanagers can be found in almost all humid montane forests from Mexico south to Bolivia. One or more members of the genus *Euphonia*, now thought to belong with Fringillidae, can be found in almost all dry to humid forest or lightly wooded habitats from western Mexico south to northern Argentina. *Chlorothraupis*, *Habia* and *Mitrospingus* are denizens of undergrowth and thickets in lowland and lower montane regions. More catholic in habitat choice are the large and mostly slow-moving *Piranga* species, one or more of which occur in a wide range of forests, forest borders, and semi-open and second-growth vegetation from lowland to highland areas, and locally also in dry to humid woodland. The four migratory *Piranga* in North America breed in a wide range of deciduous and evergreen forests.

Within the Amazonian lowlands, tanagers are arboreal and occur primarily in habitats associated with middle and upper strata of forest, or lower down along shrubby borders of forests, lakes and rivers. In a landmark study in the Manu Biosphere Reserve, in south-eastern Peru, in the 1970s and early 1980s, J. W. Terborgh and several investigators found that, of the 40 species of tanager recorded in 1 km² of forest and river edge at the Cocha Cashu Biological Station, only three foraged primarily in the understorey. Two of these, the Grey-headed Tanager and Red-crowned Ant-tanager, occurred inside the forest, and the third, the Orange-headed Tanager (*Thlypopsis sordida*), occurred in tall canegrass (*Gynerium*) on river sandbars outside the forest; since the ant-tanager genus *Habia* is now believed not to be closely related to tanagers, only two true thraupids occur regularly in the understorey. The remaining 37 species were associated with a variety of mostly arboreal forest habitats, or along forest borders and lake margins. Of the 15 habitats quantified in the Manu study, tanagers were present in eight (albeit only infrequently in two of these) including: river margins; cane brakes; swamp-forest; low-lying seasonally flooded transitional forest; high-ground forest; lake margins; marshes; and *Mauritia* palm swamps. Habitats not utilized by tanagers included river shores and lakeshores, lakes, bamboo, the aerial zone, and forest-stream margins. No tanagers were dependent upon or restricted to *Guadua* bamboo and only one species, the Magpie Tanager (*Cissopis leveriana*), occurred even occasionally in marshes; only the Palm Tanager (*Thraupis palmarum*) was seen in *Mauritia* palm swamps, and only the White-vented Euphonia (*Euphonia minuta*), now generally regarded as a fringillid, was regularly associated with forest openings. The transfer from Emberizidae to this family of the *Sporophila* seedeaters, which in the Manu region occur primarily in grassy lake margins, will not change these results appreciably. It is evident that tanagers have radiated into and now occupy almost all important arboreal habitats in Amazonia.

Nowhere, however, do tanagers seem to specialize in the subdividing of structural features in an environment as finely as they do in the Andes while, at the same time, making use of several broad habitat types such as wet montane forest, forest borders, and various stages of secondary growth and thinned woodland. In Andean cloudforests, six to ten species of *Tangara* may occur together at a single locality. Just as remarkable as this large number of co-existing congeners, however, is the fact that the composition and abundance of species continually change with elevation, so that a community of 6–10 species in the foothills will gradually be replaced by different species at successively higher elevations. Thus, a mixed flock containing seven or eight or nine species of *Tangara* at the base of the Andes will often share few or none of its members with a mixed flock of *Tangara* in a montane forest 1000–1500 m higher up the slope. To a lesser extent, various species or subspecies also replace each other latitudinally



Whereas birds of the undergrowth, forest edges and clearings readily use pools on the ground, highly arboreal species such as Tangara *tanagers generally bathe in tree sites such as rotted-out branch stubs, knotholes, large leaves and "tank" bromeliads. But the opportunistic* ***Bananaquit*** *is active at almost any height, from near ground level to the canopy, and will bathe with equal readiness in pools on the ground or, as here, in a century plant* (Agave americana) *leaf.*

[*Coereba flaveola uropygialis*, Willemstad, Curaçao. Photo: J. R. Riemer/ AGAMI]



Although only recently recognized as part of the tanager family, the ***Bananaquit*** *is typical of many tanager species in being a poor singer. It does sing persistently, however, producing songs that typically consist of a short, high-pitched series of unmusical buzzes, "chip" notes and insect-like hisses. Among the 41 subspecies distributed from south-eastern Mexico to Brazil, Peru and Bolivia, and across the Caribbean islands, there are hundreds of regional dialects and much individual variation within regions. The songs can be confused with those of hummingbirds (Trochilidae), conebills* (Conirostrum) *and dacnises* (Dacnis)*, and even with insect sounds.*

[*Coereba flaveola chloropyga*,
Iguazú National Park,
Argentina.
Photo: José Calo]

from north to south in the Andes, such that a middle-elevation flock on the east slope of the Andes in Venezuela or Colombia would not contain quite the same composition of species as a flock in humid montane forest at a similar elevation on the eastern slope in southern Peru or adjacent Bolivia. In numerous cases, the replacement of one species by an allied species occurs at large natural barriers. In the Andes, this replacement often takes place where an unusually deep mountain valley nearly splits the mountain range perpendicularly to its axis. This can be seen best at the Táchira Depression, in southern Venezuela, and the Marañon Valley, in Peru. In both cases, the valleys are so deep and low in elevation, and the habitat drier and so dramatically different in the valley bottoms compared with adjacent higher elevations, that they provide effective barriers preventing montane birds from moving from one side of the valley to the other.

While *Tangara* tanagers overlap broadly in their use of fruit resources, they search for arthropods by employing a variety of species-specific techniques and a remarkably fine-grained divi-



Along with its many beautiful but unmusical species, Thraupidae does include some fine singers, such as the ***Cinnamon Tanager****. Its song, delivered from an open perch on top of a tree or shrub, is a leisurely and exceptionally sweet series of phrases, some of which may be repeated over and over. Harsher critics have called it "rather monotonous". There is some geographical variation, but the pattern and rich melodic tone are easily recognizable. Its congener, the Black-faced Tanager* (Schistochlamys melanopis)*, also has a musical song involving repeated phrases.*

[*Schistochlamys ruficapillus capistrata*,
Serra da Canastra
National Park,
Minas Gerais, Brazil.
Photo: Edson Endrigo]



Vocal duetting is performed by several genera of tanagers and may be used in different contexts, from territorial defence to maintaining contact in dense undergrowth. Pairs of ***White-rumped Tanagers****, for example, sing to announce their territory ownership. They are conspicuous as they sit close together in the tops of isolated trees and shrubs, and sing their loud, rollicking duets. The song, heard mainly prior to sunrise, but also periodically during the day, is a rapid and loud series of melodic whistles, the phrases given over and over in rapid succession. The duet may be antiphonal or synchronized.*

[*Cypsnagra hirundinacea pallidigula*, Jalapão State Park, Mateiros, Tocantins, Brazil. Photo: Robson Silva e Silva]

sion of their foraging substrates. In western Ecuador, for example, Naoki, working at an elevation of about 1250 m, found that, in a community of seven *Tangara* tanagers, all of them used largely the same fruit resources and harvested these in the same way, but the species differed sharply in the manner in which they searched for arthropod prey and the substrates on which they searched. She found that these various species of *Tangara* foraged on bare or partly mossy branches, or mossy surfaces, or live foliage, or dead leaves, or flower buds. Moreover, the location of these structures within a tree or shrub was also important. Members of the genus regularly subdivided the parts of trees and shrubs where they habitually foraged, such that some species foraged more in the inner part of a tree or branch, others in the middle, and still others in the outer twigs and foliage. The searching techniques employed by the seven tanagers also varied from species to species and involved sallying, pulling, probing, hanging upside-down, hanging to the side, hanging downwards, reaching down, reaching to the side, reaching up, and gleaning. Some species used combinations of substrates, habitats, foraging positions and attack manoeuvres, resulting in a remarkably precise habitat subdivision in the utilization of arthropod resources. With such a rich variety of foraging manoeuvres, substrates, tree positions and habitats, it is perhaps not surprising, then, that so many similar species can co-exist.

An example of the exceedingly fine discrimination of foraging sites used by some *Tangara* is illustrated by two of the seven species studied by Naoki. The Golden Tanager consumed mostly similar fruits, and in similar proportions, to those taken by the Flame-faced Tanager, the two thus overlapping almost completely in the fruit portion of their diets. When foraging for arthropods, both species also habitually searched along branches by leaning down and peering at the sides of the branches, first on one side, and then hopping once or twice along the branch and repeating the process on the other side of the branch as they progressed outwards. Both also foraged mostly on the inner section of branches, so that the average size of the branches inspected was similar for the two species, but from two to four times larger than the branch sizes used by the other five *Tangara*. In addition, the Golden and Flame-faced Tanagers did most of their foraging in primary forest, the Flame-faced Tanagers differing mainly in including slightly more trees in semi-open areas. Up to this point, these two species were nearly identical in their foraging manoeuvres, tree position and habitat use, but, in a critical fourth dimension, the type of substrate used, they differed dramatically. Flame-faced Tanagers obtained approximately 80% of their arthropod prey from moss on the inner part of limbs, and took most of the remaining prey items from partly mossy limbs, revealing that, when foraging for arthropods, this species is a moss specialist. Golden Tanagers, on the other hand, took only about 40% of their arthropod prey from moss and a further 20% from partly mossy limbs; they captured a sizable 35% on bare limbs, a micro-habitat substrate almost completely ignored by allied Flame-faced Tanagers.

In examples where the foraging behaviour of some *Tangara* tanagers are very similar, the species may avoid direct competition by having non-overlapping distributions. The Speckled (*Tangara guttata*), Spotted, Yellow-bellied (*Tangara xanthogastra*) and Rufous-throated Tanagers all feed heavily on tiny berries of *Miconia* and other melastomes, these accounting for perhaps half or more of their food choices, and each species also searches for insects primarily on twigs and foliage near the outer ends of branches. Their distributions are largely discrete, but in areas where two or more of the species overlap, such as in southern Venezuela, the Spotted Tanager occurs in the lowlands, and the Speckled and Yellow-bellied Tanagers at higher elevations. Here in the tepui highlands, Speckled Tanagers forage primarily in terminal twigs and foliage, while Yellow-bellied Tanagers spend more time in utilizing larger-diameter, interior branch surfaces.

Many tanagers in the Amazonian region are broadly distributed geographically, whereas in the Andes distributions are more apt to be long and linear, corresponding to narrow elevational bands of suitable forest. Distributions that follow a particular forest type in the Andes often extend for hundreds and even thousands of kilometres along an eastern-slope or western-slope contour of the mountains, but may extend little more than a thousand metres vertically. A dozen or more species of tanager, however, have unusually small distributions, in some cases limited to the headwaters of a single watershed or mountain ridge. For example, the Sira Tanager is found only at the north end of a single isolated mountain top in east-central Peru, where it presumably requires the cooler montane forest confined to the top of this isolated ridge. The habitat of some other species appears not to



*The dawn song of the **Green-headed Tanager**, given from the crown of a tree, consists of a high-pitched, trisyllabic phrase, steadily repeated up to 90 times a minute. For a number of* Tangara *species, however, no song has yet been described. Some apparently sing rarely or not at all, although it is often unclear which of their vocalizations could actually comprise a song. Many songs that have been described consist of repeated buzzing, wheezing or ticking. Rare exceptions include the Grey-and-gold Tanager* (T. palmeri), *a notably vocal species with several semi-musical calls.*

[*Tangara seledon*, Brazil.
Photo: Roy de Haas/ AGAMI]

differ appreciably from that in adjacent areas, and exactly how or why the distributions of these birds are so restricted remains unknown. For example, the Orange-throated Tanager (*Wetmorethraupis sterrhopteron*) is known only from a small area of wet foothill forest in the upper Marañon Valley of northern Peru and adjacent Ecuador. The species was not discovered until the early 1960s and was considered so unusual that it was placed in a monotypic genus; it would seem, therefore, to have no closely related competitors. Furthermore, the habitat in which it occurs, with the exception of a few arid valleys, extends essentially along the length of the eastern base of the Andes from Colombia south to Bolivia. So, why is this species confined to such a small area? At the present, the factors limiting the distribution of this species so sharply are not known. Perhaps it is a relic species, historically more widespread, but now reduced to a single small area because of factors as yet unidentified. It is not readily apparent that the wet forest in this small area differs much from that in other, contiguous areas. Sadly, this rare species is now being hemmed in by deforestation, making the likelihood of learning the reasons for its small distribution ever more remote. In another example, Parodi's Hemispingus (*Hemispingus parodii*) lives in dense bamboo and wet, stunted forest at the tree-line in the department of Cuzco, in southern Peru. The species is fairly common locally, but has yet to be found farther to the north or south, despite the fact that this narrow band of wet tree-line vegetation extends more or less uninterrupted northwards to northern Peru and southwards into Bolivia. The Green-capped Tanager provides yet another example of a species confined to a single high-lying, semi-arid valley in the intermontane region of extreme southern Peru. The habitat is not unusual, because dry, intermontane valleys are characteristic of many highland areas in Peru and southwards into Bolivia. What factor or factors, modern or historical, cause this species to be confined to a single valley remain unknown.



Typically for most of the genus Diglossa, *the song of the **Grey-bellied Flowerpiercer** is a rapid, complex jumble of high-pitched notes, lasting around three seconds. The song is repeated at intervals of a few seconds during peak singing bouts, which take place at dawn, from a perch in the top of a shrub or small tree. Both sexes sing. As well as breeding territories, these flowerpiercers hold individual territories and are aggressive in defending small patches of flowers.*

[*Diglossa carbonaria*, Tunari National Park, Cochabamba, Bolivia.
Photo: Daniel Alarcón]

Numerous tanagers are associated with cool, mossy cloud-forests, and no group exemplifies this better than the genus *Tangara*. With some 49 species, *Tangara* is the largest single genus of birds in the Western Hemisphere. It is well represented across Amazonia and in Atlantic Forests of southern Brazil and a sprinkling of species have found their way northwards into Central America and south Mexico, but the genus is nowhere else as diverse as it is in the Andes. From the Amazonian lowlands and foothills along the eastern base of the Andes, various *Tangara* species gradually replace one another in succession upwards to almost 2500 m, a single species, the Blue-and-black Tanager, ranging nearly to the tree-line. This grand panoply of avian colour unfolding up the verdant slopes of the Andes represents one of the greatest of all radiations of avian diversity. About half of the Andean *Tangara* depend heavily on wet forest, the remainder favouring a variety of more disturbed habitats, including treefalls and semi-open areas, but within these *Tangara* communities there

With the likely transferral of the genus Piranga, *perhaps to the Cardinalidae, Thraupidae will lose some of its finest songsters. The song of the* ***Flame-colored Tanager****, given from a high perch, is a long series of phrases of 3–6 notes, rich, musical and reminiscent of a vireo (Vireonidae), but with a slight burr typical of the genus. Some species sing for up to half an hour at dawn, giving their slow, rich carolling from a favourite perch. Others may be less rich in their delivery: the song of the Highland Hepatic-tanager* (P. lutea) *has been called "rather repetitious", and that of the Lowland Hepatic-tanager* (P. flava) *"melodious but with little variation".*

[*Piranga bidentata bidentata*, Santa Rita Mts, Madera Canyon, Arizona, USA. Photo: Rick & Nora Bowers/VIREO]



is exceptionally broad habitat overlap, almost all of them using the same spectrum of humid forest, wooded borders and light woodland at times. In a community of eight *Tangara* tanagers in the Anchicayá Valley of western Colombia, Hilty found that two species, the Blue-necked and Golden-hooded Tanager, occurred primarily in semi-open areas with scattered trees, while the remaining six species used a combination of wet and mossy forest interior, forest borders and secondary woodland. These six, however, favoured certain forest micro-habitats over others, despite broad overlap. For example, the Emerald, Silver-throated, Bay-headed and Golden Tanagers occurred more often inside tall, wet forest, the Grey-and-gold Tanager used mainly high canopy and emergent trees in the forest and in clearings, and the Rufous-throated Tanager favoured forest borders and secondary woodland and borders. Within the Amazon Basin it is also not unusual to find most *Tangara* sharing the same spectrum of forest and forest-canopy habitats, only one species, the Masked Tanager, occurring mainly in open or semi-open areas with scattered tall trees. The other species make use of the tallest emergent forest trees and the canopy and subcanopy heights, and, indeed, they are often found together in the same mixed flocks of tanagers and honeycreepers early in the morning. Later in the day, they are likely to forage together with other species in large mixed canopy flocks.

A few tanagers are associated with semi-open habitats and grasslands where there are only scattered trees and bushes and, in Brazil, with light-canopied *cerrado* woodland. Two south-central Brazilian species, the White-banded Tanager and White-rumped Tanager (*Cypsnagra hirundinacea*), are found only in savanna with a peppering of trees and shrubs. Interestingly, the White-banded Tanager bears a striking resemblance in appearance to the Great Grey Shrike (*Lanius excubitor*) and Loggerhead Shrike (*Lanius ludovicianus*) of northern temperate regions, both of which occupy partly open terrain similar to that in which this tanager is found. The more widespread Black-faced Tanager occurs in similar open to bushy habitats, as well as in the mixed grassland and scrub that develops on white-sand soils across southern Venezuela and the Guianas, and in grassland and gallery-forest mosaics that characterize the strongly seasonal *llanos* climate of central Venezuela and north-eastern Colombia. The Red-shouldered Tanager is closely associated with the tough, sclerophyllous-leaved bushes that dot grassland on Guianan white-sand soils. It is not known what factors restrict it to this specialized vegetation of white sandy soil while the more widespread Black-faced Tanager thrives in a broader range of equally open habitats. Only four species of *Tangara* occur primarily in semi-open habitats, and they overlap little in range with the others. The Burnished-buff Tanager thrives both in white-sand scrub and in strongly seasonal, mixed grassland and woodland that characterizes much of northern and central Venezuela and adjacent Colombia east of the Andes, habitats similar to those occu-

Some tanagers always forage in a particular stratum, but the ***Blue-winged Mountain-tanager*** *forages at various heights, from below eye level to high in the canopy. Blue-winged Mountain-tanagers forage conspicuously in pairs or single-species groups of up to ten individuals. They also join mixed-species flocks containing other tanagers and New World warblers (Parulidae), but frequently strike out on their own in erratic little forays. They are energetic, nimbly run-hopping along slender, mostly bare branches, and working out fairly quickly to terminal foliage clusters.*

[*Anisognathus somptuosus cyanopterus*, Bellavista Cloud Forest Reserve, Tandayapa, Ecuador. Photo: Tui de Roy/ Roving Tortoise Photos]





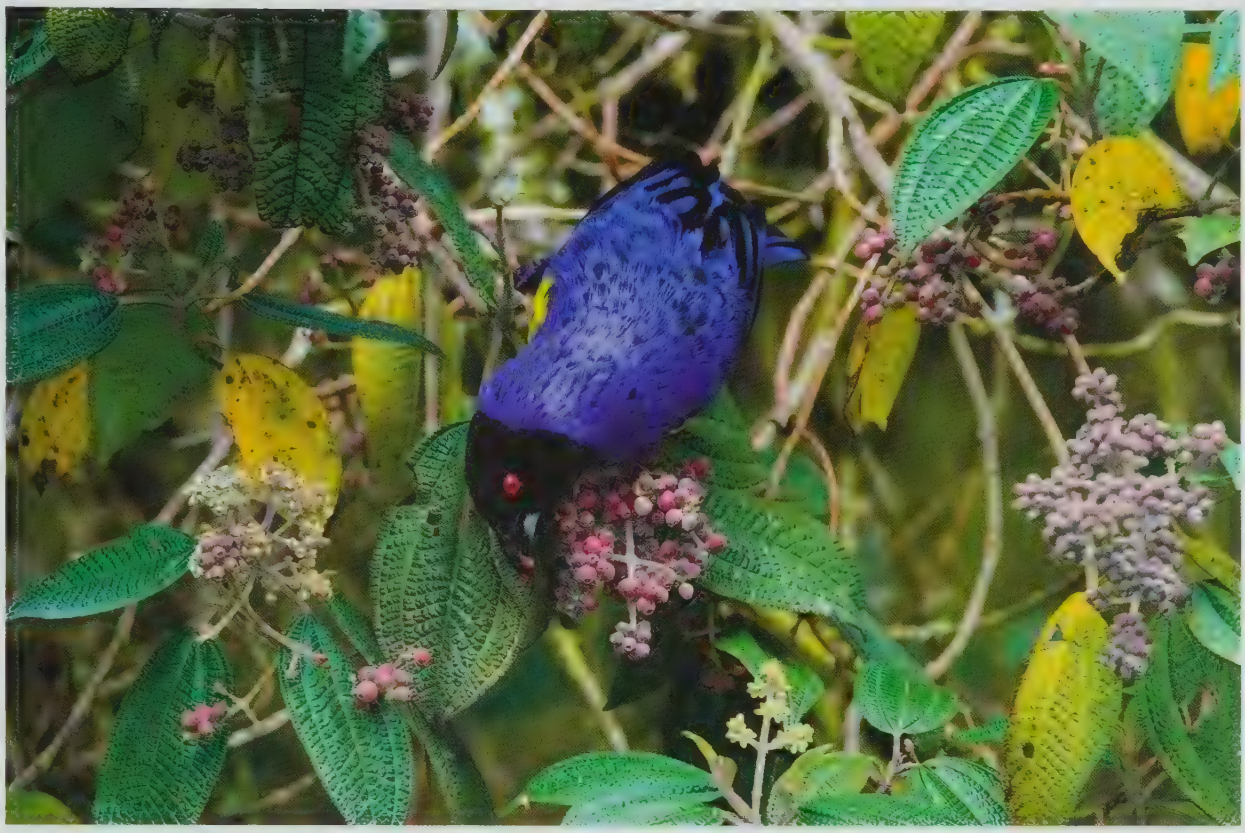
Communities of many species of tanager are able to co-exist because they divide available habitats and resources between them. The ***Vermilion Tanager*** *belongs to the monotypic genus* Calochaetes, *one of a number of Andean genera, also including* Tangara, *which are closely associated with humid montane forest and forest edges, where they forage mostly above the understorey. Other predominantly Andean genera found in these forests are more closely associated with dense undergrowth and bamboo. Vermilion Tanagers have a short, thick bill that is able to take larger fruits than can most tanager species, and they are not often seen at the small-berried trees used by many other species.*

[*Calochaetes coccineus*, Ecuador.
Photo: Kathy Kinnie]

pied by the Black-faced Tanager. It overlaps only very locally, for example near Ocaña, in the Colombian department of Norte de Santander, with the allied Scrub Tanager, which occupies a range of scrubby and intervening agricultural habitats in dry intermontane valleys in Colombia and northern Ecuador. The Green-capped Tanager, as discussed above, is found only in the watershed of a single high-lying arid valley in Peru. And the Lesser Antillean Tanager, found only on St Vincent and Grenada, occurs in gardens and semi-open areas but also in secondary growth and drier woodland.

The use of different habitats by separate geographical populations of the same species is a phenomenon that has not, so far as tanagers are concerned, received much attention from scientists and is complicated by the uncertain taxonomic status of some taxa. In many cases, a single tanager species occupies essentially similar habitats throughout its range, even though its populations are broadly dispersed geographically, but separate populations of a few species are found in two or more distinctively different habitats. The Orange-headed Tanager is an example of such a species that occupies different habitats in different portions of its range. Along the Orinoco River in Venezuela the race *orinocensis* is known mainly from young vegetation on river islands, and in western Amazonia the subspecies *chrysopis* also occurs in young vegetation such as *Gynerium* grass, willows (*Salix*), *Tessaria* (Asteraceae), *Cecropia* and *Erythrina* on river islands, as well as in young second growth along riverbanks and in humid shrubby clearings and gardens. South of the Amazon Basin, however, the nominate race of the Orange-headed Tanager inhabits dry woodland, parks, gardens and *cerrado*, as well as light woodland along watercourses; in north-western Argentina it is found in dry, strongly seasonal open woodland, and in vines, weedy scrub and brush along intermittent riverbeds in the lowlands and foothills, and here it ranges up to 1000 m elevation. In another example, the Black-goggled Tanager (*Trichothraupis melanops*) has one population in the Andes and another in the lowlands of south-eastern Brazil, and the two populations are separated by a wide gap. The habitats occupied by these two populations are quite different. Andean birds are found in a narrow band between about 1000 m and 2400 m on the eastern slope in Peru and Bolivia, where they occur at low density in the lower and middle strata of mossy forest on steep slopes, and pairs or families accompany mixed-species flocks that contain other species of tanager. The somewhat more numerous eastern population is found in both lowland and foothill forest in Atlantic eastern Brazil, east Paraguay and north-eastern Argentina, in this region reaching a maximum elevation of 1200 m, only slightly higher than the lowest elevation reported for this species in the Andes. While the eastern population is found in predominantly humid forest, the Atlantic Forests are more seasonal, warmer, and less humid than the cloudforests where the Andean population lives. A disjunct distribution also characterizes the Fawn-breasted Tanager, with an almost wholly Andean population (race *venezuelensis)* stretching from northern Venezuela south to Bolivia, as well as occurring locally in the highlands of southern Venezuela. These highland birds are found in a range of humid forest types, including forest borders, coffee plantations and disturbed or opened areas, and are nomadic or migratory, although their movements are poorly understood. A second, widely separated subspecies, the nominate race, is found in the Atlantic Forests of southern Brazil, Paraguay and Argentina. This south-eastern population occurs in both lowland and humid montane hill forest, but seasonally ranges into more open sites as far south as the *pampas* of Buenos Aires and northwards into mixed *cerrado* and dry forest in south-central Brazil. These habitats are far more open than any used by the Andean population of this species.

Disjunct or non-contiguous populations are a feature of many tanagers both in the Andes and in the lowlands of South America. In some cases, such as those of the Orange-headed, Black-goggled and Fawn-breasted Tanagers mentioned above, as well as the Blue-necked Tanager, these discontinuous ranges may be associated with habitat shifts that occurred in the past. From a modern perspective, the separations appear to be maintained by intervening habitat that is inappropriate. In another example, the Plumbeous Euphonia (*Euphonia plumbea*) occurs primarily in semi-open scrub in white sandy-soil regions, and its isolated and widely scattered populations across northern South America correspond closely to ancient deposits of these sands, some of which in western Amazonia predate the uplift of the Andes. The unravelling of historical events and corresponding time periods that may have led to such distributions is, however, difficult, and it may be almost impossible, even with the aid of molecular genetics, to reconstruct with confidence the reasons why some



Of 35 ***Hooded Mountain-tanager*** *stomachs examined, 34 contained only vegetable material and only one contained both animal and vegetable matter. As well as fruit pulp, the vegetable material consisted of seeds and leaves. These mountain-tanagers forage in two different ways. When in association with caciques* (Cacicus) *and jays (Corvidae), they move rapidly, roaming over large areas. They rarely mix with smaller species. Away from mixed flocks, they are slower and more methodical, hopping along bare or mossy branches, mainly in the middle and upper strata of trees.*

[*Buthraupis montana cucullata*, Ecuador. Photo: Kathy Kinnie]

disjunctions have occurred or why a once continuous population may have become separated into two or more in the past. In a common disjunct pattern among tanagers, a widespread population occupies humid forest across much of the Amazon Basin and a narrowly constricted population is confined to a band of coastal or montane forest in south-eastern Brazil. This distributional pattern can be observed with the Red-legged Honeycreeper, Green Honeycreeper, Yellow-backed Tanager, Flame-crested Tanager, Turquoise Tanager, Opal-rumped Tanager, Red-crowned Ant-tanager and Magpie Tanager. It is a feature also of the Orange-bellied Euphonia, Violaceous Euphonia (*Euphonia violacea*), Golden-rumped Euphonia (*Euphonia cyanocephala*) and Blue-naped Chlorophonia (*Chlorophonia cyanea*), species currently included in Thraupidae but now believed to be fringillids. An even commoner pattern of disjunction can be seen in the Andes, where populations widespread historically during cooler periods have, during a subsequent warmer epoch, been pushed to higher elevations and ultimately become separated by deep, arid and often hot valleys that become barriers to the free dispersal of species northwards and southwards. In some cases populations have, by various means, overcome these barriers. More often, however, widespread populations have found themselves isolated as climatic changes reduced appropriate habitat to a series of island-like ridges or mountain tops, with little or no chance for gene flow to occur between the various isolates. The Andes harbour many such distributional patterns, and dozens are evident from an examination of the tanager range maps. An example is provided by the Golden-crowned Tanager (*Iridosornis rufivertex*), a high-Andean species now separated into at least four and possibly as many as seven isolated high-elevation populations scattered between Colombia and northern Peru. Almost certainly this species was more widespread when climates were colder and its preferred cold, damp habitat was more extensive and continuous at lower elevations. Now, with its range fragmented, there is effectively no opportunity for gene flow between the populations, each surviving in refugium-like, wet elfin woodland at or near the tree-line. Other examples of tanagers with similarly fragmented ranges include the Superciliaried Hemispingus, Lacrimose Mountain-tanager (*Anisognathus lacrymosus*), Buff-breasted Mountain-tanager (*Dubusia taeniata*), Hooded Mountain-tanager and Black-chested Mountain-tanager. In some of these examples, isolation has been followed by minor plumage changes. In the case of the Buff-breasted Mountain-tanager, plumage differences also are accompanied by dramatic vocal differences north and south of the Marañon Valley. In some instances, isolation over time has resulted in populations that have diverged, approaching or reaching the threshold for recognition of the forms as separate full species, as has probably occurred with the various isolates of the Black-eared Hemispingus (*Hemispingus melanotis*), and the closely allied Piura Hemispingus (*Hemispingus piurae*) and Western Hemispingus (*Hemispingus ochraceus*), and with isolates of the Buff-breasted Mountain-tanager mentioned above. A similar situation can bee seen with Carmiol's Tanager (*Chlorothraupis carmioli*) and the Olive Tanager (*Chlorothraupis frenata*), taxa traditionally treated as conspecific. Both, incidentally, are now regarded as better placed within the cardinalids (see Systematics).

General Habits

Tanagers, irrespective of taxonomic definition, are an important and conspicuous component of almost every avian community in the humid New World tropics. To most humans, the general behaviour of the ones likely to be seen in settled areas must seem fairly unremarkable. Blue-grey (*Thraupis episcopus*) and Palm Tanagers, at least at first glance, appear to forage and behave in much the same way as many other small birds, and *Ramphocelus* tanagers troop around in noisy and familiar groups in gardens and bushy areas. Some of these same tanagers occasionally damage fruit in gardens, but they also eat many harmful insects (see Relationship with Man).

During at least part of the year, many tanagers join mixed-species foraging flocks and are found in pairs or families within these flocks. A minority also gather in much larger groups numbering 5–20 individuals, sometimes more, and when these forage with other species they may comprise 30–50% of all the birds in such mixed flocks; examples of this include the Beryl-spangled and Silver-throated Tanagers in the Andes and the Paradise and Green-and-gold Tanagers in Amazonia. Except when they are breeding, some tanagers occur also in wide-ranging flocks of their own species. For example, the Crimson-backed and Silver-backed



*The **Brassy-breasted Tanager** lives almost entirely on small fruits, topped up with a small quantity of arthropods. The feeding habits of this species and the Cinnamon Tanager* (Schistochlamys ruficapillus) *were studied over twelve months in Ibitipoca State Park, in Minas Gerais, Brazil. Both species consumed mainly fruit, but the two showed different responses to changes in food availability. When fruit was in short supply, the Cinnamon Tanager consumed more arthropods, leaves, flowers, and food left by tourists. But the Brassy-breasted Tanager maintained its high intake of fruit, with some arthropods, flowers and nectar, throughout the year.*

[*Tangara desmaresti*, Nova Friburgo, Rio de Janeiro, Brazil. Photo: Edson Endrigo]

Tanagers, as well as most other *Ramphocelus* tanagers, are among the most conspicuous birds in gardens, in settled areas and along forest and lake borders in lowland tropical America. They spend much of the year in little flocks, foraging, mobbing predators and even roosting together. These groups are presumably composed of related adults and offspring of these families, and perhaps also unrelated members, although the social organization of these ubiquitous flocks remains unstudied. Red-billed Pied Tanagers and Scarlet-throated (*Compsothraupis loricata*) and White-capped Tanagers (*Sericossypha albocristata*), although less well known because they occur in remote areas, also travel in groups of a few to a dozen or more individuals of their own species and roam through forest treetops. At times, Blue-grey, Sayaca (*Thraupis sayaca*) and Palm Tanagers also gather in loosely associated flocks. The reasons why these single-species flocks form are poorly understood, but this flocking behaviour may, at various times, be related to short-distance seasonal movements in response to changing food availability, to locally abundant food resources, to dispersal of the young, and to long-distance migration. In eastern Bolivia, for example, groups of 50–60 Sayaca Tanagers are commonly observed in Noel Kempff Mercado National Park in July and August and likely represent roosting and/or migratory parties from more southerly latitudes. In general, flocking, in whatever form, is most closely associated with species that occur in forested or partly wooded or shrubby areas. In contrast, species such as the Black-faced, Burnished-buff and Scrub Tanagers, which live in relatively open habitats, infrequently follow mixed-species flocks but are often seen in small, single-species groups that may consist of extended families.

The most extensive work on the display behaviour of tanagers has been conducted by Moynihan, who worked primarily in Panama with Crimson-backed Tanagers (*Ramphocelus dimidiatus*) and Lemon-rumped Tanagers, which share many similar types of display behaviour. His studies focused also, for brief periods of time, on several South American species of *Ramphocelus*, as well as on *Chlorospingus* bush-tanagers in Panama. Moynihan observed display behaviour associated primarily with locomotion, gregariousness, hostility and sexual behaviour of adults and juveniles, and found that all or most of the displays of Crimson-backed Tanagers, described below, were partly or completely homologous with those of Common Bush-tanagers.

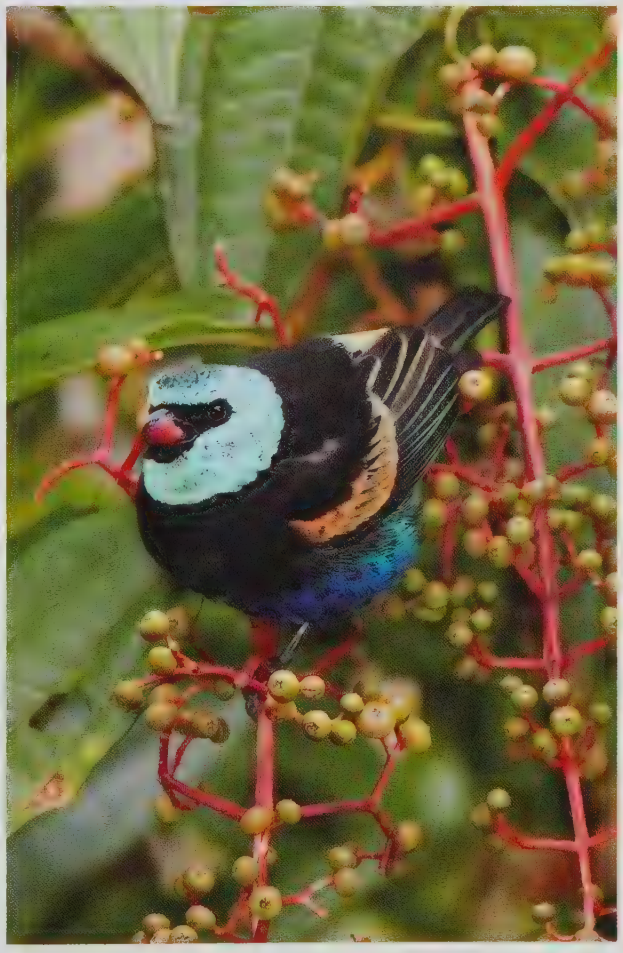
Like most small passerines, Crimson-backed Tanagers perform various stereotyped wing-flicking and tail-flicking movements when they are about to fly. These are performed by males, females and juveniles with equal frequency and in all social situations, including by solitary individuals, and by birds in mixed flocks as well as those in single-species flocks. As with many other tanagers, these movements are most pronounced when a tendency to fly is inhibited or delayed momentarily, in which case the wing-flicking and tail-flicking probably serve as a signal of an individual's intention to fly. Wing-flicking movements of Crimson-backed Tanagers are similar to those of many other birds, and involve opening and closing the wing rapidly and repeatedly. Wing-flicking is almost always performed in synchrony with tail movements, but is generally less exaggerated. Tail-flicking usually involves the jerking of the tail sharply to one side, and then more slowly returning it to its original position; less often, the tail is flicked first to one side, then to the other and finally back to its initial position. Tail-flicking can also be vertical, involving simple down-and-up or up-and-down movements, or a more complex down-up-down movement, or vice versa. Simple down-and-up tail-flicking is the commonest movement.

Crimson-backed Tanagers are gregarious although somewhat less so than some other species of *Ramphocelus*. A family of four or five individuals often remains as a unit for months, but larger groups, involving several families, are apt to be less stable and much briefer in duration. With these tanagers, gregariousness is associated with a variety of hostility displays towards group-members and, to some degree, with rather weakly developed territorial defence or maintenance. Intraspecific disputes often involve an "erect" posture with the neck extended upwards, but the head horizontal, with sleeked plumage and slightly cocked tail. More aggressive postures include crouching and ruffling of the plumage. Plumage-ruffling, especially, is associated with a tendency to attack and often precedes fights that involve physical interactions. Gaping, in which the bill is held open unusually wide in a stereotyped position, is also commonly associated with aggressive behaviour and may be combined with crouching and ruffling; it perhaps represents an exaggerated form of threat biting, in which a threat posture is followed by a physical attempt to bite.

Simple monosyllabic nasal notes are given by adults and juveniles especially in social situations, when two or more birds are









The berries of Miconia *and related genera in the Melastomataceae comprise a significant proportion of all the fruit eaten by* Tangara *tanagers. In almost any month of the year, one or more species of this small tree can usually be found in fruit. In a study in Colombia, consumption of* Miconia *berries by 23 resident tanager species varied from around 14% of all fruit-eating in February to nearly 65% in December. In Trinidad, 31% of the fruits eaten by the* ***Turquoise Tanager*** *(above left) were* Miconia *berries, although this species has been recorded as eating 26 species of fruit. Insect-seeking, however, made up almost half the foraging records for this species. The* ***Gilt-edged Tanager*** *(above right) usually forages from the middle to the canopy of forest trees, but descends to feed at fruiting shrubs along the forest edge. The* ***Blue-necked Tanager*** *(below left) is primarily a fruit-eater: of ten stomachs examined, nine contained only fruit and seeds. Insects account for 13% of its diet in Colombia, the remainder being fruit, of which* Miconia *species comprise just over half. Although not often seen in mixed flocks, it may join them at fruiting trees. But the* ***Spangle-cheeked Tanager*** *(below right), which takes a wide variety of small fruits, is often found in small mixed-species flocks.*

[Above left: *Tangara mexicana vieilloti*, Trinidad. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com.

Above right: *Tangara cyanoventris*, Atlantic Rainforest, Brazil. Photo: Cassiano Zaparoli.

Below left: *Tangara cyanicollis cyanicollis*, Cock of the Rock Lodge, Manu National Park and Biosphere Reserve, San Pedro, Cuzco, Peru. Photo: Roland Seitre.

Below right: *Tangara dowii*, Costa Rica. Photo: Marco Saborío]



*The **Golden-collared Honeycreeper** has sometimes been placed in the genus* Tangara. *Its montane distribution mirrors that of many* Tangara *species, and its plumage is much like that of the Black-headed Tanager* (T. cyanoptera), *although its bill shape differs substantially. It forages mainly in the upper levels of trees, and, typically, one or two associate with fast-moving mixed-species flocks containing* Tangara *and other tanagers. But observations suggest that it takes fewer insects than do* Tangara *species. It has been recorded as taking* Miconia *berries (as here),* Cecropia *catkins and nectar.*

[*Chlorophanes pulcherrimus pulcherrimus*, Cock of the Rock Lodge, Manu National Park and Biosphere Reserve, San Pedro, Cuzco, Peru. Photo: Roland Seitre]

present, and the calls often are not closely associated with particular types of behaviour. Nasal notes are uttered most frequently in certain types of hostile interaction, especially intraspecific territorial disputes, but not when actually fighting. Moynihan argues that nasal notes, in most situations, are given when escape and attack tendencies are roughly balanced and they thus represent a neutral situation perhaps slightly favouring escape over aggression, but are not uttered during actual escapes. They also are given very frequently when eggs or young are being threatened by predators. During these situations, the frantic calling and flying back and forth by the adults represent both escape and attack intentions, commonly referred to as "mobbing". Similar calls and mobbing behaviour are widespread among small birds. Crimson-backed Tanagers also utter a wide variety of other calls, ranging from muffled notes to hoarse notes that are associated with "flight or fight" tendencies. The entire spectrum of muffled to hoarse notes is associated with hostile situations, muffled notes representing the weakest hostile motivations, and hoarse ones the strong motivations; the latter are often uttered as threats, when attack and fight tendencies overwhelm escape tendencies. Combinations of muffled and hoarse notes may be involved in "greetings" between mated individuals, especially when the partners have been widely separated and then come unusually close together. Even in this case, however, the notes contain hostile components, although in these situations weaker muffled notes are predominant. Single plaintive notes also are used in various situations, but most often by partners that have become separated. These plaintive notes always stop as soon as a calling bird is joined by its mate.

Dawn songs, which in fact begin well before dawn, represent the most sustained vocal effort of Crimson-backed Tanagers and are given only by males. Song perches are usually well elevated and exposed, so the singer is visible from all directions and he begins to sing the moment he arrives. Dawn-song postures of the Crimson-rumped Tanager are somewhat ritualized, being more rigid than during singing at other times, and the singer typically adopts a diagonal attitude, sometimes also with some fluffing of the breast and belly feathers. Dawn song is not accompanied by flicking of the wings or tail, although males typically fly back and forth between several song perches during their dawn performance. Dawn singing, in terms of behaviour, is a solitary exercise, almost always performed by single males. If a female is within 6–10 m the male seldom sings, and he always stops singing immediately if a female joins him. As with many species, dawn singing is largely confined to the breeding period. Males are frequently joined by their mates at some point during the dawn chorus but, according to Moynihan, these interactions are more likely to relate to pairing or pair-bond maintenance rather than copulatory behaviour. For both male and female Crimson-backed Tanagers, pre-copulation behaviour is characterized by a rather exaggerated bill-up and tail-up posture, with the wings raised, the tail quivering and the breast and rear-end feathers widely fluffed. Males assumed this posture both when distant from and when close to females, and females usually adopted the same posture at the same time if copulation ensued.

Relatively little has been written about the roosting behaviour of tanagers, and most of what has been written comes from the careful observations of Skutch in Costa Rica. There is considerable variation in roost-site preference from species to species, but Skutch noted one prevailing pattern. Tanagers that build open nests sleep amid foliage, the members of a pair often roosting from a few centimetres to a metre or so apart, but never in physical contact. On the other hand, Bananaquits and *Chlorophonia* and *Euphonia*, the last two genera now generally treated as fringillids (see Systematics), build domed and covered nests, and all seek more sheltered sites for roosting. They may utilize the nest itself as a roosting site, either intermittently or continually for surprisingly long periods of time. Female Bananaquits often sleep in their nests, and both sexes sometimes construct dormitories, which are similar to the nests but thinner and less well constructed. Small pockets of moss on limbs, and nooks and holes amid ferns, orchids, lichens, liverworts and other epiphytes growing on branches, may also be used as sleeping sites. Skutch once observed a male Tawny-bellied Euphonia that roosted within a mass of moss that hung beneath a horizontal branch 5 m up in a row of calabash trees near his house. The euphonia slept in a small side-facing pocket in this moss, a site that did not differ greatly from a typical nest-site. The bird was first noticed roosting in this moss pocket on 22nd September, and it returned every night until at least mid-October. About a year later, what was presumed to be the same male Tawny-bellied Euphonia roosted for several months in nearby calabash tree, this time in a

small space between fern rhizomes and a branch that was covered with small epiphytes. After roosting in several sites in this tree, the euphonia disappeared, but it (or perhaps another individual) returned a few years later and again roosted beneath a horizontal branch, this time on the thin root of an epiphyte that was sheltered by liverworts. Except for a few brief absences, this bird returned to the same roosting site every night for the next four months, always arriving silently and unobtrusively. Skutch also observed a female sleeping in a similar pocket amid liverworts growing beneath a branch. He reported that, with only occasional absences, this female used this roost-site for two years. In one instance, Skutch watched a Bananaquit usurp the roosting site of a female euphonia, eventually filling the hole with grasses and causing the euphonia to abandon the roost-site.

During his long career of reporting on the lives of birds in the American tropics, Skutch found roosting Silver-throated Tanagers only three times, and in each case it appeared to be a solitary individual, because no mate could be located nearby. The roost-sites were small twigs and a leaf petiole located 2–3 m above ground, and with a large sheltering leaf overhead. The tanager returned to the same site for several nights, and in one case roosted close to a Rufous-tailed Hummingbird (*Amazilia tzacatl*) nest where a female was brooding her nestlings. Palm Tanagers, Blue-grey Tanagers and Golden-hooded Tanagers usually roost in pairs, the members often within a metre or two of each other but not in contact. In Costa Rica, Skutch observed a pair of Blue-grey Tanagers that roosted in an orange tree, sometimes sleeping on the long thorns present on the tree; from March until July the pair roosted about 2·8 m up in thick foliage, the two individuals always slightly separated from each other. On the island of Trinidad, pairs of Palm Tanagers have been observed to enter porches of buildings to roost on beams, a choice that must be learned and represents a "safe", predator-free, roosting site. Farther south, in Brazil, Sick has reported the use by groups of Violaceous Euphonias of dense clumps of mistletoe as roosting sites. A group of Cherrie's Tanagers, a species generally treated as conspecific with the Scarlet-rumped Tanager in the writings of Skutch, roosted for weeks in a dense hedge of *Stachytarpheta*, a shrub with spikes of purple flowers that grew in his yard. Away from houses and gardens, these tanagers roosted in tangles of bushes and vines at the edge of forest; other sites included a thorny orange tree, which they shared with other tanagers. In January, in the Maracaibo Basin of western Venezuela, Hilty watched nearly 30 Crimson-backed Tanagers at dusk as they flew over a brick wall and into a small group of citrus trees behind a house, in what appeared to be a large communal roost.

The Bananaquit is widely known for its habit of building dormitory nests for sleeping, and euphonias usually sleep in small pockets of moss on the sides of or beneath branches or in other protected crevices. So far as is known, however, most tanagers do not make use of holes or dormitory nests or other special structures for sleeping.

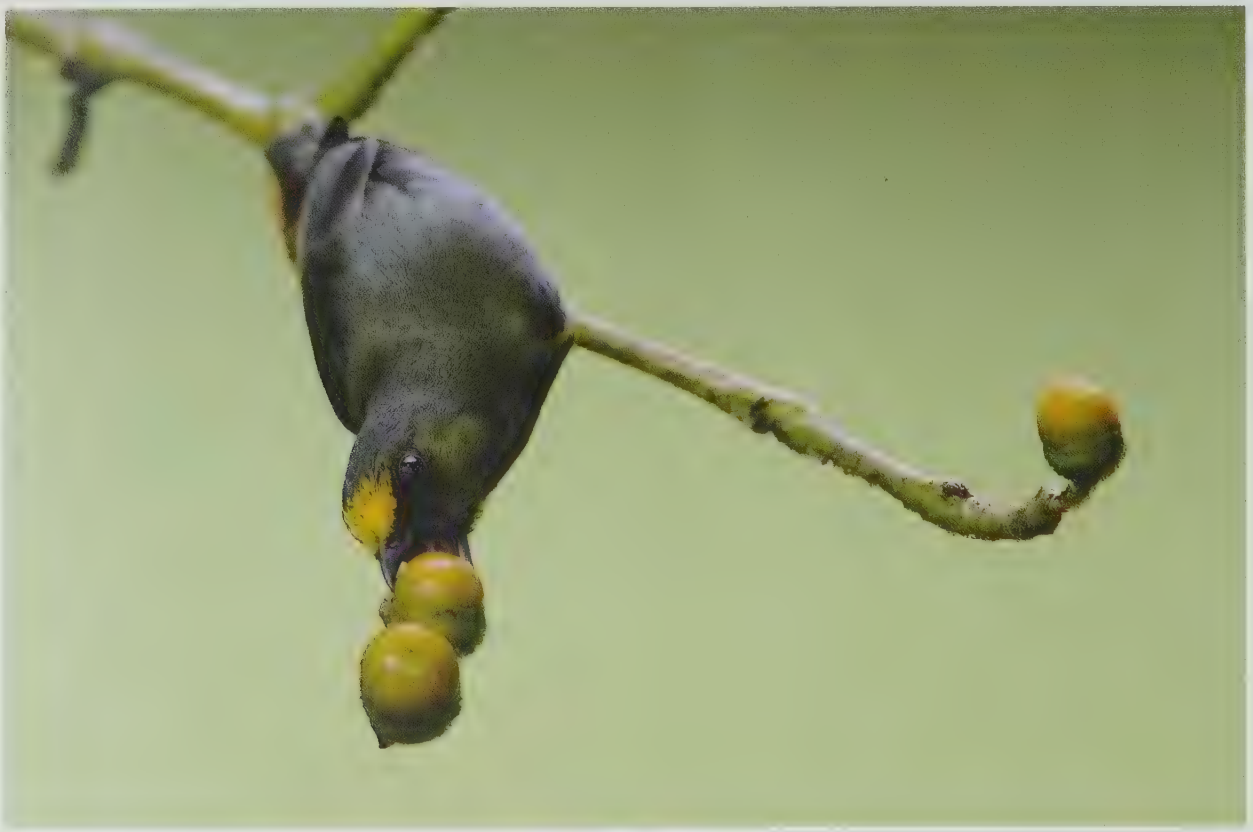
Anting by birds is an activity in which a bird grasps an ant or other small arthropod and mashes or otherwise damages it, and then brushes or rubs it through its feathers. It has been reported for more than 200 species of bird, covering many families, but it has not been frequently reported for tanagers. Skutch mentioned the anting activities of the Green Honeycreeper and noted that, unlike in temperate latitudes, where anting usually takes place on the ground, it is almost invariably performed in Costa Rica by birds perched in trees. In Brazil, Sick summarized the anting behaviour of three species of *Tangara* tanagers, the Gilt-edged (*Tangara cyanoventris*), Brassy-breasted and Blue-necked Tanagers, and also that of the Golden-chevroned Tanager (*Thraupis ornata*), but said little about when and where the behaviour was observed. Anting by birds is generally regarded as a beneficial activity, although the specific role that crushed ants or other arthropods and their body chemicals play when rubbed on feathers or skin remains largely conjectural. It is believed to be somehow useful in feather maintenance by helping to rid the feathers of mites and other parasites or to reduce skin irritations that could occur during the moult period. Because it has been reported for so many birds, it is an activity that is likely to be practised, at least occasionally, by many more species of tanager.

Unlike anting, water-bathing has been reported for numerous species of tanager, and is an activity that is probably undertaken by all thraupids when they have the opportunity to do so. There appears to be little evidence that bathing is more typical of certain genera or species of tanager than of others, or that it is more common among species living in one habitat than among those in another. In humid lowland sites in tropical America, several species of tanager have regularly been observed to bathe, especially



In a study of eight species of epiphyte-searching insectivores from various families in Costa Rica, the only thraupid, the ***Sooty-capped Bush-tanager****, was the most vocal, conspicuous member of the guild, and most mixed-species flocks seemed to organize around it. The Sooty-capped Bush-Tanager used the widest range of substrates and was the only species constantly to feed on fruit. As well as* Miconia, *it eats the fruits of* Fuchsia, *blackberries* (Rubus) *and Ericaceae. It forages from near the ground to the middle of the canopy, most commonly at 3–6 m, and is restless and active, habitually flicking its wings and tail.*

[*Chlorospingus pileatus*, Savegre Lodge, Costa Rica. Photo: Theodoulos Poullis]



Tanagers either swallow smaller fruits whole or mandibulate them with the bill. The ***Olive-backed Euphonia****, seen here plucking a fruit, frequently feeds on* Lycianthes sancta-clarae*, a member of the nightshade family (Solanaceae) with a fruit measuring 12 × 10 mm, bigger than the bird's head. The euphonia squeezes out the pulp and drops the skin and most seeds. Euphonias and chlorophonias are the only tanagers with a digestive tract modified for the quick passage of fruit pulp. Both genera are now generally placed within Fringillidae.*

[*Euphonia gouldi praetermissa*, Costa Rica. Photo: Mike Danzenbaker/ AGAMI]

late in the afternoon on hot sunny days, and the activity has been recorded also for several species of *Tangara* inhabiting the wettest cloudforests. Whether bathing takes place more frequently in hot lowland habitats than in cool, humid montane regions is unknown, although some anecdotal observations suggests that this may be true. Skutch reported bathing by numerous species in humid lowland forest in Costa Rica, and Hilty has observed bathing by a wide range of tanagers, including euphonias, several species of *Tangara* and the Green Honeycreeper, in cloudforests of the western Andes of Colombia, as well as by members of the genera *Thraupis*, *Ramphocelus*, *Tachyphonus*, *Coereba* and *Euphonia* at small pools in streams and rocky outcrops in the middle Orinoco region of southern Venezuela and near the River Magdalena, in central Colombia. Bathing sites utilized range from small forest or streamside pools, usually at the edge of forest or in a small opening but near cover, to water-filled tree holes, broken branch stubs, knotholes on limbs or trunks and tank bromeliads in trees. In general, highly arboreal species, such as *Tangara* tanagers, bathe at sites in trees, rather than descending to the ground, whereas species that occur in shrubby forest borders and clearings, such as the White-lined, Blue-grey and Palm Tanagers and various species of *Ramphocelus*, readily bathe in pools on the ground. Bathing can be a solitary activity, as when it takes place at a small bromeliad or knothole in a tree, but at larger streamside pools it is more often a social activity with several species of tanager and other bird species in attendance and bathing simultaneously or waiting nearby.

The bathing activities of tanagers have been observed mostly between mid-morning through to the late-afternoon hours. While not confined to periods of sunny conditions, bathing may occur more frequently on warm sunny days. Bathing tanagers, like most small passerines, usually stand in shallow water to a depth of 2–5 cm or so and repeatedly dip the body and head forwards and downwards into the water while holding the wings and tail partly spread. While dipping the head into the water they rapidly flick or fan their wings, thus creating a cascade of splashing water drops that aids in wetting the bird's feathers. Following a session of bathing, which can last from a few seconds to a minute or more, and may include repeated wing-flicking and wing-fanning with much splashing, the bird flies to a nearby perch and fans its wings vigorously, and then preens for up to several minutes.

Many tanagers readily mob predators, often joining excited groups of birds that include hummingbirds (Trochilidae), tyrant-flycatchers, gnatcatchers (Polioptilidae), parulid warblers and emberizids. Small owls, especially those in the genus *Glaucidium*, are frequent targets of mobbing activities, as are arboreal snakes. Cats (Felidae), opossums (Didelphidae), raccoons (*Procyon*), rodents and other small mammalian predators, and even some small hawks (Accipitridae), may also be mobbed when the opportunity presents itself. Mobbing alarm calls seem to be universally recognized by all small birds and, although most mobbing activity is generally limited to harassment, including a constant stream of excited alarm calls, wing-flicking and hopping and flying back and forth in the vicinity of the predator, attacks involving physical strikes by tanagers and other species in an attempt to drive a predator from the area do occur at times. Small owls, once they fly, are almost always pursued for varying distances by a swarm of agitated small birds. In the northern portion of the Andes, various flowerpiercers, *Hemispingus* tanagers, Blue-capped and Blue-and-yellow Tanagers, and Lacrimose and Buff-breasted Mountain-tanagers have frequently been observed to mob Andean Pygmy-owls (*Glaucidium jardinii*). In lowland areas of northern South America, Crimson-backed and Silver-beaked Tanagers, White-lined Tanagers, and Blue-grey, Glaucous (*Thraupis glaucocolpa*) and Palm Tanagers, as well as Bananaquits and various species of euphonia, dacnis and *Cyanerpes* honeycreepers, all readily mob Ferruginous Pygmy-owls (*Glaucidium brasilianum*).

Although the majority of tanagers occur in pairs when breeding, their post-breeding behaviour varies considerably. Skutch believed that Grey-headed Tanagers remained in pairs throughout the year, although territoriality was weak, as might be expected for a species that follows a mobile food resource, in this case prey flushed by army ants (see Food and Feeding), and must frequently trespass through the areas of neighbouring conspecifics to reach such an unpredictable resource. Silver-throated Tanagers, a forest-based species, were seen in pairs all year, but Skutch believed that, when these tanagers were not breeding, pair-bonds were looser than those of some other tanagers. He also frequently saw solitary individuals, especially towards the year end, but it is not certain if this indicates an absence of pair-bonds. Cherrie's Tanager, like all *Ramphocelus*, occurs in noisy, conspicuous flocks



Many species of tanager include Cecropia *catkins in their diet, either throughout the year or seasonally. The* ***Bay-headed Tanager*** *readily hangs head downwards to eat the catkins and takes tiny protein corpuscles from the petioles. In a community of 41 species of tanager in western Colombia, 17 species were recorded as feeding in every month on the catkins of* Cecropia reticulata. *Usage peaked in October, when 25 tanager species were recorded as feeding at these trees. In a similar study of bird use of* Cecropia *in Espírito Santo State, in Brazil, visits peaked at dawn, midday and mid-afternoon, suggesting a "three meals a day" feeding pattern.*

[*Tangara gyrola catharinae*, Podocarpus National Park, SE Ecuador. Photo: Glenn Bartley]

that wander along forest borders and in overgrown clearings when not breeding, but mostly form pairs when breeding. Curiously, Skutch was unable to detect any behaviour by this species that seemed directly associated with pair-bond formation or courtship. Furthermore, territorial defence was essentially non-existent, conflicts among individuals were rare, and even the location of dawn-song perches seemed to bear little relationship to nest locations, which often were well separated but occasionally quite close together.

The social behaviour of Golden-hooded Tanagers proved even more puzzling to Skutch. Most nestings involved pairs, although one or two immature or adult-plumaged birds were present as helpers at some nests (see Breeding). Outside the breeding season, Skutch sometimes observed pairs, trios or even four adult-plumaged individuals travelling together and once observed up to 17 roosting together in two adjacent trees, including eleven together on one low branch. Extended periods of conflict between two individuals at the start of the March–April breeding period suggested that pair-bonds were reformed, or contested, at the onset of breeding. In western Colombia, observations by Hilty of colour-marked Golden-hooded Tanagers suggested a more stable social organization. Of four birds marked for twelve months or longer, all were present at the end of the study, and five birds marked for nine months or longer were also present at the end of the study. Both members of a colour-marked pair ringed at the outset of the study remained together throughout 15 months of observation and were never recorded more than about 375 m from the original capture site. One member of a second ringed pair died shortly after having been ringed, and it was not until about 4–5 months later that the survivor was observed with a mate, an unringed individual. These two then remained together for the last five months of the study. During the months before the single bird found a mate, it wandered widely, up to 450 m or more from its original capture site. Once mated, this second pair rarely moved more than about 200 m from its nest-site. Of two nests observed, no helpers were seen at either.

In a study in west Colombia involving several hundred marked individuals of 17 tanager species, several colour-marked tanagers remained paired for twelve months or more. These were the Grey-and-gold Tanager, Rufous-throated Tanager, Blue-necked Tanager, Golden-hooded Tanager and Palm Tanager. Colour-marked pairs observed for up to six months included the Bay-headed Tanager and the Emerald Tanager, as well as the Yellow-green Bush-tanager (*Chlorospingus flavovirens*), a species not genetically close to the true tanagers.

The longevity of pair-bonds of Orange-bellied Euphonias, however, could not be established with certainty. Several pairs, involving a ringed individual and an unringed bird, could be recognized, but it was not known if the partners remained together beyond a nesting period. The comparative stability of montane populations in western Colombia contrasts with empirical observations of euphonias in lowland western Amazonia, where the Orange-bellied Euphonia and several other species form small mixed flocks, at least in drier months, and remain together for unknown periods of time when feeding on mistletoe berries in the forest canopy. It is not known if pair-bonds are maintained within these groups, or if their members are related, or move seasonally. One Amazonian species, the White-lored Euphonia (*Euphonia chrysopasta*), is routinely observed in pairs, both when nesting and when visiting fruiting trees. and it may form permanent or semi-permanent pair-bonds lasting over several years.

Voice

Numerous authors have remarked that the tanager family contains some of the most beautiful of all birds, but also some of the poorest singers. A great many do have songs that are squeaky and unmusical, and in some cases a true song is so seldom heard that it is almost non-existent. For a few species, a song has yet to be identified with certainty. Nevertheless, the vocalizations of many tanagers are distinctive, albeit often difficult for human ears to discern clearly. A minority have musical songs, and these may be simple repeated phrases, such as are commonly given by *Ramphocelus* tanagers at dawn, whereas other thraupids have remarkably complex songs that involve intricate and rapid phrases, precisely timed duets, and even trio and quartet singing. Morphologically, the syrinx of tanagers is similar to that of other oscine passerines and capable of producing a wide range of complex sounds. So far as is known, songs are always given at least by males and, in some cases, also by females, although females may sing briefer and perhaps weaker songs than those of their respective mates.

By whatever means one chooses to discuss vocalizations within this broad family, however, a caveat looms, and it is the changing taxonomy of the family (see Systematics). Many of the most gifted singers currently included in Thraupidae, those with melodious songs pleasing to the human ear, are species now regarded by many as being best placed in other families. For example, all members of the genus *Piranga*, which includes four species in North America and a few others scattered from Mexico to Argentina, are excellent singers, noted for their slow, rich, carolling songs not unlike those of some *Turdus* thrushes. All of them, however, appear to be genetically more closely related to cardinalid finches than to tanagers. The *Habia* ant-tanagers likewise have slow, sweet songs and they, too, appear to be unrelated to the true tanagers. The various species of *Euphonia* comprise another group in which some species have complex chattering songs, others a variety of simple whistles, and still others a great ability to mimic sounds, and the genus has sometimes been placed in Fringillidae in recent reclassifications. The Violaceous Euphonia, the Yellow-throated Euphonia (*Euphonia hirundinacea*), the Thick-billed Euphonia (*Euphonia laniirostris*) and, to a lesser extent, the Chestnut-bellied Euphonia (*Euphonia pectoralis*) all imitate calls and songs of other birds. Generally, their mimicked calls are accurate, although they are unlikely to deceive the original models because they are often given over and over in rapid delivery. The dawn songs of at least some of the *Chlorothraupis* tanagers, if not especially musical, are certainly notable for their energy and complexity, and *Chlorothraupis*, as well as the large assemblage of *Chlorospingus* bush-tanagers which have energetic, if rather simple, dawn songs, evidently shows closer genetic affinities to other families.

Stripped of some of the best singers in the family, many of which are being shipped off, taxonomically, to other families, what remains of vocal talent within the Thraupidae? For such a large and colourful family, the remaining species comprise, at present, a group whose songs, in large measure, have been described with such words as "high-pitched", "squeaky", "thin", "a high trill", "rapid", "monotonous", "high and strident", "excited bursts of ticking and twittering", "sharp, dry or buzzy", and so on. From the literature, it is clear that the songs of many tanagers are high-pitched and complicated, and difficult to paraphrase in a meaningful way. Furthermore, no comprehensive vocal analysis has been carried out for any tanager; no detailed studies have been made of the complete vocal repertoire, the functional and behavioural context of the vocalizations, sexual differences, and seasonal differences, nor of the ontogenic development of the vocal repertoire. Even the range of geographical variation in a thraupid's songs is largely limited to anecdotal comments, as, for example, when Skutch mentions that the Blue-grey Tanager, which he often called the "Blue Tanager", has developed song dialects, noting that in Carabobo, in Venezuela, the "song started off much like that of Costa Rican Blue Tanagers but it ran off into high, wiry notes like those of the Bay-headed Tanager—notes that I have not heard from the Blue Tanagers in Central America". For a surprising number of tanagers, especially in the genus *Tangara*, there is relatively little information: few archival sound recordings and few substantive qualitative written transcriptions of vocalizations. Vocal descriptions of *Tangara* are a particularly thorny problem, because it is often unclear which of their vocalizations actually comprises a song. For many species, it has proved difficult to distinguish true songs clearly from vocalizations that could denote greeting, excitement or other aspects of behaviour. Furthermore, the songs of many *Tangara* tanagers apparently are given infrequently, or they are so weak and high-pitched that they are infrequently heard or recognized as songs.

In general, the songs of oscine passeriforms are more complex, having more non-repeating notes or phrases, than the simple, often repetitive suboscine songs, and at least portions of oscine songs are learned, rather than inherited. While the songs of many tanagers could hardly be regarded as musical, they are often complex and, in some cases, trios, quartets and even quintets have evolved. Chief among tanagers engaging in these types of complex vocal choruses are several species of *Hemispingus*. It is uncertain if all members of this genus engage in group performances, but this behaviour has been reported for at least a third of them, including the Superciliaried Hemispingus, Oleaginous Hemispingus (*Hemispingus frontalis*), Rufous-browed Hemispingus (*Hemispingus rufosuperciliaris*), Black-headed Hemispingus (*Hemispingus verticalis*) and Drab Hemispingus (*Hemispingus xanthophthalmus*). There is no information on the function of these songs, nor on the context in which they are delivered. The performance of the Oleaginous Hemispingus is perhaps typical.



In a study of bird use of Cecropia *in Espírito Santo State, in Brazil, the species that tended to arrive first was the* ***Violaceous Euphonia*** *(seen here feeding in a* Piper aduncum *tree). It often sang, imitating the calls of other birds, as if calling them to the fruiting trees, perhaps to provide "safety in numbers" against predators. Rather than feeding for extended periods, birds tended to make repeated and rapid visits to* Cecropia, *as if wary of hawks (Accipitridae) that may wait in ambush near a busy fruit tree. The Violaceous Euphonia joins mixed groups of birds in mobbing small owls (Strigidae) and other predators.*

[*Euphonia violacea rodwayi*,
Trinidad.
Photo: David Lingard]



*The **Olive-green Tanager**, seen here feeding on the seeds of a bromeliad of the genus* Aechmea, *is most often found in single-species flocks, and is only occasionally joined by other passerines. When foraging, individuals within a flock often spread over a fairly large area. Only two other thraupids, the White-lined* (Tachyphonus rufus) *and Silver-beaked Tanagers* (Ramphocelus carbo), *are known to eat bromeliad fruits. But many species visit bromeliads in search of insects, either hopping around them and peering at them (as the Olive-green Tanager does), or rummaging through them.*

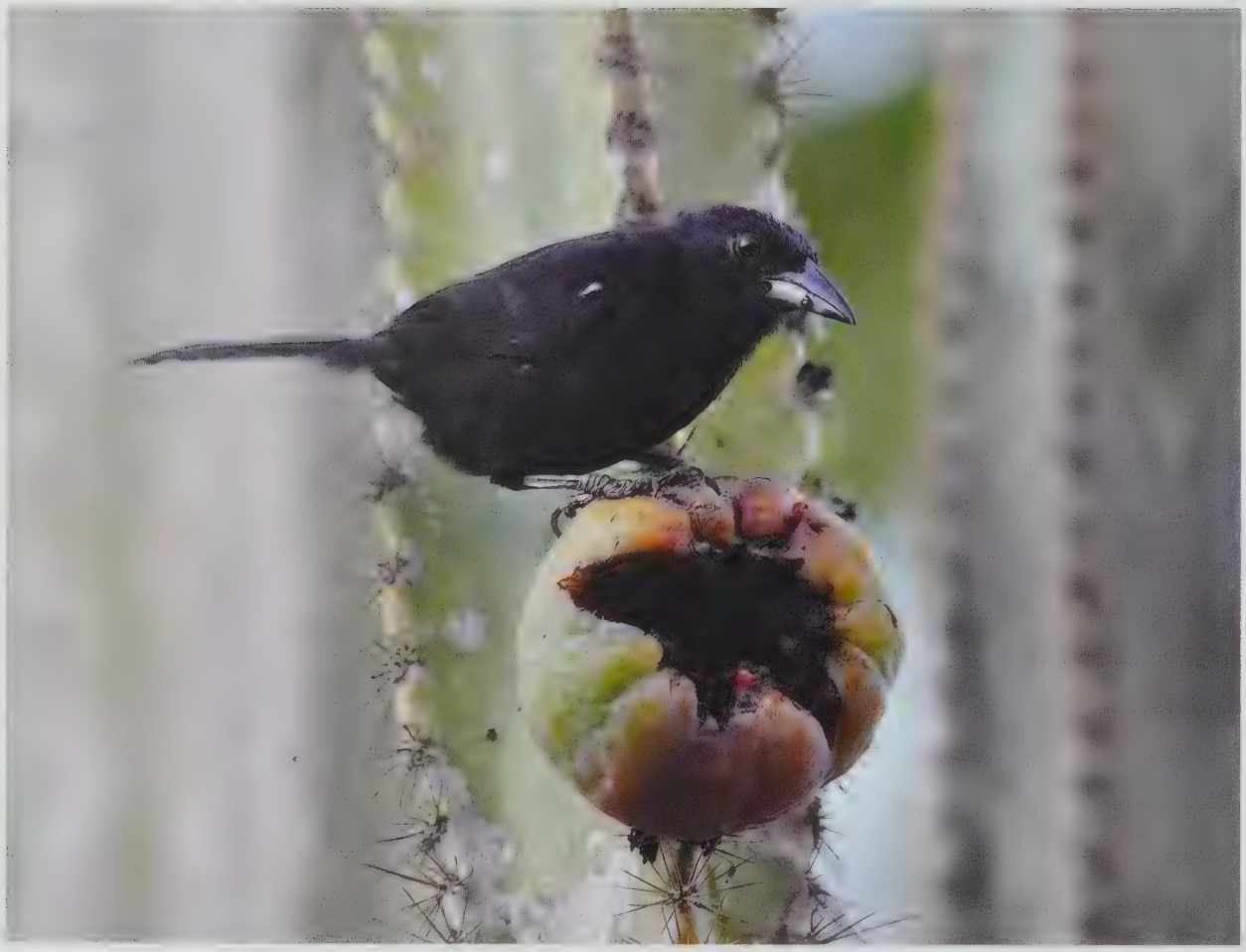
[*Orthogonys chloricterus*, Itatiaia City, Rio de Janeiro, Brazil. Photo: Edson Endrigo]

Pairs, trios or quartets of this species, while foraging relatively close together at dawn or shortly thereafter, periodically break into more or less simultaneous song, sometimes several times within a minute. One individual initiates the chorus, and the other singers, which may be only a metre or a few metres away, immediately join in, giving songs that are either identical or similar but sound as if slightly out of sync with that of the lead bird and perhaps also with those of neighbours. The audible effect of up to four birds more or less simultaneously giving a rapid stream of chipping notes is that of an intense chattering vibration that may accelerate slightly, and then gradually slow as the singers proceed. Unquestionably, the sound volume and vibration effects produced by four birds is greater than could be achieved by any single individual alone, although it is unclear how this is used in the context of the social units of these species.

Vocal duetting is performed by several genera of tanagers, including *Neothraupis*, *Cypsnagra*, *Thlypopsis*, *Hemispingus* and *Rhodinocichla*, and the structure of the environment in which each species occurs has shaped the way in which duets have evolved and are used in communication. For example, vocal duets are an important aspect of song performance of the White-rumped Tanager, a species of savanna with scattered trees (*campo sujo* and *cerrado*) in Brazil and eastern Bolivia. Duetting is well documented also for the enigmatic Rosy Thrush-tanager (*Rhodinocichla rosea*), a species that occurs in dense understorey in dry to humid scrub and forest borders from Mexico south to western Venezuela. While mated pairs of both of these species perform duets, they are given in dramatically different ways and, to some extent, for different purposes. Pairs of White-rumped Tanagers, for example, are conspicuous as they sit close together in the open in isolated low treetops or the tops of tall shrubs and sing loud rollicking duets in the early morning hours, and periodically during the day, to announce their territorial ownership. Males initiate these duets with a churring that changes to a low-pitched, staccato rattle, at which point the female joins in with a series of forceful and syncopated musical phrases that may be repeated several times, the overall effect being not unlike that of humans singing old-fashioned "rounds", but with a distinct syncopation in the performance. The contrast between the male's unmusical vocalizations and the musical part performed by the female is dramatic and unforgettable, and travels a long distance across open savanna. Between performances, the pair may fly off a considerable distance to other trees and repeat the duets and, if another pair enters its territory, the partners quickly and aggressively respond to the intruders. Rosy Thrush-tanagers, on the other hand, are retiring birds of dense undergrowth and are difficult to see, and they rarely or never sing from an exposed position of any kind, yet both males and females announce themselves with slow musical phrases. Pairs sometimes sing antiphonal duets from hidden positions in dense undergrowth, and do so even at the nest-site. Pairs of Rosy Thrush-tanagers may sing both solos and duets during territorial disputes, but vocal duetting remains only one of several vocal tools in territorial defence, and it appears to be employed much less often by this species than it is by White-rumped Tanagers. Antiphonal duets by thrush-tanagers are used extensively also in pair maintenance and mate location, as a means of keeping track of the partner in dense undergrowth, where pair-members are often out of sight of each other for extended periods of time. In this manner, the duet behaviour of thrush-tanagers resembles that of many *Thryothorus* wrens.

While the songs of tanagers, as noted above, are often described as being high-pitched and complex, general song types tend to be similar among species within the same genus and are, therefore, useful for taxonomic purposes and for identification of species in the field. Some examples within the family include the two species of *Schistochlamys*, which sing a rather lilting and melodic series of whistles that brings to mind the songs of some cardueline finches; *Hemispingus*, which give high, thin chipping notes when foraging and periodically perform vocal duets, trios, quartets, and even quintets that consist of a fast staccato series of chipping notes; and the small, warbler-like *Thlypopsis*, which sing high, wiry notes and bursts of thin "chip" notes that are given, at least by two species, as duets. The two *Creurgops* are vocal minimalists with only their calls, but not their songs, recorded. *Tachyphonus* comprises a less easily characterized group in which the males' songs are either a series of rather simple, flat rising and falling notes or much more complex, high-pitched songs, and, as noted previously (see Systematics), the genus is polyphyletic. *Lanio* is a small but vocally facile group of species with simple whistled songs, loud smacking contact notes and harsh, well-developed alarms; *Ramphocelus* tanagers deliver





Tanagers have few morphological features specifically for handling fruit. The Swallow Tanager (Tersina viridis) *is the only thraupid with a gape wide enough to swallow what are, in relation to its body size, even moderate-sized fruits. A few non-forest tanager species eat the fruits of* Cereus *cacti; these include the* ***Sayaca Tanager*** *(above) and its congener the Blue-and-yellow Tanager* (Thraupis bonariensis), *the* ***White-lined Tanager*** *(below) and the Silver-beaked Tanager* (Ramphocelus carbo). *The fruits of* Cereus *cacti are dehiscent, splitting open to expose the pulp and seeds. Tanagers mandibulate the pulp before swallowing it, and tend to move the seeds and any attached skin to the edge of their beak, and drop them. In a study in* restinga *habitat in south-east Brazil, only 3·5% of 145 seeds of the cactus* Pilosocereus arrabidae *regurgitated or defecated by Sayaca Tanagers germinated. Germination rates were much higher for the Purple-throated Euphonia* (Euphonia chlorotica), *which, like other euphonias, has a digestive tract adapted to process fruit pulp quickly while eliminating potentially poisonous seeds. The Purple-throated* Euphonia *is one of a number of Euphonia species which eat the fruits of* Rhipsalis, *a genus of epiphytic cacti which grow in the forest canopy. The fruits of figs* (Ficus) *are another important component of the Sayaca Tanager's diet. In a study in dry forest in western Brazil, 20 bird species were observed to feed on figs during the wet season. They ate an estimated 83,000 figs between them, and the Sayaca Tanager consumed 16% of the total. This increased to 27% of 85,000 figs during the dry season.*

[Above: *Thraupis sayaca obscura*,
Samaipata,
Santa Cruz, Bolivia.
Photo: Daniel Alarcón.

Below: *Tachyphonus rufus*,
Jeremoabo, Bahia, Brazil.
Photo: Pedro Lima]



*This **Fawn-breasted Tanager** is eating the fruits of* Eriobotrya japonica, *an exotic tree from south-eastern China which is rapidly colonizing some parts of Brazil, including the borders of the Atlantic Forest. The Fawn-breasted Tanager was one of a number of frugivorous bird species which, a study found, were entering Brazilian towns and cities to eat the fruit of this and other exotic trees and shrubs grown in gardens and parks. The study concluded that these birds could transport viable seeds of alien species in their gut and disperse them on their return to natural and semi-natural habitats, including protected areas.*

[*Pipraeidea melanonota melanonota*, São Lourenço do Oeste, Santa Catarina, Brazil. Photo: Rudimar Narciso Cipriani]

sharp chipping notes when foraging and sweet, melodious whistled songs at dawn and dusk; *Spindalis*, a Caribbean group of four species, has variable songs of sharp notes, ticking notes, harsh scolding notes and thin trills; and *Thraupis* tanagers give songs that are the quintessential high-pitched, squeaky songs for which the family is so well known. *Bangsia* is a vocally poorly known group, its members, so far as is documented, having high-pitched but rather simple repetitive songs that may consist of single or two-note phrases, buzzes or pulsating trills. In contrast, the songs of *Anisognathus*, the mountain-tanagers of the high Andes, are more varied and less easily characterized, but they are usually complex and include one or a few lower-pitched or forceful notes alternated with higher-pitched squeaky notes, or rapid and complex bursts of high and low notes, and, in one taxon, a series of melodious whistles that increase in volume and pitch. *Buthraupis*, another high-Andean group with what are, for the birds' size, surprisingly high-pitched and weak songs, utters phrases that consist of various squeals and "wheedles" and repeated single notes or phrases, as well as fast complex songs given in flight display. The genus *Tangara*, comprising over a sixth of the family as traditionally classified, gives songs that are, so far as is known, mostly quite high-pitched and vary from being a few simple notes to being wiry, complicated and sometimes pulsating verses, but the songs of most species are infrequently heard. *Diglossa* songs are generally characterized by their long-sustained, and often extremely complex and jumbled series of notes delivered rapidly; a few members of this genus have a song that is, instead, a flat trill. Other groups currently included in Thraupidae, although likely to be unrelated to true tanagers, exhibit similar generic song patterns. As mentioned in the preceding paragraphs, *Chlorospingus* bush-tanagers, for example, typically give fast bursts of chipping and twittering notes when excited, but their dawn songs are simple and repetitive, and *Piranga* species sing single, mostly simple melodic songs. *Habia* species are noted for their mellow whistled songs and rich vocal repertoires, although some have simple, repetitive and unmusical dawn songs.

Tanagers generally sing at dawn, although the extent of dawn song varies greatly and, in some areas, is almost certainly seasonal, too. Dawn songs of a few genera, such as *Ramphocelus* and *Thraupis*, which often live in the presence of humans, are well documented and often pleasing, or at least persistent. Dawn songs are reported for such varied genera as *Neothraupis*, *Thlypopsis*, *Habia*, *Thraupis* and *Tangara*, and probably are given by many tanagers. Some species, however, sing relatively little, regardless of the season or the time of day. The Magpie Tanager is one such example, as are many species of *Tangara*, and a number of primarily Andean genera of tanagers, including *Creurgops*, *Bangsia* and *Buthraupis*, although in some, perhaps many, cases the apparent lack of song may be an artefact resulting from an inability of human observers to recognize what constitutes a song in the species in these genera.

Dawn songs are typically delivered from a prominent perch, suggesting that maximum territorial coverage is the desired purpose of the performance. On the other hand, some species also sing day songs, which differ in various ways from those given at dawn, and these songs are more often given from lower and less visible perches. The function of day songs may vary with context, but it is more likely related to pair maintenance and contact between partners, although little is known about these songs. Far less often heard or witnessed are the flight songs and displays performed by a few mountain-tanagers. In the rare cases in which these have been observed, a complex song is given as the bird flies out on a circular or oval path over the canopy of mountain forest. Apparently, these aerial song displays can occur at any time of the day, and little is known about the context in which they are performed.

In addition to songs, given at dawn and sometimes periodically during the day, tanagers also have various calls. These include contact notes, which are almost invariably high-pitched and weak, and one or more kinds of alarm calls, which are usually sharp or harsh and lower-pitched than contact notes. Other vocalizations are used in various situations, especially in hostile or aggressive encounters, at or near nests, and during courtship, and include various harsh or scolding notes, rattles and high-pitched chipping notes, although the vocal repertoires of thraupids are poorly documented. Several mountain-tanagers in the genus *Buthraupis* emit distinctive calls prior to taking flight and during flight. These vocalizations may serve to communicate information to flock-members, which are sometimes well scattered.

Perhaps the most remarkable documentation of the dual role of vocalization was discovered during a study of mixed-species



A versatile forager that employs a range of techniques to catch insects, the Blue-grey Tanager also eats a variety of fruits. It plucks and swallows small fruits and berries while perched, but clings to larger fruits (like this papaya) and pecks out pieces. In a study in Trinidad, ***Blue-grey Tanagers*** *ate two kinds of fruits not generally taken by any other tanagers. They mandibulated the 1-cm-long berries of* Vismia *before swallowing them, but plucked the 5-cm-long catkin-like fruits of* Piper, *which they carried to a perch before laying them across a branch and eating pieces out of them.*

[*Thraupis episcopus episcopus*, Tailândia, Pará, Brazil. Photo: Edson Endrigo]

flocks in south-western Amazonia. Researcher C. A. Munn found that the White-winged Shrike-tanager employed alarm calls at the approach of predators, but occasionally gave false alarm calls to warn off a competing species if the outcome of an aerial chase for arthropod prey was close. This remains one of the few documented examples in which birds have been shown to employ calls for the purpose of deceit (see also Food and Feeding).

Lastly, it is worth reiterating that tanagers, as currently defined taxonomically, are far from being a monophyletic group, and discussions of their vocalizations, especially the notably deficient efforts of many species mentioned above, likely present a biased view of the family. Recent molecular studies, as summarized at the beginning of this essay (see Systematics), reveal that some cardinalids and numerous emberizids are closely aligned with tanagers. A significant number of these species will probably be transferred to the thraupid family and many of them are excellent singers, including especially the cardinals (*Paroaria*), saltators (*Saltator*), seedeaters (*Sporophila*), diuca-finches (*Diuca*), sierra-finches (*Phrygilus*) and yellow-finches (*Sicalis*) and even the warbling-finches (*Poospiza*). The outcome is likely to reveal an assemblage of birds more evenly balanced between species that have what are, to the human ear, pleasing songs and those possessing squeaky, unmusical songs.

Food and Feeding

Almost all tanagers live on a mixed diet of fruit and insects, and for some, including members of the genera *Coereba*, *Chlorophanes* and *Diglossa*, nectar is an important food item, at least seasonally. Species of *Thraupis*, *Chlorospingus* and a few others also eat some buds, as well as immature ovaries of flowers, and *Thraupis* tanagers include young leaves in the diet. With such a wide range of foods taken by members of this family, it is not surprising to find that there are numerous species with specialized foraging habits and feeding behaviour. There are, for example, species or groups of species that are almost wholly frugivorous, and others that are almost wholly insectivorous, or nectarivorous, or that consume combinations of these items. Using traditional taxonomic arrangements, there are no species of tanager that feed predominantly on seeds. Molecular-genetic studies, however, have modified ornithologists' understanding of family and genus limits of tanagers (see Systematics), and forthcoming taxonomic arrangements are likely to include within Thraupidae many species that eat mostly seeds or have a mixed diet of seeds and insects, including numerous genera from the high-Andean *puna*, from the scrub of Patagonia, from semi-open grasslands in humid New World tropical lowlands, from the Caribbean, and even from the Galapagos Islands.

Although many tanagers are widely considered to be mostly frugivorous, foraging data for those species studied in detail indicate that they consume a mixed diet of fruit and arthropods. The proportions of food items eaten can vary dramatically through the year in seasonal areas, but may vary little in humid areas. Species living in strongly seasonal habitats, such as places with lengthy wet and dry seasons, are apt to switch the diet in response to periodic shortages of certain resources. On the other hand, communities of tanagers in wet and relatively non-seasonal environments, such as the western slope of the western Andes in Colombia, and in western Amazonia, experience few resource shortages and their diets include fairly similar proportions of fruits and arthropods throughout the year. The composition, and possibly the quality, of the fruits taken, however, may change through the year. The manner in which tanagers search for insect prey and the substrates on which they search are often highly species-specific, and even the range of fruit sizes and the method by which fruits are handled vary among members of the family. Unfortunately, however, only a few formal studies have focused specifically on these aspects of tanager dietary strategies.

Isler and Isler, in their landmark treatise on tanagers, were among the first to attempt a family-wide synthesis of broad dietary patterns in the family. Bringing together information on fruit and insects, but excluding other dietary items, they compiled data from published and unpublished sources on 149 species of tanager. Their compilation included both formal studies of foraging behaviour and non-systematic observations from numerous observers over a broad geographical area. Despite some likely bias resulting from the greater ease of observing birds eating fruit compared with those consuming cryptic insects, the study reveals broad dietary patterns within the family. For example, the diet of 33% of the tanagers in their survey consisted of at least two-thirds insects, while the diet of 28% contained at least two-



Arillate fruits are often rich in both proteins and lipids, and attract a wide range of small frugivorous birds, including honeycreepers, dacnises and many Tangara *species. The* ***Red-legged Honeycreeper*** *regularly hangs head downwards, or completely upside-down, to obtain fruit or arils, and also hovers to extract arils from their woody coverings. In Trinidad, the tiny berries of* Miconia *species comprised 33% of all fruit taken by Red-legged Honeycreepers, which is typical of thraupid species, but the arils of arillate trees and vines accounted for an additional 35% of fruit material eaten.*

[*Cyanerpes cyaneus cyaneus*, between Cayenne and Saint-Georges, French Guiana. Photo: Damien Laversanne/ Bios]

thirds fruit. The remaining species, approximately 40% of the total, ate more or less equal proportions of insects and fruit. Perhaps the most significant finding was that fruit comprises half or more of the diet of approximately 68% of all tanagers as currently classified.

The first attempt to quantify foraging behaviour among a community of tanagers involved a 13·5-month study in Trinidad by B. K. Snow and D. W. Snow. This husband-and-wife team kept systematic records of the foraging behaviour of the 15 species of tanager and honeycreeper on the island in an effort to discover the extent of feeding overlap between the various species and to determine ways in which foraging behaviour differed among them. Of the 15 species studied, ten were relatively unspecialized morphologically, having a bill suitable for the exploitation of a wide range of small fruits and berries. The three honeycreepers and the Bananaquit had a bill specialized to varying degrees for the exploitation of nectar, and the dacnis possessed a sharp-pointed bill suitable for fruit, nectar and the capture of insects. The Snow team found that, among the ten unspecialized tanagers, some feeding-niche separation between the species was due to their exploiting different habitats, but more was due to a differential utilization of micro-habitats within a habitat. Among closely related species, feeding overlap was much greater in the portion of the diet that was fruit than in that represented by insects. Nevertheless, some important differences in fruits chosen were evident. Blue-grey Tanagers, for example, frequently ate compound fruits, items that other species rarely or never took, and White-lined Tanagers often consumed bromeliad fruits, a dietary item shared with Silver-beaked Tanagers. The three species of *Tangara* and the two *Thraupis* species were numerically the most important genera, and the Snows found that, compared with the *Tangara*, the *Thraupis* favoured non-forest areas, took more nectar and fewer fruits, foraged higher in trees, and sallied more for flying insects. They also pointed out that, while species that eat fruit are often numerically the most abundant, there were far fewer species of frugivore than of insectivore, a reflection perhaps of the fact that there are many more ways for insects to hide and hence more opportunities for specialization on them. Both of the two *Cyanerpes* honeycreepers searched for insects by using a "look-under-the-branch" technique, but the Red-legged Honeycreepers also searched foliage and frequently sallied for flying insects. Overall, insects comprised a much larger proportion of the diet of Red-legged Honeycreepers than they did for Purple Honeycreepers (*Cyanerpes caeruleus*), which relied more heavily on seasonal availability of nectar. Red-legged Honeycreepers included more fruit in their diet than Purple Honeycreepers, roughly 44% to 30% fruit respectively, but, because of the long narrow bill, neither species exploited more than three or four kinds of fruiting shrub, mainly species of *Miconia*, a smallish tree that often produces large crops of sugary but tiny berries. The Green Honeycreeper, a *Chlorophanes* species with a sharply pointed but much shorter bill than that of *Cyanerpes*, fed heavily on fruit and on small flying insects, which it captured in the vicinity of large flowers, whereas the Blue Dacnis took a wide variety of fruit and a roughly equal proportion of insects, but less nectar than any of the other thraupids in the study. The Bananaquit was highly specialized for nectar-feeding. It depended far more on nectar than any of the other species, and indeed this food source accounted for about 75% of its diet throughout the year. Not surprisingly, it fed on a much greater variety of flowers than any other tanager in the study. Fruit comprised a small proportion of its diet, and it pierced the majority of these fruits, whereas most other tanagers mashed or gulped fruits. Because the *Cyanerpes* honeycreepers fed on only a few nectar sources, their nectar consumption varied sharply during the year.

As most tanagers are small, they are capable of eating only small fruits which they can gulp whole, or mash and swallow piecemeal. Small fruits are usually high in carbohydrates, or sugars, but low in fats and proteins, and they do not, by themselves, comprise a balanced diet, unlike the large fat-rich and protein-rich fruits favoured by large-bodied, specialized, fruit-eating birds. Many tanagers consume large quantities of tiny berries, especially those produced by *Miconia* and related genera in the Melastomataceae family. An analysis of two species of melastomes showed that their berries consisted of 84% carbohydrate by dry weight, far higher than an average of 56% recorded from a sample of fruits in 26 other plant families. The implications of a diet of high-carbohydrate but low-quality fruits have led tanagers and most other small frugivorous birds also to include in their diets varying quantities of insects, which provide a source of protein. Perhaps no better example of a mixed diet can be found than that of members of the genus *Tangara*. The 49





The long, slender, decurved bill of Cyanerpes *honeycreepers is associated with specialized ways of consuming fruit, insects and nectar. Of observations of the* ***Shining Honeycreeper*** *(above) foraging in Panama, 44% were of fruit-eating, 37% were of insect-hunting and 19% were at flowers. The Shining Honeycreeper is sometimes aggressive towards the* ***Red-legged Honeycreeper*** *(on right in lower picture) and may displace it from food sources. Shining Honeycreepers, however, generally favour more humid regions, where seasonal swings in food availability are less pronounced than in the drier habitats used by Red-legged Honeycreepers. In Trinidad,* Cyanerpes *honeycreepers feed on only a few nectar sources, and so their nectar consumption varies sharply during the year. This differs markedly from the Bananaquit* (Coereba flaveola)*, for which nectar accounts for about 75% of the diet throughout the year. Nectar-feeding at flowers made up just 12% of observed foraging by Red-legged Honeycreepers in Trinidad. Overall, insects comprised a much larger proportion of the diet of the Red-legged Honeycreeper than of that of the* ***Purple Honeycreeper*** *(on left in lower picture), which relied more heavily on the seasonal availability of nectar. The Purple Honeycreeper takes a smaller percentage of fruit than the other honeycreepers, and its narrow bill probably precludes it from including many of the fruits that the other species eat. But Purple Honeycreepers occasionally use the beak to pierce and suck fruits such as oranges.*

[Above: *Cyanerpes lucidus isthmicus*, Costa Rica. Photo: Glenn Bartley.

Below: *Cyanerpes caeruleus caeruleus* and *Cyanerpes cyaneus cyaneus*, St Laurent du Maro, French Guiana. Photo: Tanguy Deville]

or so species scattered from Mexico south to northern Argentina all have a mixed diet of fruit and insects. A few species also consume nectar and other vegetable items, but the quantity of these is negligible when compared with the amounts of fruit and insects taken.

While most tanagers include some fruit in their diets, these birds are well designed for capturing arthropod prey. Their morphological and behavioural adaptations represent a compromise between what is required for capturing insects and, at the same time, what is needed for efficiently harvesting a variety of small fruits and berries. Whereas the behaviour of some birds when hunting arthropods involves a stationary search, as illustrated by, among others, the jacamars (Galbulidae), puffbirds (Bucconidae), motmots (Momotidae) and certain tyrant-flycatchers, the foraging behaviour of all tanagers is characterized by movement, usually little sprints and pauses, as the individual progresses along a branch or twig or moves restlessly through foliage. Within this broadly defined category, however, tanagers make use of an extremely wide range of substrate specializations and employ an almost limitless variety of searching techniques with the aim of finding arthropod prey and, at the same time, avoiding excessive foraging overlap with other species, which would reduce prey-capture rates for all species involved.

The Isler husband-and-wife team enumerated ten broad substrates used by tanagers when foraging, as well as some of the methods utilized by the birds in order to obtain prey from these substrates. Since their preliminary survey, detailed observations by Naoki and others have shown that, in some tanager communities, subdivision of niche substrates extends well beyond these groupings. A sample of the major substrates utilized by tanagers includes the following twelve.

1) **Branch surfaces**. Many tanagers, both large and small and both in the highlands and in the lowlands, hop along branches, pausing frequently to inspect the sides or underside of branches. Smaller species often search in a very stereotyped or repetitive manner, larger species generally less so, and the category can include both large and small branches, twigs, bare branches, and partially or completely moss-covered or epiphyte-covered surfaces. A few species hang downwards from the sides of branches, and especially from moss and other plant material growing on the sides of these.



*The **Chestnut-bellied Euphonia** probes flowers for nectar and/or insects and also takes sugar water from feeders. Hovering is only a small part of a wider foraging repertoire for this species. Euphonias and chlorophonias both hover, but are less efficient at hovering than are hummingbirds (Trochilidae) and manakins (Pipridae). Their bills are short and rather thick, which may prevent them from reaching as far or as efficiently as species in these other families, and limit the range of nectar and fruit that they can harvest.*

[*Euphonia pectoralis*, Brazil. Photo: Kathy Kinnie]

2) **Leaf undersurfaces**. Tanagers in a number of genera search the undersurface of leaves, and a smaller number also regularly search upper surfaces (see next category) or both surfaces. To reach the undersurface of a leaf, most *Tangara* perch on a twig or leaf petiole, or cling to the leaf itself, and lean down to peer underneath. Some species, typified by the Red-crowned Ant-tanager and the *Chlorospingus* and *Cnemoscopus* bush-tanagers, hop quickly up slanting branches and twigs until they are close enough



*The **Rufous-browed Conebill** probes dense flowerheads and inflorescences with its thin, sharply pointed bill, but in search of insects rather than nectar. Conebills also inspect and probe clusters of leaves, and some specialize in foraging on leaves damaged by infestations of foliage-chewing insects. The Rufous-browed Conebill forages mostly in the tops of shrubs and smaller trees, including exotic vegetation in parks and gardens. It may also be found in the trees and bushes around small wetlands* (humedales) *on the high plateau savanna of the Sabana de Bogotá, occasionally moving out into the reeds and sedges.*

[*Conirostrum rufum*, Bogotá, Colombia. Photo: Pete Morris]

to peer up at the underside of leaves overhead. *Chlorochrysa* tanagers, which have unusually thick, strong tarsi, habitually work their way quickly out to branch tips and then hang upside-down from leaves or leaf clusters, from which they then inspect both surfaces of leaves. White-eared Conebills (*Conirostrum leucogenys*) also persistently inspect leaf surfaces in this manner, being especially attracted to the compound leaves of species of Fabaceae (Leguminosae/Mimosoideae), where they regularly remain high above ground and hang upside-down from leaf tips at the ends of large spreading branches.

3) **Leaf upper surfaces**. It has been noted that tanagers probably forage for arthropods on the upper surfaces of leaves proportionately more often than other bird species. In order to gain access to the tops of leaves, some tanagers have evolved specialized techniques. White-shouldered Tanagers often flutter in the outer foliage, peer downwards at large leaves, and then dart or leap downwards to attack prey; Guira, Rufous-throated and Speckled Tanagers, among others, stick the head up above the leaves and then execute acrobatic sallying manoeuvres to capture prey. Two high-Andean species, the Black-headed Hemispingus and the Drab Hemispingus, simply alight on large stiff leaves and stand or walk on the tops of them. In the lowlands, Palm Tanagers also sometimes walk on large leaves and, aided by their unusually sharp claws, regularly hang from the slippery tips of palm-frond leaflets to inspect the undersurfaces. In mountain forests White-winged Tanagers may sally out to snap arthropods from the tops of leaves, and in the lowlands Masked Crimson Tanagers employ a similar technique in sallying to the tops of leaves.

4) **Mossy trunks and branches**. In cloudforests of Central America and the Andes, where moss often covers almost all bark surfaces, many tanagers sprint along branches, pausing every second or two to inspect mossy surfaces or to probe for cryptic arthropods. Moss clumps also are checked by many highland genera, including *Bangsia*, *Buthraupis*, *Anisognathus*, *Iridosornis*, *Dubusia*, *Delothraupis* and *Chlorospingus*.

5) **Epiphytes**. Not only do many cloudforest tanagers inspect the surface or probe into clumps of moss, they also inspect the surfaces of a wide range of epiphytes, including bromeliads, ferns and orchids. Although information is scanty, a few species may partly confine their foraging to the surfaces of epiphytic plants, especially bromeliads. The Olive Tanager and the Ochre-breasted Tanager regularly rummage in bromeliads, as well as in arums and philodendrons (Araceae), two plants that often grow as epiphytes. Orange-bellied Euphonias pluck berries from the spike-like spadix of these plants and regularly glean small insects from inside the spathe; they also hover in front of spider webs suspended between philodendron leaves, and have been observed to pluck tiny spiders, as well as trapped insects, from these webs.

6) **Air: for flying insects**. Few tanagers are specialized morphologically for foraging on flying insects. The most prominent exception is the Swallow Tanager, which is often found in the tops of open trees and in semi-open areas; this species, with a broad gape and long wings, takes many flying insects in short sallies. Similarly, the Fawn-breasted Tanager, another species with long wings and a bill gape that is wider than that of most other tanagers, is often found in partly open areas and frequently sallies to air for insects. Inside tropical forests, shrike-tanagers, which have long wings for speed and a relatively long tail for manoeuvrability, are specialized for capturing insects in swift, aerobatic looping sallies. Red-legged Honeycreepers also capture many insects in flight and are far more insectivorous than other *Cyanerpes* honeycreepers, all of which have shorter bills; they make many captures in short sallies and aerial lunges in the vicinity of large canopy flowers, which attract insects. Although seemingly poorly adapted for capturing aerial insects, several species of *Tangara* regularly make short, awkward-looking sallies for flying insects. Despite the appearance of inefficiency or awkwardness when sallying, a few of these *Tangara* species, especially the Masked, Golden-hooded, Blue-necked and Golden-naped Tanagers (*Tangara ruficervix*), capture a significant number of flying insects. Many other tanagers occasionally seize aerial insects in flight and, while none seems well adapted for even short aerial sorties, they do, nevertheless, avail themselves of outbreaks of emerging termites (Isopoda) and other seasonal swarms of insects, and regularly pursue small flying insects. Rufous-throated Tanagers and both Black-and-yellow and Scarlet-and-white Tanagers regularly sally short distances or chase small flying insects.

7) **On or near the ground, in association with army-ant raids**. Arthropod prey flushed by army ants, especially those of the species *Echiton burchelli*, represent a food resource exploited by only a tiny fraction of tanagers. The best-known examples of





Heliconia (Heliconiaceae) flowers are bird-pollinated, relying in particular on hummingbirds (Trochilidae). But some thraupids, such as Diglossa *flowerpiercers, rob them of nectar by breaking in below the flower's sexual parts, while others, such as the* ***Scarlet-rumped Tanager*** *(left), eat the petals and other soft parts. Heliconias are plants of clearings, disturbed habitats and early secondary growth, habitats used both by many species of* Ramphocelus *and by the* ***Olive-backed Euphonia*** *(right).*

[Left: *Ramphocelus passerinii*,
Costa Rica.
Photo: Glenn Bartley.

Right: *Euphonia gouldi gouldi*,
Chan Chich Lodge,
Orange Walk, Belize.
Photo: Silvio Sommazzi]



On Caribbean islands and over much of its range in northern South America, the ***Bananaquit*** *occupies almost every type of habitat other than the deepest forest and the most arid scrub. It is common in gardens and parks, orchards, plantations, light woodlands and mangroves, and other places where flowers are abundant. It appears to be equally at home at any level, foraging from near the ground to the canopy. To a far greater extent than any other thraupids, including honeycreepers and flowerpiercers, Bananaquits are nectar specialists. They feed from a wide range of trees, shrubs, vines and herbaceous plants, restricted only by the length of their beak, which may prevent them from reaching into flowers with long corollas. However, they pierce the bases of some deep tubular flowers with their bill to get at the nectar. They feed in particular on dense clusters of small flowers which, probably because of the tiny amount of nectar that they contain, are not used by other thraupids. Bananaquits flit or hop quickly from one group of flowers to the next, and their head movements are very quick, enabling them to probe all the flowers in a cluster in a matter of seconds. In Trinidad, they compete only with the very smallest hummingbirds (Trochilidae) for these small flowers, although they exploit a far greater range of flowers than does any hummingbird species. Unlike hummingbirds, Bananaquits perch to feed and do not hover, and so expend less energy. They eat some small fruits and berries, but also pierce and suck the juice from larger fruits.*

[*Coereba flaveola chloropyga*, Juquiá, São Paulo, Brazil. Photo: Fabio Colombini]



Flowerpiercers (Diglossa) *have the most highly modified bill of all the thraupids. Both the upper and the lower mandibles are slightly upturned and there is a sharp hook at the tip of the upper mandible, while the lower mandible is short and sharply pointed. They feed by hooking the upper mandible over, or into, a flower corolla to hold it firm, while using the lower mandible to puncture the base of the corolla. The tongue is U-shaped in cross-section, and, when pressed against the lower mandible, forms a tube that aids the bird in rapidly extracting nectar; the tongue also has the brush tip typical of nectar-feeding birds. This bill shape is most pronounced in the smaller species in the genus, such as the* ***Slaty Flowerpiercer****, which obtains a substantial amount of its nourishment from nectar. The Slaty Flowerpiercer visits a wide variety of flowers, of both native and introduced species, and is especially fond of certain flowering shrubs and epiphytes. It forages with remarkable swiftness, each flower visit lasting little more than a second before the bird flits to another, nearby flower and repeats the process. Like other small* Diglossa *species, Slaty Flowerpiercers are extremely territorial, and pairs or non-breeding singletons will vigorously defend favourite flower patches against conspecifics. They may themselves be attacked and supplanted by larger species of hummingbird (Trochilidae).*

[*Diglossa plumbea*, Cerro de la Muerte, Costa Rica. Photo: Konrad Wothe]

There are documented instances of Diglossa *flowerpiercers extracting nectar by "legitimate" means, reaching into the flower, rather than piercing the base of the corolla and robbing it. A study of four species of flowerpiercer in the Colombian eastern Andes found that species with short bill and relatively large hook, such as the* ***White-sided Flowerpiercer****, were more likely to pierce and rob flowers than were those with a longer bill and small hook, such as the Masked Flowerpiercer* (D. cyanea)*, which were able to reach into longer corollas. Tubular, erect flowers were robbed most often; however, the flowerpiercers transported pollen between plants with pendent flowers and short to medium-length corollas.*



[*Diglossa albilatera albilatera*, El Dorado, Sierra Nevada de Santa Marta, Colombia. Photo: Ketil Knudsen]

army-ant followers among the Thraupidae are the Grey-headed Tanager, Red-crowned Ant-tanager and Red-throated Ant-tanager (*Habia fuscicauda*). While both Grey-headed Tanagers and Red-crowned Ant-tanagers regularly forage at army-ant swarms in Central America and northern South America, neither species is much associated with ant swarms in the Amazonian portion of its range. The Crested Ant-tanager follows swarms of the small black *Labidus* army ants in the Andean highlands of Colombia, but these swarms are infrequently encountered and unpredictable in occurrence and they do not provide a reliable resource base. The eastern, lowland population of the Black-goggled Tanager has been reported at army-ant swarms, but its discrete sister population in the Andes has not. Other tanagers, especially species of *Tachyphonus* and *Ramphocelus*, have occasionally been reported at swarms. In cooler highland forests army ants become increasingly scarce, and above about 1000 m these ants are rare. At this elevation and higher, the only army ant likely to be followed by birds is *Labidus praedator*, the swarms of which are typically rather small, unpredictable in occurrence, and not regularly followed by birds. Some species do take occasional advantage of these swarms, although none does so on a regular basis. Many birds, even canopy-level species that normally do not descend low, will opportunistically take prey items flushed by army ants. In western Colombia, between 980 m and 1250 m elevation, six *Labidus praedator* swarms were noted by Hilty, and at one large swarm an Emerald Tanager and ten Silver-throated Tanagers were present, some individuals descending as low as 0·3 m to capture fleeing prey; a few Silver-throated Tanagers appeared unsure of how to utilize this unusual resource or were intimidated by the presence of two species of ant-following antbird and were not observed to capture prey. Neither tanager normally forages so low, although both will descend briefly to about 3 m in order to feed on berries of fruiting shrubs. At another swarm, at an elevation of 1250 m, a pair of Moss-backed Tanagers was noted; both individuals foraged about 1–2 m up over this swarm, spending approximately12 minutes in capturing a few prey items before leaving. It is likely that many highland birds, including tanagers, make occasional use of prey flushed by army ants, but the importance of these ants to most highland birds is small.

8) **On the ground, in or near forest**. A few species of tanager regularly forage on the forest floor. Most notable are the Rosy Thrush-tanager and the two *Calyptophilus* species, the Eastern (*Calyptophilus frugivorus*) and Western Chat-tanagers (*Calyptophilus tertius*), all of which may ultimately prove to belong not with Thraupidae, but with other avian families (see Systematics). The thrush-tanager typically remains at one location on the ground for extended periods of time as it flicks leaves aside with its bill. More than 20 other tanagers, almost all of them lowland species, are known to forage occasionally on the ground. This group includes members of such varied genera as *Neothraupis*, *Tachyphonus*, *Eucometis*, *Trichothraupis*, *Habia* and *Ramphocelus*. No highland species currently classified as a tanager is known regularly to forage on the ground, although a few species of *Iridosornis* have been observed foraging on mossy rocks and roadside banks. On the other hand, many genera currently placed in Emberizidae, but now believed to be closer to tanagers (see Systematics), typically forage on the ground; they include the *Phrygilus* finches, the *Diuca* finches, the *Poospiza* finches, the *Embernagra* finches, the chaco finch genus *Saltatricula*, the two *Coryphospingus* finches, and also the single species of *Rhodospingus*.

9) **Arboreal dead leaves**. This substrate is an important foraging site for birds in several predominantly insectivorous families, such as the ovenbirds (Furnariidae) and the typical antbirds (Thamnophilidae). At least 25 species of tanager also regularly or occasionally inspect dead-leaf clusters for hidden arthropods. The Oleaginous Hemispingus is one of the most prominent searchers of dead-leaf clumps, and in many, or perhaps most, areas this species consistently searches dead leaves and hanging clumps of dead leaves. In the coastal cordillera of Venezuela, more than half of all prey captures made by this thraupid are from suspended dead leaves, although this species may take a higher proportion of prey in this manner here than it does elsewhere. In the Machu Picchu area of south-eastern Peru, the Oleaginous Hemispingus regularly checks dead hanging leaves, but it also frequently forages on mossy branches or other substrates. Several other species of hemispingus spend lesser amounts of time in searching clusters of suspended dead leaves. This foraging method is reported also for various species of *Thlypopsis*, *Tangara* and *Cnemoscopus*. Three other genera, namely *Habia*, *Chlorospingus* and *Chlorothraupis*, all now believed to be allied to cardinalids (see Systematics), also frequently search suspended dead leaves and clumps of old leaves lodged in branch forks.



*Small and agile species such as the **Chestnut-bellied Euphonia** are able to crawl over large inflorescences like this* Combretum fruticosum *flower, instead of hovering or perching alongside to peck at them. Clambering and thrusting their heads among the stamens as they probe for nectar and insects, they may do some damage to the flower. But they pick up pollen (clearly visible on the forehead of this bird), which they transfer to the plants which they visit subsequently. Chestnut-bellied Euphonias also take sugar water from hummingbird feeders.*

[*Euphonia pectoralis*, Ubatuba, São Paulo, Brazil. Photo: Ivan Sazima]

10) **Damaged leaves**. This is a substrate utilized to varying degrees by some species of dacnis, which, in general, take more insects than fruit. Damaged leaves can provide a particularly rich insect foraging site. When foliage-chewing insects are active and the damage is extensive, hundreds to thousands of holes in clumps of leaves are evident and may blight entire trees. Foraging Blue Dacnises have been observed to fly directly from one damaged leaf site to another. Pearly-breasted Conebills (*Conirostrum margaritae*), which occur mainly in stands of young *Cecropia* on newly formed river islands in Amazonia, also make extensive use of damaged leaves. Chestnut-vented Conebills (*Conirostrum speciosum*), at least locally, and Bicolored Conebills in the Amazon region, but not coastally, along with a few *Tangara* tanagers, such as the Golden-naped Tanager in Colombia, also make use of damaged leaves as food-resource patches.

11) **Bamboo**. Although bamboo is an important and sometimes exclusive micro-habitat for birds across the southern Amazonian lowlands, and also an important foraging site for a wide range of species near the tree-line in the Andean highlands, relatively few tanagers use it to the exclusion of other substrates. The single known exception to this is the Plushcap (*Catamblyrhynchus diadema*), which systematically searches the leafy internodes and, to a lesser extent, the stems of *Chusquea* bamboo in the highlands. Bamboo is an important foraging substrate also for the Rufous-browed Hemispingus in Bolivia and somewhat less so for several other hemispingus species. Other highland tanagers, including *Chlorornis*, *Dubusia* and several species of *Iridosornis*, are often closely associated with bamboo when foraging, although they seem not to be dependent upon it.

12) **Flowers**. While flowers are usually regarded in the context of nectar resources, some, especially mass flowerings in forest canopy trees, attract many insects, and a few species of tanager regularly use flowers as insect-holding substrates, picking insects directly from flowers and sallying short distances in the vicinity of the flowers. Both Green Honeycreepers and Red-legged Honeycreepers take many insects in short fluttering sallies near flowers, and the Golden-collared Honeycreeper, a scarce species for which little information is available, has also been observed while fluttering and sallying for insects around flowers. Several *Tangara* tanagers, including the Blue-necked, Masked, Golden-hooded, Rufous-throated and Grey-and-gold Tanagers, may employ this technique for obtaining insects; indeed, many, if not most, members of the genus *Tangara* opportunistically forage in this manner.

When the taxonomy affecting the thraupid family settles down once more, the revisions are likely to include species with foraging-substrate specializations that fall well outside those listed above. While it is unlikely that any of the above categories will be eliminated from the list by pending taxonomic changes, except possibly that involving the following of army ants, a few prominent foraging substrates not included in the list are worthy of brief mention, because they are utilized by species likely to be transferred from Emberizidae to Thraupidae in the future. Among them are (i) grass stems, which are utilized by all *Sporophila* and *Tiaris* species as perch sites which the birds ride downwards, causing the stems to bend over so that the birds can then reach out and down along the stems to obtain seeds and, perhaps, occasionally insects; (ii) open bare or rocky ground, substrates used by many *Phrygilus*, *Diuca* and *Sicalis* finches of the high Andes and Patagonia; and (iii) the ground in tall grassland, a substrate exploited by *Embernagra* and species in a few other emberizid genera.

In a summary of arthropod prey items taken by tanagers, the Isler team found that 62 species included larvae and caterpillars in the diet, 57 included beetles (Coleoptera), 39 incorporated wasps and bees (Hymenoptera), and 34 species took orthopterans. Although the survey was incomplete and probably biased towards the captures of large insects, which are more visible to field observers, the sample does show that tanagers take a broad range of arthropod prey. It also suggested that highland tanagers took more beetles and grub-like insects than their lowland counterparts. Lowland tanagers, in general, took a wider variety of arthropod prey items than highland species, doubtless a reflection of greater lowland-insect diversity, and greater orthopteran diversity in particular in the lowlands.

Small tanagers of less than about 15 cm are more likely to specialize on specific substrates when foraging than are larger tanagers. Many small tanagers move along branches and twigs or through foliage and search for prey in a methodical but often highly stereotyped manner, myopically inspecting their preferred substrates from as close as 2–5 cm. *Tangara* tanagers are often cited as extreme examples of this substrate specialization. In a



Mostly insectivorous, the ***Western Tanager*** *forages in the upper levels of coniferous trees and the canopy of mature alder trees (*Alnus*). It examines the foliage, hopping or jumping from perch to perch and taking prey mostly by pecking from leaves. It sometimes remains motionless except for head movements as it watches for flying prey, and sallies varying distances into the air for flying ants and termites. Hymenopterans, mostly wasps but some ants, account for 56% of its insect food, increasing to 75% in August. In Montana, the Western Tanager was observed to hover over musk thistle* (Carduus nutans) *heads and attempt to pick out the introduced weevil* Rhinocyllus conicus.

[*Piranga ludoviciana*, Victoria, British Columbia, Canada. Photo: Glenn Bartley]

summary compilation of foraging behaviour from various sources for 31 species of *Tangara*, the Islers found that at least 24 species, 77% of the total, were substrate specialists, preferring to forage in specific ways and on specific substrates to the virtual exclusion of other sites. In their sample, 15 species searched for arthropod prey mainly on branches, five from leaves and one from the undersides of leaves and branches, and three often captured insects in short aerial sorties. Even more remarkably, those species which preferred branches, almost half of the total, could be further divided into several subcategories, including those that habitually inspected bare branches and those that favoured mossy or partly mossy branches. More recent studies, detailed below, have shown that substrate discrimination in *Tangara* communities can be even finer. Such extreme specialization with regard to the invertebrate portion of the diet is most obvious in the Andes, where up to ten species of *Tangara* may have overlapping or partially overlapping ranges and are, in turn, replaced by others at successively higher elevations. Foraging specialization is characteristic of lowland *Tangara*, as well, and it is not uncommon to find up to eight overlapping species locally in Amazonia. There



Although active and full of nervous energy, the ***Chestnut-vented Conebill*** *is easily overlooked as it forages high in the outer foliage of spreading branches. It is especially fond of searching the tiny leaflets and axils of the compound foliage of legumes (Leguminosae), busily hustling from one spray of leaflets to the next, often hanging upside-down to probe and glean. It may exploit damaged leaves for foliage-chewing insects. Pearly-breasted Conebills* (Conirostrum margaritae)*, which occur mainly in stands of young* Cecropia *on newly formed river islands in Amazonia, make more extensive use of damaged leaves as a foraging substrate.*

[*Conirostrum speciosum speciosum*, Cachoeiras de Macacu, Rio de Janeiro, Brazil. Photo: Narciso Cipriani]



Chlorothraupis *species forage mostly in the understorey. The* ***Olive Tanager*** *seems more restless and faster-moving than others in its genus, as it hops along branches or flies short distances to new perches. It is generally seen in smaller parties than Carmiol's Tanager* (C. carmioli)*, with which it was once thought to be conspecific. Carmiol's Tanager searches for larger insect prey such as beetles (Coleoptera) and crickets (Orthoptera) by hopping, rummaging and peering, lunging forwards or hanging downwards. Of observations of Carmiol's Tanagers feeding on insects from leaves, 65% involved the leaf undersides.*

[*Chlorothraupis frenata*, Amazonia Lodge, Manu Biosphere Reserve, Madre de Dios, Peru. Photo: Roland Seitre]

are, however, far fewer species overall in the lowlands compared with the highlands, and foraging substrate specialization may be less extreme.

In western Ecuador, Naoki examined the patterns of foraging, for both arthropods and fruit, in a community of seven sympatric species of *Tangara*. To achieve her objective, she took foraging data over a period of seven months in order to permit a detailed analysis of foraging parameters, and to test whether foraging differences among the species resulted in resource-partitioning. Naoki's analysis showed that not only did substrate preference differ among the seven tanager species, as was found in the broad analysis by the Islers, but the physical attack manoeuvres used to obtain arthropods also differed, as did the horizontal foraging position within trees and the preferred habitat. An example of the fine discrimination displayed by these small mixed-diet species can be seen in the attack manoeuvres and foraging substrates of the Golden Tanager and the Flame-faced Tanager, two forest-dwelling species both of which used inner and middle portions of thick branches and searched in a highly stereotyped manner by reaching down or hanging downwards to check first one side of a branch, then the opposite side, all the while progressing outwards a few hops at a time. Beryl-spangled Tanagers employed similar stereotyped searching movements, but searched only thin branches and twigs in foliage. Metallic-green and Rufous-throated Tanagers searched mainly in outer foliage, inspecting and gleaning from the tops of leaves, or reaching up from below to the undersurfaces. Blue-necked and Golden-naped Tanagers differed still further in often sallying or fluttering short distances to the air. The species which were most similar to each other in foraging behaviour, such as the Golden and Flame-faced Tanagers, differed in both foraging position and attack manoeuvres: the Flame-faced foraged mostly on mossy branches and often probed into the moss; whereas the Golden Tanager foraged far less on mossy branches and, when it did so, picked prey items from the surface, rather than obtaining them by probing. Metallic-green and Rufous-throated Tanagers both used leaf substrates for foraging, but the latter employed more manoeuvres involving hanging upside-down, especially to get at leaf undersurfaces and when searching large leaves. Further, the two species differed somewhat in habitat preference and the elevation at which they occurred, with Metallic-green more in forest and at higher elevation and Rufous-throated more in edge and disturbed situations at slightly lower elevations. A final example is provided by the Blue-necked and Golden-naped Tanagers, which obtained a majority of their prey in short aerial sallies, but favoured different habitats. Approximately 80% of the recorded foraging attempts of Blue-necked Tanagers were in semi-open habitat and a further 15% were in secondary forest, while for Golden-naped Tanagers the situation was almost exactly the reverse.

In contrast to the tanagers' foraging behaviour when seeking arthropods, Naoki found few differences in the methods by which



One or more Chlorospingus *bush-tanagers can be found in almost all humid montane forests from Mexico south to Bolivia. They hop quickly up slanting branches and twigs until they are close enough to peer up at the underside of leaves. They also check moss clumps, and frequently search bunches of dead leaves. The* ***Dusky Bush-tanager****, seen here with a moth (Lepidoptera), is particularly attracted to vine tangles, which it searches from near the ground to the treetops. It is seen high or in the canopy more often than are other* Chlorospingus.

[*Chlorospingus semifuscus paulus*, Sachatamia, Mindo, Ecuador. Photo: Tom Friedel/VIREO]

the species of *Tangara* obtained the fruit portion of their diet. Golden and Flame-faced Tanagers perched on the thick hanging catkins of *Cecropia* more than did other species, and thus used vertical perch positions. In comparison with other species, Rufous-throated Tanagers ate more berries of *Trema*, an early-successional-stage tree in regrowth areas, and thus had a higher average perch height. Otherwise there were few interspecific differences in foliage density, or in preference for vertical or horizontal position of perches utilized when feeding on fruit. More than half of all records of fruit-eating involved simple reaching and gleaning manoeuvres, and the berries of two species of *Miconia* accounted for almost half of all fruit consumed by the seven species of *Tangara*.

In summary, Naoki found that when *Tangara* foraged for arthropods, the various species in a community each searched slightly different substrates, no species overlapping completely with another conspecific. Naoki also found that, secondarily, they also differentiated slightly in the habitats they occupied. These differences result in a low degree of resource overlap and a particularly low overlap among species occupying the same habitat and foraging in the same mixed-species flock with other *Tangara*. On the other hand, when searching for fruit, most species of *Tangara* ate the same kinds of fruit, and overlapped widely with congeners using the same habitats. These results suggest that it is the arthropod portion of the diet, rather than fruit, that is the more important factor reducing competition for food.

While Naoki's study is the most detailed published work to date on resource-partitioning by tanagers, some unpublished findings by Hilty in Colombia suggest a closely similar pattern. The high species diversity in these *Tangara* communities appears to be maintained not by fruit abundance, because there is relatively little competition for it, but by the ability of these species to partition their foraging sites to a remarkably high degree through differences in a combination of foraging manoeuvres, substrate use, foraging position and habitat. Such fine-grained micro-habitat and behavioural discrimination presumably means that the species are feeding on different subsets of arthropods, and in this way avoid direct competition for the higher-quality portion of their diet.

Whereas small-bodied tanagers tend to be substrate specialists, the larger species are, conversely, more likely to be substrate generalists that search for prey by peering at sites beyond their immediate reach. As a consequence, their movements are less stereotyped, involve more generalized searching, and usually entail a brief lunging attack to capture prey. Mountain-tanagers of the genera *Anisognathus* and *Buthraupis* employ this type of searching behaviour, which involves hopping along a branch and peering in a deliberate manner at branches and foliage, and then reaching out or lunging to grab prey once it is located. In the highlands, species in several genera, including *Iridosornis*, *Creurgops*, *Bangsia* and *Dubusia*, employ somewhat similar for-



Apart from some seasonal fruit, the ***Summer Tanager*** *eats mostly arthropods. It sallies after flying insects like the one seen here. Its diet includes many bees and wasps (Hymenoptera), and wasp larvae. When attacking the nests of the wasp* Polistes exclamans, *the bird hovers by the nest, catching flying adults in its beak. When all the adult wasps are eaten or have escaped, the Summer Tanager attacks the nest with its beak and eats the larvae inside. By the end of the bird's visit, the nest is shredded and the colony destroyed.*

[*Piranga rubra rubra*, Costa Rica. Photo: Glenn Bartley]



Hemispingus *tanagers were sometimes considered to belong with New World warblers (Parulidae), and the* ***Black-capped Hemispingus*** *behaves very much like one when it is foraging. It often acts as the leader of fast-moving mixed flocks, which include* Basileuterus *warblers and other small tanagers. It gleans or picks insects and other small arthropods from foliage, mainly from near the ground to around 6 m up. It also forages in bamboo, but does not specialize on it. Its congener the Rufous-browed Hemispingus (H. rufosuperciliaris) is one of the few tanagers that uses bamboo extensively.*

[*Hemispingus atropileus*, Río Blanco Reserve, Manizales, Caldas, Colombia. Photo: Ketil Knudsen]

aging tactics. In a common variation, *Tachyphonus* tanagers move faster and, once they locate a prey item, attack with lunging motions and quick darting actions that may end in an acrobatic chase. *Thraupis* tanagers, including such common and widespread species as the Blue-grey and Palm Tanagers, incorporate any or all of these movements, sometimes moving rapidly, at other times more slowly, and also often fluttering to foliage or branches in pursuit of escaping prey. Other large-bodied lowland tanagers, including *Schistochlamys*, *Neothraupis*, *Lamprospiza*, *Ramphocelus* and *Stephanophorus*, all employ various methods of hopping rather heavily along limbs or in thicker shrubbery and peering around, before lunging after prey. *Eucometis*, the Grey-headed Tanager, behaves in a similar manner, but, in an unusual variation, it regularly forages in the vicinity of army ants. Waiting at the periphery of raiding swarms, it lunges or goes to the ground repeatedly to capture arthropod prey attempting to escape from the ants. Some species of *Habia* ant-tanager, a group now thought not to be closely related to tanagers (see Systematics), also follow raiding army ants, at least in the northern portions of their range, but their movements of peering and then lunging recall those of other larger-bodied tanagers.

Shrike-tanagers, the genus *Lanio*, are another group of relatively large-bodied tanagers that are not substrate specialists. Widespread in humid lowland forests, they follow mixed-species flocks and forage by engaging in fast aerial sorties within the confines of the subcanopy or canopy, where they regularly chase flying prey flushed by other species. In south-eastern Peru, the foraging behaviour and social role of the White-winged Shrike-tanager within mixed flocks have proved to be of considerable interest. Notable for its often loud, sharp alarm calls, the species is reported as behaving both as a sentinel to the flocks by warning of danger and, occasionally, as a thief by issuing false warnings to distract a competitor if the outcome of an aerial pursuit of prey is in doubt. Because shrike-tanagers keep a lookout for prey by sitting on relatively open branches beneath the canopy, they usually have a more unobstructed view of their surroundings than other species. As a result of their alertness, they are quick to spot prey items flushed by other species and, more often than not, they are the first to capture these escaping prey items. They also are among the first to detect predators, such as incoming hawks. Verified instances of false alarms, or "lying", in avian ecosystems are rare, and the shrike-tanager's behaviour appears to be unique within the social structure of mixed-species flocks. Munn, who was the first to confirm this behaviour among shrike-tanagers, was able to show that false alarms, or "crying wolf", by these birds were given with somewhat greater frequency when pairs were feeding young, but even then they remained infrequent.

Birds that eat fruit are found in a wide range of both tropical and temperate-latitude families, although very few of them, either as adults or as nestlings, live on fruit alone. In most cases, as is true with the tanagers, adults consume fruit and supplement it with protein-rich arthropod prey, mostly insects. Nestlings, because of their greater need for protein for growth, are initially fed almost entirely with insects. Fruit, however, is often readily available and easy to harvest, and it is an important food for tanagers. As noted previously, fruit comprises half or more of the food items eaten by approximately 68% of all tanagers. In fact, all members of the family Thraupidae, as currently constituted, include at least some fruit in the diet. Forthcoming taxonomic changes within the family (see Systematics) will modify these generalizations, with the likely inclusion of several genera that are primarily seed-eating species, such as *Phrygilus*, *Sporophila*, *Tiaris*, *Geospiza* and others, and the eventual exclusion of several frugivorous groups currently included, such as *Euphonia*, *Chlorophonia* and *Chlorospingus*.

All tanagers are relatively small birds, and the range of fruit and seed sizes which they can handle and process is largely limited to small items or, in a few instances, to large fruits from which they can remove pieces of pulp, by pecking at the item, and leave the seeds intact. As a food resource, fruit presents a number of difficulties for birds, because it is usually low in protein compared with caloric value, it is mostly water, and it contains seeds which are heavy and indigestible. Indeed, seeds can add as much as 50% in indigestible bulk to a fruit item. Among bird-dispersed seeds, the fruit pulp surrounding the seeds is typically either rich in lipids (fats) and often large, or high in carbohydrates (sugars) and small in size. Rarely are fruits high in both lipids and carbohydrates, containing more than 20% of each. Surveys of a variety of tropical plant families with bird-dispersed fruits show a median protein level of 8·4% by dry weight. This compares with a median of 12% for cereal seeds and one of 66% for a sample of 19 species of insect.



Around 20 species of lowland tanager, including some Habia *ant-tanagers, occasionally forage on the forest floor. Of 4000 foraging attempts by the* ***Red-throated Ant-tanager*** *in Belize, 75% were below 5 m, and the species often foraged on the ground around army-ant (Formicidae) swarms. While capturing prey flushed by army ants, the Red-throated Ant-tanager may hop on the ground briefly to grab prey or use horizontal perches. It hops along branches, peering rapidly, and frequently turning about-face before lunging for escaping insects. Its behaviour is similar away from ant swarms, where it perches mostly in a horizontal position and reaches or pecks prey from foliage and trunks.*

[*Habia fuscicauda salvini*, Belize.
Photo: Christian Artuso]



Euphonias have been maintained in captivity on diets consisting largely of bananas, and the ***Spot-crowned Euphonia*** *is known to visit feeders to eat pieces of this fruit. An experiment at La Selva Biological Station, in Costa Rica, used a banana diet to examine the sugar-tasting abilities of tanagers and manakins (Pipridae). The tanagers were of four genera:* Euphonia, Ramphocelus, Thraupis *and* Tachyphonus. *The first three were able to detect differences of 2% in the sugar content of the banana mash, and all three preferred the sweeter mixtures. Only the Tawny-crested Tanager* (Tachyphonus delatrii) *was, like the two manakin species, indifferent to the sweetness.*

[*Euphonia imitans*, Osa Peninsula, Costa Rica. Photo: Felipe López]

Most tanagers and other small fruit-eating birds are limited to eating small fruits which are generally little more than juicy packets of sugar. On the other hand, large fruits are more likely to have higher protein and fat contents, and large specialized frugivores such as cotingas, toucans (Ramphastidae) and the Oilbird (*Steatornis caripensis*), because of their size, are able to harvest a much wider range of fruit. Tanagers exhibit few special morphological features specifically for handling fruit. For example, the Swallow Tanager is the only thraupid with a bill and gape wide enough to enable it to eat even what are moderate-sized fruits in relation to its body size, and *Euphonia* and *Chlorophonia*, genera now generally placed with the Fringillidae, are the only ones with a digestive tract modified for quick passage and gentle handling of fruit pulp and seeds. As most tanagers consume both fruit and insects, their digestive tracts do not differ appreciably from those of insectivores. For example, small frugivores have a thin-walled, non-muscular gizzard and a small crop similar to those of primarily insectivorous birds, and the passage rate of food material through their gut is, likewise, similar to those of the latter. Although it has been suggested that frugivores should have a shorter gut to facilitate quick passage of heavy ballast pulp, and a large liver to aid in detoxification of the secondary compounds often present in fruit, researchers have found no constant patterns in these or other internal morphological adaptations. Generally, small birds do not possess any morphological adaptations for storage of fruit, as the crop is either small or lacking, and the proventriculus and oesophagus are also small; the proventriculus is enlarged in *Euphonia* and the oesophagus is extensible in the Swallow Tanager, but these apparently represent exceptions. Among small fruit-eating birds such as tanagers, adaptations to accommodate fruit in the diet are in general likely to involve behavioural changes, rather than slowly evolving and less flexible structural morphological changes. Not surprisingly, small birds that feed mostly on insects are capable of eating fruit about as readily as those feeding on fruits can eat insects. Differences in the abilities of the two groups to utilize fruit are more likely to be related to the external morphology, mainly leg length and wing shape, which can affect harvest time, rather than to specific internal anatomical features that aid digestion once the fruit is harvested. In both cases, the ability to switch diet, or to shift the proportions of food types in the diet, is advantageous during periods when a major resource is limited. While tanagers exemplify a dual fruit–insect dietary strategy, many other small frugivores pursue a mixed diet with varying proportions, including species of the families Tyrannidae, Pipridae, Cotingidae, Cardinalidae and Emberizidae, among others, in the New World.

With their small size, tanagers generally process fruit either by plucking a fruit and swallowing it whole or, if the fruit is larger, by mashing it and eating it piecemeal. Mashing a fruit, often referred to as mandibulation, is a type of behaviour that is, so far as is known, unique to nine-primaried oscines. Typically, small seeds are swallowed whole, whereas large seeds are often mandibulated for a few moments in order for the seed to be extracted and dropped. The mashing of fruits may also serve to squeeze out watery juice, which is heavy and has less food value when compared with pulp.

Even with their limitations of small size and relatively unspecialized physical anatomy, tanagers take an enormous range of small fruits. Most tanagers have a bill that is not exceptionally wide or flat and is moderate in length. Birds that take fruit while on the wing usually have a wide, flat bill that is also short, whereas those that take fruit while perched usually have a longer and more narrow bill. These differences can affect which fruits are accessible to a bird. For example, birds that take fruit when in flight usually have shorter or more rounded wings and are adept at hovering or swooping up or snatching to grab the fruit. Birds that obtain fruit by reaching in various ways, such as most tanagers, are constrained by leg-muscle mass, and strength and size of the tarsus, in the ways in which they are capable of reaching.

Few bird species are able efficiently to reach for fruit items and also to hover and pluck them while on the wing. In this regard, *Euphonia* and *Chlorophonia* represent a compromise. Species in both genera hover, but are less efficient at hovering than manakins, and their bills, although not exceptionally wide or flat, are short and rather thick, which may prevent them from reaching as far or as efficiently as many species, thereby limiting the range of fruits that they can efficiently harvest. These compromises, however, may be offset by their more highly modified gut anatomy, which permits them to harvest certain potentially toxic resources such as mistletoe berries. Mistletoe-berry pulp is harmless, and one species has been shown to be high in lipids, but the seeds are highly toxic. Mistletoe seeds are coated with a slippery





Tanagers obtain a good proportion of their water requirements from their diets. For nectar-eaters, excess water from very dilute nectar may even be a burden, which prevents them from meeting their energy requirements from what they are able to consume. When tanagers drink, they can do so by suction, without needing to tip the head to swallow each beakful of water. Drinking is an activity that makes them vulnerable; predators may lurk near regular watering places, and during the time its head is down and its beak immersed, the bird is unable to be vigilant. The ***Summer Tanager*** *(above) drinks by dipping its beak for a split second, then raising its head to look around before dipping its beak again. The* ***Swallow Tanager*** *(below) will come down to the ground to drink at pools and streams, but will also take advantage of elevated water sources such as spouts and gutters, and puddles on flat roofs. It has been suggested that suction-drinking by tanagers derived from the already extant behaviour of mandibulating succulent fruit.*

[Above: *Piranga rubra rubra*,
High Island, Texas, USA.
Photo: Charles W. Melton.

Below: *Tersina viridis viridis*,
Itatiaia City,
Rio de Janeiro, Brazil.
Photo: Edson Endrigo]



Male tanagers display to females by showing off their brightest or most contrasting feathers, such as the bright blue back of the ***Blue-naped Chlorophonia****. The few courtship displays described for tanagers include bowing and tail-lifting. In the two genera studied in detail,* Ramphocelus *and* Chlorospingus*, displays including sexual behaviour were found to be partly or wholly similar (although* Chlorospingus *now appears to be closer to parulid warblers than to tanagers). Chlorophonias and euphonias are also now thought to belong in another family (Fringillidae); they differ from all thraupids except the Bananaquit* (Coereba flaveola) *in building covered nests.*

[*Chlorophonia cyanea cyanea*, Itatiaia City, Rio de Janeiro, Brazil. Photo: Edson Endrigo]

covering that, if disturbed, exposes the potentially toxic seed to the gut, and this could result in the poisoning and death of a small bird if the seeds were digested or remained long in the alimentary tract. Consequently, mistletoe berries, as a fruit resource, are generally avoided by many groups of birds. In the Neotropics, chlorophonias, euphonias and a few small, specialized tyrannids are the principal consumers of mistletoe berries; in addition to having gut modifications, all three groups void the sticky seeds in long strings. The birds wipe the seeds, which stick together like strings of tiny pearls, off their rear parts and across branches by using a curious to-and-fro motion, as if the bird were swivelling its hips. This behaviour accomplishes two purposes: it assures that the bird is rid of the unwanted seeds and, coincidentally, that the seeds are deposited on a bare branch, where germination is possible.

While many of the fruits eaten by tanagers are rather unremarkable in size and shape and in colour, two other types, in addition to mistletoe berries, are worthy of mention. These are *Cecropia* catkins and arillate fruits, and both are widely taken by many tanagers. *Cecropia* is a conspicuous genus of trees in the family Urticaceae, with more than 100 species in the New World. The family is distinctive for its large, radically lobed, peltate leaves, which impart an open shape to the sometimes branchless trees. *Cecropia* species also have hollow internodes inhabited by ants, glycogen-containing food bodies at the base of the petioles, and distinctive fruits, which are finger-shaped catkins that project upwards or downwards in clusters. Many species of *Cecropia* are pioneer trees that thrive in regrowth and successional areas, although a few are canopy members of mature forest, especially at middle elevations in the Andes. *Cecropia* trees rely principally on birds, as well as some mammals, for the rapid and widespread dispersal of their tiny seeds, which are densely packed in the catkins. Many species of tanager include *Cecropia* catkins in their diet, either throughout the year or seasonally. Tanagers may perch on the stem containing the catkins and reach out or down to the catkin itself, or they perch directly on a catkin, sometimes clinging to the side of it, as they reach down to peck away pieces of the fruit material, swallowing the food on the spot. The importance of *Cecropia* in the year-round diet of a thraupid community in western Colombia is evident in the unpublished data of Hilty. In a community of 41 species of tanager, 17 species were recorded as feeding in every month on the catkins of a group of *Cecropia reticulata* trees, which were monitored on five mornings each month. Usage peaked in October, when 25 tanager species were recording as feeding at these trees. The catkins were such an important food resource that this single species of *Cecropia* was responsible for, each month, from 5·3% to 13·8% of all fruit-foraging records within the tanager community. Although production of *Cecropia* catkins and the use of these as food by bird communities are seasonal in areas with well-marked wet and dry seasons, these results underscore the importance of this genus, indeed the importance of a single species of *Cecropia* tree, in a tropical bird community.

Arils are often brightly coloured red or orange, fleshy pulp-like coverings that encapsulate some seeds. They are usually produced inside tough, even woody pods or multi-pointed, star-shaped fruiting structures that eventually split open to reveal layers of bright arils. One species of arillate fruit that was tested in Costa Rica was rich in both proteins and lipids, and it is not surprising, therefore, that arillate fruits attract a wide range of small frugivorous birds, including honeycreepers, dacnises and many *Tangara*. One of the commonest aril-producers is *Clusia*, a sclerophyllous-leaved tree or shrub of the family Clusiaceae that usually grows as an epiphyte or hemi-epiphyte or climber, and produces large resinous, capsular fruits that split open like multi-pointed stars to present rows of bright red-orange arillate seeds. Most arils are eaten by birds even before the fruiting capsule is fully open, and honeycreepers, especially those in the genera *Cyanerpes* and *Chlorophanes*, aided by their long bill, are among the first to be able to reach the arils sequestered inside.

Miconia and several related genera in the family Melastomataceae represent, collectively, one of the most important fruit resources for small birds in the Neotropics, and especially for *Tangara* tanagers. The small, juicy berries of *Miconia* are presented in flattish panicles at the end of branches of mostly small trees and shrubs, and are eaten by many kinds of bird. Melastomes, in fact, quickly colonize small openings in humid lowland and montane forest, especially in treefalls, at landslides, along streams or wherever in the forest there is an open area. They are especially numerous on steep mountain slopes, where a high level of rainfall creates abundant, year-round opportunities for colonization. One to a half-dozen or more species of these



Courtship feeding, performed here by the ***Azure-shouldered Tanager****, has previously been recorded for another* Thraupis *species, the Blue-grey Tanager* (T. episcopus), *as well as for* Tangara *and* Chlorophanes *species. In courtship feeding the male usually feeds the female, although instances of female tanagers feeding their mates have been recorded. Courtship feeding has also been observed for* Piranga, Chlorophonia *and* Euphonia, *genera included in Thraupidae but now thought to belong elsewhere.*

[*Thraupis cyanoptera*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]

shrubs or small trees can usually be found fruiting in almost any month of the year. The berries consist mostly of carbohydrate. They are abundant and easy to harvest, and are taken by birds ranging in size from manakins and small tanagers up to pigeons (Columbidae), toucans, and guans (Cracidae). As they are produced in such copious amounts, a strategy that insures that their tiny seeds are widely distributed, they are among the first woody plants to colonize an opening in the forest. On steep Andean slopes, various species of *Miconia* and a few related genera of these widespread and common plants may comprise a significant proportion of all fruit eaten by *Tangara* tanagers. In an unpublished study undertaken by Hilty on the Pacific slope in Colombia, consumption of the berries of 19 species of *Miconia* by 23 resident tanager species varied from representing 13·9% of all records of fruit-eating in February to a high of 64·4% in December. In Naoki's study of seven *Tangara* tanagers, *Miconia* accounted for 33–78% of all the observations of fruit-foraging by the seven tanagers. Nearly half or more of all fruit consumed was from one plant alone, *Miconia brevitheca*, and this species together with *Miconia micrantha* accounted for nearly two-thirds or more of all fruit-foraging observations. Such remarkably high dependence on only two species of plant is a clear indication of the importance of *Miconia* in the diets of these tanagers, and suggests the likelihood of a co-dependent link between seed-producers, in the form of *Miconia*, and seed-dispersers, represented by tanagers and other birds.

Most species of tanager forage in some type of mixed-species flock, but the extent to which they participate varies from one species to another, and it is difficult to formulate generalizations regarding the diets of tanagers and their tendency to travel with flocks. Furthermore, the flocks, themselves, can be composed of dramatically different species having different agendas, depending upon the foraging choices of the species in the flocks. For example, in lowland rainforests, mixed flocks tend to be composed primarily of insectivorous species, one flock type foraging mainly higher up in the rainforest, and another in the understorey. Although the two flock types occasionally overlap, or even merge, the species in one flock type are largely different from those in the other type, and the flocks themselves, although they seem to coalesce around one or a few vocal species, are almost always composed of two to six permanently associated species that forage together, each species defending a common territory that more or less coincides with the territory used by the flock. In a study of colour-ringed birds in south-eastern Peru, Munn and Terborgh discovered that canopy flocks typically consisted of six core species, of which three were tanagers; in the understorey, flocks were also composed of six core species, all different from the canopy flocks, and none was a tanager. They also observed 20 additional species of tanager participating in one or both of these two types of flock, but in both examples tanagers comprised a minority of the species in the flocks. In Panama, J. A. Gradwohl and R. S. Greenberg observed similar behaviour in mixed-species flocks, although the total number of core species, as well as species joining the flocks, was smaller.

It is worth noting that a third flock type, not studied by investigators in Peru or in Panama, appears to roam primarily canopy tops and emergent trees in tall rainforest, and represents yet a third type of social structure. These emergent-tree flocks are composed primarily of tanagers, dacnises and honeycreepers, and they may be transitory, perhaps seasonal, and are variable in composition. Participating members band together early in the morning, range widely through emergent or high canopy trees, may visit fruit resources, and typically do not remain together for extended periods of time. Some individuals disperse and may join the primarily insectivorous, canopy-dwelling mixed-species group foraging below. The erratic appearance of these fast-moving emergent-tree flocks suggests that they re-form and disperse repeatedly during the day. These transitory flocks of tanagers, dacnises and honeycreepers have not been the focus of study. Qualitative observations suggest, however, that species in them are mostly small, with a mixed diet of fruit and arthropods, that they also join larger permanent flocks for varying periods of time when actively insect-seeking, but that they frequently leave these flocks to search for fruiting trees or to rest and loaf between foraging bouts.

In the highlands of Central and South America, flock composition is equally varied and the social roles of species in the flocks may vary geographically. In a study in cloudforest in central Costa Rica, mixed flocks of mostly insect-eating birds formed around a single core species, the Common Bush-tanager, and other attendant species joined or left as the bush-tanager foraged through its home range. In another study in Costa Rica, however, bush-



*The nest of the **Swallow Tanager** is built by the female from various fibrous materials. The Swallow Tanager is a hole-nesting species, often using existing holes in cliffs and banks, trees and walls, though capable of digging its own hole in soft earth. The eggs are completely white or only lightly marked, which is typical of hole-nesters. Pair formation by this species includes extended bowing, sometimes accompanied by "bouncy hopping" and chasing. Breeding males also bow extensively to each other.*

[*Tersina viridis viridis*, Lindóia, São Paulo, Brazil. Photo: Geiser Trivelato]

tanagers behaved as attendant species. In the Andes, flock structures are also varied, and range from small groups of primarily insectivorous species that forage in the understorey to fast-moving tanager-dominated flocks that feed heavily on small fruits and share a more or less common home range. This situation is similar to that of the flocks studied by Munn and Terborgh in the lowlands. These highland flocks, however, differ from the lowland ones in their much greater speed of travel, often covering hundreds of metres in a few minutes as they sweep across steep ravines or leap-frog along misty slopes. They differ further in being dominated by small, fast-moving tanagers, members of the genera *Tangara* and *Chlorochrysa* at middle elevations, and other genera, mainly *Buthraupis*, *Chlorornis*, *Anisognathus* and *Delothraupis*, at higher elevations. The daily activity patterns of these flocks, unlike in the lowlands, appear to be strongly influenced by prevailing weather patterns, with foraging activity conspicuous and accelerating to a frenzy ahead of oncoming rainstorms. On the other hand, on hot sunny days in the Andes, foraging activity becomes remarkably inconspicuous and quiet, and, if it continues at all, it is mainly in the shady forest interior and out of view.

Tanagers that occur in semi-open areas are least likely to join or participate in mixed-species flocks, perhaps largely because few mixed flocks form in these habitats. Not all tanagers in forested habitats, however, join mixed-species flocks. A few species, the Dusky-faced Tanager (*Mitrospingus cassinii*) being one example, are noisy and troop about in the understorey in groups of their own. The Ochre-breasted Tanager, another understorey species now believed unrelated to tanagers, forages in mixed flocks or in large, single-species flocks in about equal measure. The Swallow Tanager, perhaps because of its habit of perching high in the open and sallying frequently, occurs mostly in single-species flocks. When not breeding, the majority of tanagers remain in pairs or gather in small groups that presumably include parents and offspring, while a few, such as the White-capped Tanager and the bush-tanagers, are regularly seen in larger groups. The composition of these larger single-species groups remains unknown, but they may include offspring from multiple generations, as well as unrelated individuals. Solitary behaviour is typical of a few species after breeding, such as northern, migratory *Piranga* tanagers, which may well be unrelated to true tanagers (see Systematics). These *Piranga* species, breeding in the north-temperate region, typically maintain solitary territories on tropical non-breeding grounds, and some flowerpiercers, when not breeding, also attempt to hold exclusive patches of flowers for themselves.

In Amazonia, seasonal flooding, which can be widespread along large rivers, brings dramatic changes in the abundance of food resources in the understorey and floor of the forest and in habitats subject to inundation. Flooding causes predictable but dramatic seasonal changes in the lives of species that live on or close to the ground. No tanager in Amazonia habitually forages on the ground, and only a few, mainly *Ramphocelus*, are found low along borders. The Red-crowned Ant-tanager, a member of a genus, *Habia*, likely soon to be removed from Thraupidae (see Systematics), occurs in both *várzea* and *terra firme* forest understorey, but neither the ant-tanager nor the various species of *Ramphocelus* are likely to be strongly affected by seasonal flooding. These species, as well as other tanagers, are insulated, to some extent, from these seasonal rhythms by their diets, which include both fruit and insects. A mixed diet should provide more buffering against swings in resource availability than would a specialized diet, although the proportion of fruit-eating to insect-seeking among small tanagers such as *Tangara* can vary markedly, even in environments where seasonality of rainfall is reduced.

Breeding

The breeding behaviour of tanagers, so far as is known, does not differ appreciably from that of many other small oscine passerines. Among tanagers that have been studied, almost all species breed in monogamous pairs, hold at least loosely guarded territories, and raise one or two young, or more at higher latitudes, which stay with the adults for varying periods of up to several months after fledging. The presence of helpers, which are typically offspring of a previous generation, has been documented for a number of species. Details of breeding behaviour have been published for only a relatively small number of species, which is perhaps surprising for a group of birds that are so colourful and so well known. For the majority of tanagers, relatively little is known



The nests of Conirostrum *conebills are small, deep compact cups, often tightly woven from a mixture of plant and animal fibres. The nest of the* ***Cinereous Conebill*** *includes a mixture of plant fibres and vegetable down, from* Typha *"bulrushes", for example, and is lined with horsehair. Materials used by the Bicolored Conebill* (C. bicolor) *include grass and feathers, and the Tamarugo Conebill* (C. tamarugense) *incorporates sheep's wool as well as twigs, feathers and the midribs of* Prosopis tamarugo *leaves. Nests are often well concealed. A Rufous-browed Conebill* (C. rufum) *nest was found 2·5 m up in a blackberry* (Rubus) *thicket at the edge of a road and was camouflaged with dry blackberry leaves incorporated into its exterior. A nest of a Chestnut-vented Conebill* (C. speciosum), *a tiny cup made from leaf petioles and fibres, with no animal materials, was hidden in a curled, dead* Cecropia *leaf, hanging from a thin vine 4·5 m above the ground, at the edge of a forest bordering a road. Tamarugo Conebill nests in northern Chile were situated either on descending branches or at the outer ends of horizontal branches in the middle third of trees, possibly to escape predation by lizards, which climbed the main branches.*

[*Conirostrum cinereum littorale*, 11 km NE of Arica, Chile. Photo: Alejandro Torés]



Among populations of the ***Scarlet-throated Tanager****, red-throated males are in a minority, and males may breed in a subadult plumage, which resembles that of the female but is duller. Some male euphonias may also breed in a subadult plumage that differs from the female in having a small black face mask. During the breeding season, male Scarlet-throated Tanagers display the white bases of the feathers on their back. These icterid-like tanagers have been observed to carry long sticks to add to their nests, which are hidden in the crowns of palms, in woodpecker (Picidae) holes in* Mauritia *palm snags, or in abandoned stick nests of the Caatinga Cachalote (Pseudoseisura cristata).*

[*Compsothraupis loricata*, São Feliz do Araguaia, Mato Grosso, Brazil. Photo: Edson Endrigo]

about even the most basic aspects of breeding such as social structure and territoriality, nest architecture, eggs, and nestling and fledgling behaviour. Information on breeding by tanagers is skewed towards a few localities, with information from much of the Neotropical Region scant or lacking. The detailed life-history studies by Skutch provide the most complete data available on the breeding activities of tanagers, and almost all of his work was carried out in Costa Rica. Breeding data for several species of tanager in Trinidad are available from the studies of the Snows. Studies by S. Narosky, M. de la Peña, P. Mason and others in Argentina have provided some information for that region, and, more recently, the prolific nest-behaviour studies of H. Greeney in Ecuador have produced a good deal of useful data. There are also some unpublished data for western Colombia from Hilty. In addition, breeding data from a wide variety of sources were compiled by the Islers in their landmark monograph on tanagers.

Remarkably few breeding data are available on tanagers from anywhere in Amazonia, and information from the Andes is very spotty and incomplete, yet these are the two areas with highest thraupid diversity. Moreover, only a relatively small amount of information is available on tanagers, or other species, from the Atlantic Forest region of south-eastern Brazil, and almost none from the vast black-water/white-sand forests of southern Venezuela, the Guianas and northern Brazil. This concentration of breeding data from just a few localities leaves large gaps in our knowledge of avian life cycles, especially in major biotic regions, which are likely to differ greatly in seasonal rainfall, temperature, and soil and forest productivity.

So far as is known, the breeding seasons of tanagers coincide with those of most other small Neotropical passerines. In Middle America and northern South America north of about 10° N, breeding is at its peak between about March and the end of July, although with considerable annual variation. The Snows, working in Trinidad, discovered that, for most of the resident tropical birds in Central America and northern South America, the onset of the complete annual moult, which is an energetically expensive process, was much more predictable than was the start of breeding. The complete moult of both oscine and non-oscine passerines typically began in June, varying by little more than a month earlier or later. The Snows found that this relatively constrained time period was constant from year to year for small frugivores and insectivores, and occurred about a month after the annual rainy season began. This also is the period of the year when both plant and arthropod resources are likely to be at or near a peak in regions about 10° north of the Equator. These latitudes, they found, were far enough away from the Equator to experience distinct seasonality in rainfall, a consequence of the sun's annual north–south passage overhead and the subsequent band of heating and increased rainfall that follows a month or more after the sun's passage.

Both breeding and the annual moult, then, seem to be timed, as far as possible, to take advantage of a seasonal peak in arthropod and fruit resources. The onset of breeding is generally more variable but breeding activity typically declines sharply as moult, with its more predictable timing, begins. The onset of breeding turns out to be quite variable for tanagers, as it is for most small resident birds of Central America and northern South America. In Trinidad, for example, the Snows found that the onset of egg-laying can occur in almost any month from October through to May, usually triggered by an increase in rainfall and food supply, but for some species living in forest, where resources are likely more predictable over time than would be the case in semi-open and secondary areas, breeding can continue at a relatively low level throughout the year, with the exception of the approximately two to three months of the annual moult. Breeding and moult thus appear timed, so far as possible, to a period or periods of the year when food resources are relatively high, but it is moult, more than breeding, that dictates the cycle. A similar pattern, beginning almost exactly six months later, emerges in the Southern Hemisphere, where moult immediately follows, or even truncates, breeding and becomes progressively more synchronized in its timing as one moves farther away from the Equator. As may be expected, breeding and moult periods are less clearly defined in areas close to the Equator, where rainfall patterns are apt to be bimodal or nearly aseasonal. Thus, the seasonal breeding patterns, or lack of them, that we observe for tanagers should be viewed in the context of food resources and in the context of the annual moult, because these are the two most energetically costly activities that must be faced by tanagers, as well as by most other small tropical birds, each year.

The onset and duration of breeding are affected by many factors, but most importantly by the abundance of food. For



The nests of Ramphocelus *tanagers are built entirely by the females. The female* ***Scarlet-rumped Tanager*** *begins with a base of large leaves before weaving thick walls of fibres and rootlets, which she lines with fine hair-like fibres. Nests are usually several metres above the ground in dense shrubs or thickets, but have also been found among sugar cane and in coarse grass and ferns. Females have been observed to steal material from neighbouring nests: territorial defence of nest areas, weakly developed in most tanagers, is almost non-existent in* Ramphocelus. *In Costa Rica, Cherrie's Tanagers* (R. costaricensis) *have been found nesting just a few centimetres apart.*

[*Ramphocelus passerinii*, Costa Rica.
Photo: Marco Saborío]

example, a food-resource peak for tanagers feeding on foliage-eating insects is likely to occur at the onset of the major rainy season, slightly ahead of the peak in fruit abundance, which, in turn, precedes a resource peak for grass seeds or arthropods on the forest floor. In equatorial regions, such as the mountains of Colombia and Ecuador, double rainfall peaks, in March–April and October–November, respectively, may result in a more bimodal breeding pattern for some species of tanager. Species such as the Blue-grey and Palm Tanagers, which breed around human habitations where food resources may be plentiful almost throughout the year, may have prolonged breeding seasons, with at least some breeding activity in almost every month of the year. On the other hand, species that depend upon specialized resources such as nectar may have breeding patterns more closely matched to flowering peaks, and unrelated to the patterns shown by frugivores and insectivores. In Guatemala, for example, Skutch found that the Cinnamon-bellied Flowerpiercer usually bred from November to January, well ahead of other species, but timed to coincide with peak flower abundance.

Among those tanagers which have been studied, breeding systems are almost universally monogamous. There is almost no information from marked populations, but observational evidence suggests that monogamy is the norm in the family. *Ramphocelus* tanagers may on rare occasions be polygamous, in part because they are typically found in groups throughout the year. During his long observations of Cherrie's Tanager, Skutch documented one or more cases of presumed polygamy but noted that, even among females nesting relatively close together, several males were almost always present; male participation in the feeding of the young, however, was often less than half that of females, and in three instances no male was present to feed the young, or a male only rarely did so. Skutch believed that these represented exceptions, involving females that may have formed temporary pair-bonds with males or females that had lost a mate, and he concluded that monogamy was the predominant mating system even for Cherrie's Tanager. Although Skutch did not mark individuals, his long and detailed studies of many tanager species in Costa Rica indicate that monogamy is surely the predominant mating system, if not the only one, among thraupid species studied to date. Among a small number of marked pairs of nesting *Tangara* tanagers observed in western Colombia, Hilty noted that only pairs, or pairs and helpers, attended nests. In addition, colour-ringed pairs of Grey-and-gold Tanagers, Blue-necked Tanagers, Golden-hooded Tanagers and Rufous-throated Tanagers remained as pairs throughout a 16-month observation period. Few data exist on the long-term duration of pair-bonds, but for these Andean *Tangara* species the bond may remain stable for at least a year or more. Multi-year ringing projects could provide valuable information on population movements and pair-bond stability, but few such studies have been conducted with tropical passerines. One exception to this is a long-term ringing project carried out in the Henri Pittier National Park, in northern Venezuela, but to date little information has been published from that study.

In addition to *Ramphocelus* tanagers, all of which typically are found in single-species groups, the White-capped, Scarlet-throated, Azure-rumped (*Tangara cabanisi*), Grey-and-gold, Turquoise and Swallow Tanagers all regularly occur in groups of their own. Others, such as the Red-billed Pied Tanager, Oleaginous Hemispingus, Paradise Tanager, Green-headed Tanager, Purple Honeycreeper and Red-legged Honeycreeper, are found in both single-species and mixed flocks. Whether the social systems of these gregarious species are more complex than monogamy remains unknown. Observations at nests of Azure-rumped and Turquoise Tanagers suggest that nestlings may be fed by up to five or six individuals, but apparently no more than a single adult pair is involved in nest-building, egg-laying and incubation.

Courtship feeding, in which a male feeds a female, was recorded for several *Tangara* tanagers that Skutch studied in Costa Rica, among them the Golden-hooded Tanager, Silver-throated Tanager and Speckled Tanager, as well as the Blue-grey Tanager and Green Honeycreeper. In courtship feeding, known also as nuptial feeding, the male feeds the female away from the nest, or occasionally at the nest. Skutch further notes that, while courtship feeding typically involves the feeding of females by the males, occasionally females have been noted feeding males. Courtship feeding has also been recorded for *Piranga*, *Chlorophonia* and *Euphonia*, genera currently included in Thraupidae but now thought to belong elsewhere (see Systematics). It is likely that this behaviour is more widespread than reported. Occasionally, the male brings food to the nest prior to the hatching of the eggs, and may even feed it to the female, but this behaviour, near

the end of the incubation stage, represents anticipatory food-bringing, rather than true courtship feeding. Delivery of food before the hatch has been observed for *Ramphocelus* tanagers in Costa Rica and Panama.

Thraupid nests are, for the most part, rather unremarkable, being simple open cups built among forked branches in bushes or trees. They are typically well constructed, consisting of a fairly thick layer of dry leaves, shredded fibres, ferns, dry grass, fibrous plant material and moss. A thin layer of rootlets and finer material is usually used as a nest lining. Those of Grey-headed Tanagers are notable for their frail and flimsy construction. Blue-grey Tanagers and Palm Tanagers build loosely constructed cup-nests in broken tree cavities, stubs, palms, or cracks or crannies in buildings, under eaves, or on beams inside buildings. Blue-grey Tanagers also may usurp nests of other species, most conspicuously those of Rufous-fronted Thornbirds (*Phacellodomus rufifrons*) in Venezuela, but also tyrant-flycatcher nests, including those of Boat-billed Flycatchers (*Megarynchus pitangua*). Females of the enigmatic Swallow Tanager build a weak cup at the end of an earthen tunnel in a bank, in a cavity in a stone wall, in a tree hole, or even in a dark recess beneath a bridge. As a whole, tanager nests are sufficiently durable for a single nesting attempt, but even the thickest and most well-constructed nests deteriorate quickly in the humid environments, and it is usual for a new nest to be built prior to a second nesting attempt. Skutch reported a few examples in which a female Cherrie's Tanager attempted to reuse a nest from an earlier, failed nesting attempt, but without success. In one case, a pair of Rusty-margined Flycatchers (*Myiozetetes cayanensis*) stole much of the nest material before a second clutch could be laid. In the Andes, some *Tangara* tanagers build little cup-nests inside pockets or recesses in clumps of moss and epiphytes hanging beneath limbs, thus achieving some overhead protection. In cloudforests, where the surface of almost every twig, branch and trunk is covered with epiphytes and moss, such nest-sites are exceedingly cryptic and difficult to spot, except by watching the comings and goings of the adults, or by hearing the begging cries of the young when the adults return with food. In western Colombia, nests of the Rufous-throated Tanager and Golden Tanager have been discovered in hanging clumps of moss, and other montane *Tangara* may use similar suitable sites at least occasionally.

Domed or enclosed nests are, on the basis of present knowledge, constructed only by the enigmatic Bananaquit, the taxonomic affinities of which have, until recently, been disputed, and by members of the genera *Chlorophonia* and *Euphonia*, both of which have now been found to be unrelated to other thraupids (see Systematics). The nest of the Bananaquit differs from that of all other tanagers in being thick-walled, entirely enclosed, ovoid or globular in shape, and with a small, downward-facing entrance opening near the bottom. There is considerable variation in its size and shape, and it may be placed low or high and often in a rather exposed position. The construction material is equally variable, and can consist of whatever is immediately available, including coarse or fine vegetable fibres, grass, bamboo leaves, strips of leaves and pieces of vines, weed stems, tendrils, thin papery bark and moss. Bananaquits are energetic nest-builders and both sexes build auxiliary nests for sleeping. These "dormitory nests" resemble breeding nests, but are usually less well constructed. Females, when not nesting, also may use old nests as dormitories for extended periods of time.

Nests of tanagers are usually built by both members of a pair, although females, especially those of *Tangara*, typically contribute much more material than males and carry out all or most of the building work. In case of the Red-legged Honeycreeper, all nest construction is performed by females. The length of time required for building is known for only a few species and generally varies within the range of about 3–6 days, but it can sometimes take longer. Factors that influence the length of time required for nest construction are unknown. Bananaquit nests, although considerably more substantial than the cup-nests of other tanagers, are built by a single industrious individual or a pair in 4–5 days. For most species studied by Skutch in Costa Rica, more nest-building took place during the morning hours than in the afternoon. The Red-legged Honeycreeper was exceptional in that it brought in nest material mainly during the hours of late morning and early afternoon. The rates of delivery of nest material varied widely. A female Red-legged Honeycreeper brought material 11–14 times per hour during mid-day periods, but her rate of construction was irregular and long periods passed with no building work done. A female Silver-throated Tanager watched by Skutch in Costa Rica was observed bringing material to a nest a record 68 times during a two-hour period between 06:25 hours and 08:25



Piranga *tanagers build rather frail, poorly constructed nests. That of the* **Lowland Hepatic-tanager** *is a flattish cup, loosely woven from dry leaves, roots and grass stems. In some* Piranga *species the female is said to build the nest alone, accompanied by her mate; in others, the male is recorded as carrying material to the female as she builds the nest. Here, the male appears to be involved in nest-building, too, while the female waits her turn.*

[*Piranga flava saira*, Estrada BR-153 Km 8, Palmeirante, Tocantins, Brazil. Photo: Dante Buzzetti]



The nest of the ***Black-legged Dacnis*** *differs markedly from those described for congeners such as the Scarlet-thighed Dacnis* (Dacnis venusta) *and Yellow-bellied Dacnis* (D. flaviventer), *which are frail, shallow open cups supported by branches. One Black-legged Dacnis nest, in Intervales State Park, in São Paulo, Brazil (the location of this picture), was situated about 6 m above the ground and attached to at least two twigs in the crown and outermost part of a narrow-trunked* Rapanea ferruginea *tree. It was made chiefly from live* Usnea *lichen. Dangling lichen completely hid the egg-chamber, which was a compact, hanging pouch-like structure, as in the nest shown here, apparently completely enclosed except for a small entrance hole. Another nest described was a partially concealed, basket-like cup 5–8 cm in diameter, suspended from epiphytes 20 m up and half-way out on a limb of a large* Schizolobium parahyba *tree in a cacao plantation. Black-legged Dacnis nests are sometimes built relatively close to one another (in one case as close as 15 m), with no aggression between pairs. It has been suggested that this species may nest in loose groups close to favourable food resources. The nest of the Blue Dacnis* (D. cayana) *also differs from those of its congeners, being a deep, almost pouch-like cup of soft fibres and seed down, suspended between leafy twigs in the outer parts of trees.*

[*Dacnis nigripes*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo]

hours and again 13 times during a 24-minute period from 15:30 to 15:54 hours. At a rate of a little more than once every two minutes, including time spent arranging nest material, this likely represents close to the upper limit possible for any bird, unless construction material is immediately at hand. During a six-hour period, the male made only 4–5 contributions to his mate's industrious efforts, but he was seen to feed her 5–6 times and she was possibly fed more. Male tanagers regularly accompany females to nest-sites, even when they do not bring material. Males of *Thraupis* tanagers and of the Grey-headed Tanager help with nest construction, but the nests of *Ramphocelus* tanagers are built entirely by females.

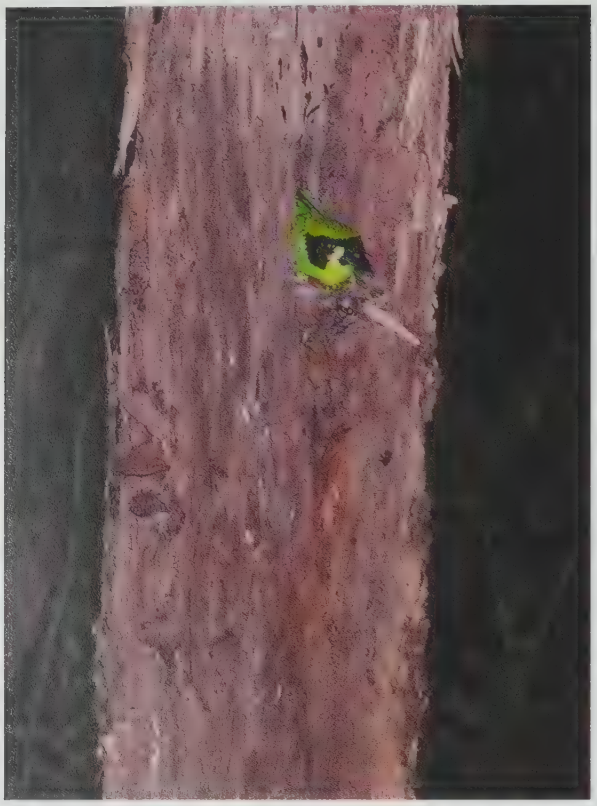
Above-ground height of tanager nests is only weakly correlated with the stratum in which the species in question forages. Edge, garden and undergrowth species, such as *Ramphocelus* tanagers and the Grey-headed, White-lined and Diademed Tanagers (*Stephanophorus diadematus*), forage low down and usually build their nests within a few metres of the ground. Species that forage well above ground along forest borders and in light or semi-open woodland may locate their nests somewhat higher. Three nests of the Hooded Tanager, for example, were all placed 8–10 m up and in semi-open situations. On the other hand, nests of tanagers inhabiting the canopy or subcanopy are recorded at both high and low levels. A White-throated Shrike-tanager (*Lanio leucothorax*) nest in Costa Rica was found in a low bush near a forest stream, even though this species is most frequently found at middle heights or higher in rainforest. The only reported nest of the Green-and-gold Tanager, a subcanopy and canopy species in Amazonia, was sited only 2 m up inside rainforest in south-eastern Peru. Similarly, a nest of the White-shouldered Tanager in Trinidad was located only 1–1·5 m above ground in the forest undergrowth; it is worth noting, however, that in Trinidad this species occurs both high up and low down inside forest, and thus occupies a much broader niche space than on the mainland, where it is usually at middle levels or higher and often near forest treefall openings. In Costa Rica, nest heights of the Silver-throated and Golden-hooded Tanagers, two species that typically forage at middle levels or above, varied widely, ranging from 1 m to 28 m above the ground, and nests of Blue-grey Tanagers have likewise been recorded from ground level to 30 m up. The highest recorded tanager nests appear to be one of a Paradise Tanager, a canopy and emergent-tree specialist in Amazonia, which was located 31 m up in a small outer branch of a kapok tree (*Ceiba pentandra*) in south-eastern Peru; and a nest of a Grey-and-gold Tanager estimated at 30–32 m up on a mossy branch in the valley of the Anchicayá River, in west Colombia. Some *Euphonia* nests are even higher up, as detailed at the end of this section. The nests of several Amazonian/Guianan treetop tanagers, including the Red-billed Pied Tanager and the Blue-backed Tanager (*Cyanicterus cyanicterus*), remain undiscovered and may be placed even higher; both of those species are almost always found very high up in rainforest. At least two species of *Chlorospingus* and a half-a-dozen or more of *Euphonia* are known to build nests at ground level on the tops or sides of roadbanks, but none build on flat, level ground and few other tanagers, as traditionally classified, nest on the ground. One exception is the Red-shouldered Tanager, a savanna-scrub species that has been reported as nesting on the ground in Suriname. Several species, including the Black-faced Tanager, Masked Crimson Tanager, Black-goggled Tanager and Grey-headed Tanager, are known to nest close to the ground on occasion. The Black-and-white Tanager has been suspected of nesting on or close to the ground and in grass, but its nest remains undiscovered.

Clutch size is known for a small number of tanagers and appears to vary with latitude, much as reported for other passerines. In general, the average number of eggs laid by tanagers in lowland tropical latitudes is two, or occasionally three. Clutch size increases to 3–4 at the edge of or beyond tropical latitudes. Two species in southern Brazil, namely the Black-goggled Tanager, which also has a separate Andean population, and the Golden-chevroned Tanager, the ranges of which lie close to the southern border of the tropics, often have clutches of three eggs, as does the Yellow-winged Tanager (*Thraupis abbas*) in Mexico, at the northern end of the tropics. In Costa Rica and Panama, Skutch reported that in more than 30 nests of Blue-grey Tanagers the clutch was always of two eggs, but, of three nests in Guatemala, two contained clutches of two and the third held three eggs, suggesting that a slightly larger clutch might be expected in the more northerly country. In temperate latitudes of central Argentina, the Diademed Tanager, Blue-and-yellow



All published information about the breeding of the ***Red-necked Tanager*** *comes from captive birds, which are reported as building deep cup-shaped nests of grass. The materials used by this wild bird seem quite different, including large leaves and the shoots of vines or creepers; and video material available at the Internet Bird Collection shows a nest that appears to consist mainly of slender twigs. The available information on captive birds does not extend to whether one or both of the pair were involved in building the nests. The female alone incubates the eggs, but both sexes feed the nestlings.*

[*Tangara cyanocephala corallina*, Alagoas, Brazil. Photo: Anita Studer]



Although a number of tanager species have occasionally been recorded as breeding in holes, only the Swallow Tanager (Tersina viridis) *does so habitually. The few nests of the* ***Green-and-gold Tanager*** *that have been described previously have been placed low down (from 75 cm to 2 m), well concealed and woven tightly to the base of a palm frond or fern. One was at the base of an* Asplenium serratum *fern, 1·8 m above the ground, in an unknown understorey tree. The cup-shaped nest was made from rootlets and dried fronds and attached at its bottom by fern rootlets and old fern petioles.*

[*Tangara schrankii schrankii*,
Serranía del Tigre, Bolivia.
Photo: Bennett Hennessey]

Tanager and Sayaca Tanager typically lay four eggs. Two striking exceptions to this pattern of increasing clutch size with increasing latitude, however, suggest that clutch size may be more complex than a simple geographical pattern. The White-rumped Tanager, a widespread species of *cerrado* mixed grassland and scrub in south-central Brazil, and still well within tropical latitudes, lays clutches of four or, less often, three eggs. The Swallow Tanager, a hole-nesting species that breeds in mountainous regions across northern Venezuela and southward in the Andes, also lays 3–4 eggs. Cavity-nesting species typically have higher rates of fledging success, an advantage offset by the fact that suitable holes or cavities are often in short supply. The large clutch size of the Swallow Tanager may have less to do with geographical variation than with selection factors resulting from nest-site choice. White-rumped Tanagers, however, build open cup-nests, as do most other tanagers. Larger clutch sizes are well documented for all species of *Chlorophonia* and *Euphonia*, as well as for North American breeding *Piranga*, and these species, now believed to belong in other families (see Systematics), are discussed at the end of this section.

Clutch size information exists for so few species of true tanager that, beyond the small number of examples cited above, few meaningful generalizations can be made. There is, for example, very little information on the clutch size of tanagers occurring at high elevations within tropical latitudes. Does clutch size increase with declining average temperatures, or does it vary between arid and humid regions, or between forest and grassland? For a family of which so many species, especially in the Andes, are so eagerly sought by avid birders and other naturalists, the lack of breeding data is remarkable. Breeding data are almost completely lacking for most species of high-Andean genera, including *Buthraupis*, *Anisognathus*, *Iridosornis*, *Dubusia*, *Cnemoscopus*, *Hemispingus*, *Urothraupis* and *Thlypopsis*, as well as highland species of *Dacnis* and *Conirostrum*. Aside from Skutch's study of the Slaty Flowerpiercer in Central America, there is an almost complete absence of breeding data for *Diglossa*, another large, predominantly high-Andean genus.

From the limited information available, tanager eggs are slightly to heavily pigmented. The ground colour can be cream or white, but is more usually pinkish, grey, bluish-white, pale to bright blue, blue-green or other, similar shades or combinations, and is almost invariably marked with fine to coarse spotting, blotches or scrawls of reddish, purple, lilac, brown or black; the markings are often more heavy, forming a dense wreath, at the larger end of the egg. The cavity-nesting Swallow Tanager is an exception in that its 3–4 eggs vary from being completely white to being lightly marked with dark spots and scrawls, a pattern typical of most hole-nesting species, which also typically have white eggs.

So far as is known, incubation is undertaken solely by female tanagers, although data are available for only a relatively small number of species. An exception is provided by the Rosy



Euphonias and chlorophonias build covered nests, rather than the open cups constructed by most thraupids. The euphonias include some species which nest near the ground, and others which nest higher in the canopy than any known tanager species. The ***Violaceous Euphonia*** *builds a globular nest with a side entrance, usually well concealed among epiphytes or vines. Occasionally nests have been found in niches high on mossy, well-vegetated roadside banks. Violaceous, Thick-billed* (Euphonia laniirostris) *and Golden-sided Euphonias* (E. cayennensis) *have all been documented as using nests of other birds, refurbishing these for their own purposes.*

[Euphonia violacea violacea,
Fazenda Nordisk,
Marabá, Brazil.
Photo: Dante Buzzetti]

Thrush-tanager, an odd species the taxonomic affinities of which have been questioned and which may ultimately be removed from the family. In Venezuela, male Rosy Thrush-tanagers have been reported to incubate eggs, alternating stints with the female. Information on the time of day at which tanagers lay their eggs is based on the studies of Skutch, who noted that eggs were most frequently laid in the early morning between 05:30 and 06:30 hours, and that incubation started on the day when the last egg was laid.

Similarly, data on the constancy of incubation stem mostly from the work of Skutch, whose detailed life-history studies included no fewer than 13 species of tanager in Costa Rica and a further eight species formerly regarded as tanagers. Females generally incubate throughout the night, as well as during much of the day. During a watch of over 12 hours, the incubation constancy of a female Speckled Tanager was 79·8%, among the highest of any tanager that Skutch observed. During that period, the female had 14 incubation sessions each of 30–53 minutes, the average session lasting for 39·7 minutes. Between incubation stints she took rests ranging from 2 to 27 minutes, with an average recess time of 10·1 minutes. During this same period of time, the male fed the female ten times, nine of which were at the nest and the other when she was nearby. Data collected during a second all-day nest observation yielded similar results, the longest incubation period being of 77 minutes, and the longest period of "egg neglect" only 23 minutes. Data for other species of tanager studied by Skutch, including the Blue-grey, Grey-headed, Cherrie's, Crimson-backed, Golden-hooded, Plain-colored and Silver-throated Tanagers, the Green, Red-legged and Shining Honeycreepers (*Cyanerpes lucidus*), the Slaty Flowerpiercer and the Bananaquit, are similar, but with somewhat lower incubation constancy. The lowest incubation constancies were recorded for the Grey-headed Tanager and a female Blue-grey Tanager, with respective averages of 62·6% and 66·2%. The low incubation constancy observed for Grey-headed Tanagers may be associated with this species' behaviour of preferentially foraging with army-ant swarms, which may be distant from the nest-site, thus requiring longer commuting times and possibly also additional time involved in searching for swarms. Male tanagers were not observed to feed their mates at or near the nest during these watches. Incubation constancies calculated by Skutch were obtained largely during periods of fair weather. The data gathered during two rainy afternoons were dramatically different, when one female Shining Honeycreeper incubated continuously for 179 minutes and, between 13:00 and 18:00 hours, was absent from her eggs for only 12 minutes during the entire five-hour period. During a second period of observation, this same female incubated continuously for 4 hours and 2 minutes, from 14:21 hours until nightfall, sitting through an hour and a quarter of rainfall. Overall, the incubation constancy of tanagers observed by Skutch in Costa Rica varied within the range of about 60–80% of daylight hours.



*The leaf collected by the **Scarlet-rumped Tanager**, pictured earlier (see page 126), forms part of the nest here, and the same bird, a female, is now incubating her eggs. As with almost every tanager species, incubation is undertaken solely by the female, attended and fed to some extent by her mate. The Scarlet-rumped Tanager lays two eggs, rarely three, on consecutive days. The eggs are pale greyish-blue or, more uncommonly, greenish-blue, and marked with small black or brown spots, or fine irregular lines, mainly around the larger end. The incubation period for this species is twelve days.*

[*Ramphocelus passerinii*, Costa Rica. Photo: Marco Saborío]



*In Taquaritinga do Norte, in Pernambuco, Brazil, on 21st January 2000, five different pairs of **Seven-colored Tanager** were seen nest-building in different arboreal bromeliads up to 15 m above the ground. The total area which they occupied was slightly larger than 500 m^2, suggesting that breeding territories are relatively small. It appears that for breeding this species needs large bromeliads and cannot survive in secondary forest without them; conversely, it has been observed in gardens and orchards with bromeliad-laden trees. Its already small range in Brazil's Atlantic Forest is shrinking fast and numbers are also caught for the cagebird trade. This species is listed as Vulnerable.*

[*Tangara fastuosa*, Alagoas, Brazil. Photo: Anita Studer]



Among tanagers, as with other passerine families, clutch sizes are smaller in the tropics than at higher latitudes. There appears, however, to be no information as to whether the clutch size of the ***Lowland Hepatic-tanager*** *varies from the tropical north of its range, in Guyana and Suriname, to southern Brazil, Paraguay and Uruguay. The Highland Hepatic-tanager* (Piranga lutea), *traditionally considered conspecific with the Lowland species, produces two eggs in Trinidad, and the Northern Hepatic-tanager* (P. hepatica), *also often treated as a race of "Hepatic Tanager", produces up to five eggs (average four) in the southern USA.*

[*Piranga flava saira*, Minas Gerais, Brazil. Photo: Anita Studer]

Incubation periods for most tanager species vary from about 12 days to 14 days, with occasional records of 15 days. In a possible exception to this, the hole-nesting Swallow Tanager is reported as having an incubation period of 13–17 days. Nestling periods are variable, but the shortest times are for species that nest low down, that of *Ramphocelus* in Costa Rica, for example, being only 11–13 days. Otherwise, *Tangara* species have a nestling period of 13–16 days, the Bananaquit one of 17–19 days, and *Thraupis* 16–20 days. Even longer nestling periods were recorded for *Euphonia* and *Chlorophonia* (see end of this section), both of which build relatively "safe" covered nests and regurgitate mainly a low-protein diet of fruit pulp to their nestlings.

On hatching, the altricial tanager nestlings are blind and have only minimal natal down. They are brooded only by the female, but fed by both sexes. The feeding efforts of the male parent are variable, typically less than those of the female initially but, in some instances, exceeding the contribution of the female when the nestlings are older. For almost all species reported, the nestlings are at first fed primarily with arthropods, especially insects, but as they grow their parents bring a mixed diet of arthropods



Tanager nestlings are at first fed primarily with arthropods, especially insects. But as they grow, their parents bring a mixed diet of arthropods and fruit, the proportions perhaps depending on whether the adults are more insectivorous or more frugivorous. Birds given mostly animal food tend to grow more quickly. The rather long nestling period of the ***Palm Tanager***, *17–21 days, may suggest that the young are fed mostly on a low-protein diet of fruit. This adult is accumulating fruit to take back to the nest.*

[*Thraupis palmarum melanoptera*, Coroico, La Paz, Bolivia. Photo: Joe Tobias]

and fruit. Helpers, which are believed to be the breeding pair's offspring from previous broods, are reported for a number of *Tangara* tanagers, including the Golden-hooded, Golden, Plain-colored, Turquoise, Azure-rumped and Rufous-throated Tanagers, as well as for the White-capped Tanager and the Red-throated Ant-tanager, the last-mentioned now believed to be more closely related to cardinalids than to the Thraupidae (see Systematics).

Territorial defence of nest areas is weakly developed in most tanagers, and almost non-existent in *Ramphocelus* tanagers. In Costa Rica, Skutch recorded that nests of Cherrie's Tanagers were occasionally only a few centimetres to a few metres apart, while in other cases they were widely separated. Regardless of spatial separation of nests, pairs or members of groups displayed little or no aggression towards one another. The clearest evidence of territorial behaviour derives from the *Diglossa* flowerpiercers and the Tit-like Dacnis (*Xenodacnis parina*), which breed in patchy, stunted woodlands at high elevations. Flowerpiercers, many of which are highly nectarivorous, are notably territorial when breeding. When not breeding, pairs separate on individual feeding territories, which continue to be aggressively defended but are somewhat fluid, depending upon the distribution of suitable nectar resources. Territoriality of many flowerpiercers extends to conspecifics and, when not breeding, even to individuals of the opposite sex, which often hold separate territories. In addition, flowerpiercers attempt to exclude hummingbirds from their territories, although large hummingbirds may dominate smaller species of *Diglossa*. In Mérida, in south-west Venezuela, Sparkling Violetears (*Colibri coruscans*) have been seen aggressively supplanting Merida Flowerpiercers in flower gardens.

Distraction displays, or feigning displays, towards potential nest predators are almost unknown for tanagers. Skutch noted that, on rare occasions, an adult Grey-headed Tanager gave a rather poor feigning display when a human visited a nest. He also noted that an adult Golden-hooded Tanager once became very agitated and emitted forceful "chip" notes as he examined a nest, but he did not observe any injury-feigning display. E. O. Willis reported a weak distraction display for the Red-throated Ant-tanager.

Observations of a single pair making more than one nesting attempt during a breeding season have been reported for several tanagers in Costa Rica, but a number of factors may determine how frequently this occurs and, furthermore, there is little information on second-brood attempts from the Andes or Amazonia. True second broods, in which a second nesting is attempted following a previously successful nesting, are probably less frequent in occurrence than are incidents of renesting following nest failure. Skutch, however, documented more true second broods than replacements for Golden-hooded Tanagers, but he reasoned that nest failures more often resulted in a pair moving some distance away, where he was unable to detect them. For Cherrie's Tanager, renesting attempts following failure were common, so frequent in fact that Skutch stated "These birds lose so many nests to predators that they probably could not maintain their population if they did not try repeatedly to rear a brood." Golden-hooded Tanagers, too, often attempted to raise true second broods, and sometimes even third broods, in a season. Intervals between the departure of a brood and the next laying period were usually short, in the range of about 9–23 days, but occasionally much longer. In the case of one very short nine-day interval, the parent pair began to build a second nest nearby only two days after fledging one young from the first nest. In the case of Cherrie's Tanagers, females often built new nests a few metres away from preyed-on nests, and the interval between the loss of nest contents and the laying of the first egg of a replacement clutch was only about 7–10 days. In Costa Rica, Grey-headed Tanagers frequently built replacement nests following nest failures. Intervals between failure and the laying of the first egg of a new clutch were on average about 7–9 days, but occasionally more than three weeks. One pair made three attempts in quick succession, with intervals of only 8–9 days between renesting attempts, and successfully fledged two young from the third nest. Silver-throated Tanagers, which have one of the highest fledging successes reported, often raise two and possibly three broods during their long March–September breeding season in Costa Rica. Intervals between the departure of one brood and the first eggs of another breeding attempt varied from eight days to 45 days.

Golden-hooded Tanagers commonly reuse a nest even after losing eggs or nestlings in an earlier attempt. So strong is site-fidelity that Skutch documented several examples in which a pair used the same nest three times. In one remarkable example, a pair built a nest 2 m up in a small orange tree, but never laid in it. In the next year, the tanagers built a new nest in exactly the same site, reared one young to fledging, and twelve days later laid the first of two more eggs, which subsequently disappeared. This twice-used nest then remained empty for 78 days, before being



*Living in semi-open areas, the **Black-faced Tanager** places its nest low down, sometimes in grass. There is little other information on the breeding of this species or its congener, the Cinnamon Tanager* (Schistochlamys ruficapillus)*, except that both lay two eggs. This bird is approaching the nest with a beak full of insects. The diet of this species seems evenly divided between animal and vegetable matter. One pair fed regularly on small, very hot peppers, though one imagines that, as with humans, the taste for these is likely to be confined to the adults.*

[*Schistochlamys melanopis olivina*, São Carlos, São Paulo, Brazil. Photo: Haroldo Palo]



Flying insects, particularly wasps and ants, make up a high proportion of the prey of the ***Western Tanager*** *when they have young. This species also takes advantage of termite (Isoptera) mating flights. A study of Western Tanager nests in Boulder, Colorado, found that nesting success varied annually, from 11·3% in 2000 to 75·3% in 2001. Predation was the primary cause of failure. Parasitism by Brown-headed Cowbirds* (Molothrus ater) *occurred in seven of 17 nests found during egg-laying or incubation. Clutch size averaged 3·8 in ten unparasitized nests, but only 2·4 in eight parasitized nests. Brood parasitism dramatically reduced the number of fledglings produced per nest.*

[*Piranga ludoviciana*, USA.
Photo: Kevin Smith/VIREO]

remodelled. Two more eggs were once again laid, but this third attempt also failed when the nestlings abruptly disappeared.

Comparisons of nesting success of thraupids reveal surprising variability among species. Of 35 Golden-hooded Tanager nests in Costa Rica for which the success, in terms of fledging at least one young, was known, 25 failed, yielding a low success rate of just 28·6%. Of 21 nests found before incubation began, the success rate was even lower, at 23·8%. The hatching success of 40 eggs was 57·5%, but the percentage of eggs that produced fledglings was only 20%. For hatched eggs, the percentage of hatchlings that fledged was 34·8%, somewhat higher than the overall nesting success. By whatever criteria are applied, the nesting success of Golden-hooded Tanagers is remarkably low. Comparable figures for the Silver-throated Tanager, a more forest-based species found in the same area, were substantially higher, including an overall nest success of 54·3%, and a success rate of 50% for nests found before the incubation stage; hatching success was 59·6%, and 44·7% of eggs produced fledglings. Moreover, the success rate for hatchlings rose to 75%, more than double that of the Golden-hooded Tanager. These examples, both based on the sample of 35 nests with known outcome, may represent extremes for tanagers, with Golden-hooded Tanagers among the least successful and Silver-throated Tanagers among the most successful. The reasons for such disparity, however, are difficult to identify with present knowledge and are unlikely to be revealed without substantial samples from other areas, especially from sites where the impact of human-caused environmental factors in minimized.

Skutch presented similar nesting-success data for other tanagers, verifying that overall nesting success is low, but generally somewhere between the values for the Golden-masked and Silver-throated Tanagers. Thus, of 163 nests of Cherrie's Tanager, only 38·6% were successful and 41·5% of eggs produced fledglings; the percentage of eggs that hatched was 58·4%, and the percentage of hatchlings that fledged was 71%. Of 24 Grey-headed Tanager nests of known outcome, 37·5% produced at least one fledgling, a rate remarkably similar to that of Cherrie's Tanager. A lower hatching rate, of only 49%, was attributed by Skutch to the female Grey-headed Tanager's longer incubation recesses, sometimes more than an hour, and an incubation constancy of only 62·6%, which Skutch believed to have resulted from the greater distances over which females of this habitual army-ant follower might have had to commute to find food, as well as the species' notably thin nest, which failed to provide insulation for the eggs.

Predation is suspected in the cause of many nest failures of tanagers, but, because it is seldom observed, the identity of the predator can rarely be proved. When nest contents are removed without evidence of damage to the nest or without any trace of feathers or eggshells, snakes are often implicated; this is because they swallow nest contents whole and are unlikely to damage the nest itself. When damage is evident, or fragments of eggshell, skin or feathers are present, mammalian predators are suspected. Predation of nest contents by other birds is more difficult to trace, because of the variable nature of attacks. An extreme example from Costa Rica illustrates the problem of verifying avian nest predation. In this case, Skutch watched an American Swallow-tailed Kite (*Elanoides forficatus*) as it swooped down and snatched an entire nest with nestlings of a Golden-hooded Tanager; circling overhead, the kite extracted the nestlings and then dropped the nest, allowing it to float earthwards at some distance. The open cup-nests of tanagers offer little protection from predators beyond being well hidden in foliage or placed in cryptic sites, such as within hanging clumps of moss. Enclosed nests of Bananaquits, as well as those of *Chlorophonia* and *Euphonia* species, may offer additional protection because the nest contents are completely encapsulated and the small nest opening may be difficult to locate. Unfortunately, there is little information on the nesting success of Bananaquits, and it is not known whether their better-built nests lead to increased success rates.

Brood parasitism by Shiny Cowbirds (*Molothrus bonariensis*) has been reported for at least eight species of tanager, and it is probable that a few others are occasionally victimized. Cowbird parasitism may affect relatively few species of tanager, however, because most do not occur in the open habitats preferred by the cowbirds. Fly larvae (Diptera) are occasional parasites of nestlings. For example, Skutch reported that the head of one nestling Grey-headed Tanager appeared infected with fly larvae.

Information on the length of the post-fledging dependency period is spotty. In Costa Rica, Skutch reported that young Bananaquits, once they leave the nest, are rarely seen again in the company of their parents. On the other hand, Silver-throated



Euphonias and chlorophonias build covered nests. So far as is known, females of both genera lay clutches of four eggs, which is twice as many as small tropical passerines that build open cup-nests, as do the majority of tanagers. The ***White-lored Euphonia****, an Amazonian forest-canopy species, regularly nests 30–35 m above ground. Its football-shaped nest is hidden in recesses in clumps of epiphytes, especially on the sides of large branches of emergent kapok trees* (Ceiba pentandra)*, among moss or ferns, or on the sides of spiny palm trunks. Because the nests are high out of sight and well concealed, there are few data on breeding for this species. For other euphonia species, however, both incubation and nestling periods are known to be much longer than in the majority of "true" tanager species. One clutch of the Spot-crowned Euphonia* (Euphonia imitans)*, for example, was incubated for 18 days, and the nestling periods in the Thick-billed* (E. laniirostris) *and Violaceous Euphonias* (E. violacea) *are up to 21 days. The nestlings are fed mainly with fruit pulp regurgitated by the adult, a low-protein diet which explains the slow maturation compared with true tanagers. The chicks of both* Chlorophonia *and* Euphonia *are typically not feathered until they are 15 or more days old.*

[*Euphonia chrysopasta*, Cristalino Jungle Lodge, Alta Floresta, Mato Grosso, Brazil. Photo: Dante Buzzetti]



In a study of the parental care of the ***Black-capped Tanager*** *in north-eastern Ecuador, the adults contributed with an almost equal amount of food, the male making slightly more visits (53·1%). Each nestling was fed at an overall rate of about six times an hour. The female generally brooded the young after bringing food to them, and the male sometimes passed to her the food which he brought but usually fed the young directly. On the day of hatching, both adults regurgitated food for the nestlings; after this, they fed them with whole insects and small berries, and a pale "mush" probably consisting of mashed* Cecropia *fruit.*

[*Tangara heinei*, La Planada Nature Reserve, Nariño, Colombia. Photo: Patricio Robles Gil/ VIREO]

Tanager fledglings hide in foliage and continue to be fed by their parents, initially by both sexes and later primarily by the female, for a period of days to weeks. Skutch observed young Silver-throated Tanagers in Costa Rica being fed until late October, well beyond the breeding season, which ends by September. Young Cherrie's Tanagers fly weakly on leaving the nest, and they remain mostly hidden in shrubbery and thickets while their parents continue to bring food to them for two to three weeks, the female again being the more attentive of the two parents. In Costa Rica, a marked fledgling of this species only two weeks out of the nest, and 27 days old, began to feed itself. In the Andes, dull juvenile *Tangara* and members of other highland genera remain with their parents for a few weeks to, possibly, several months, and are frequently seen accompanying the adults to fruiting trees and foraging with them in mixed-species flocks. The age at which tanagers first breed is unknown, but it is likely to be at about one year old.

The breeding behaviour of genera traditionally placed in Thraupidae, but found in recent studies to be genetically closer to other families (see Systematics), is worthy of examination. The genera concerned are *Euphonia*, *Chlorophonia*, *Chlorospingus*, *Mitrospingus*, *Rhodinocichla*, *Piranga*, *Habia*, *Chlorothraupis*, *Spindalis* and *Calyptophilus*. Many aspects of the breeding behaviour of these genera resemble those of the true tanagers. Differences are most pronounced in *Chlorophonia* and *Euphonia*, all members of which construct well-made, enclosed, globular nests with a small entrance on the side. *Chlorophonia* species build nests in branch forks or crevices, usually well above ground, but occasionally in vegetation on a steep bank. *Euphonia* species nest at almost any height from ground level on road cuttings to the canopy of some of the tallest trees. Their nests are typically well hidden, wedged into crevices, tucked into moss beneath limbs, amid epiphytes and vines on the sides of trunks or large limbs, or occasionally in holes in posts. The Blue-hooded Euphonia (*Euphonia elegantissima*), Golden-rumped Euphonia, Thick-billed Euphonia and Yellow-throated Euphonia also frequently utilize mossy and vegetation-covered roadside banks as nesting sites. Such sites on steep banks are invariably well up on the side of the bank or on the top of it and represent, in a sense, elevated nesting sites. No member of either genus is a true ground-nesting species. A few euphonias are known to usurp old nests of other birds, especially of tyrant-flycatchers. The Thick-billed, Violaceous and Golden-sided Euphonias (*Euphonia cayennensis*) have all been documented using nests of other birds on multiple occasions, refurbishing these for their own purposes.

The White-lored Euphonia, an Amazonian forest-canopy species, regularly nests 30–35 m above ground, and is one of the few small oscine passerines to nest so high on a regular basis. During the early hours of the morning, both members of a pair regularly bring fibrous material for their nests, which are hidden in recesses in clumps of epiphytes, especially on the sides of large branches of emergent kapok trees. Both sexes of *Chlorophonia* and *Euphonia* participate in building the nest, but only the female incubates. So far as is known, females of both genera lay clutches of four eggs, less often three; this is almost twice that of small tropical passerines that build cup-nests. The incubation period is comparatively long, at 17–18 days. In Costa Rica, a female White-vented Euphonia covered the eggs for about 65% of the day. The young, which are almost completely naked on hatching, are fed by both adults, which often arrive together to feed them, although only one parent at time approaches the nest, the male usually taking the first turn. Nestlings are fed mainly with fruit pulp, regurgitated by the adult. The low-protein diet results in slow maturation compared with that of true tanagers. The chicks of both *Chlorophonia* and *Euphonia* typically are not feathered until they are about 15 days of age or more. After hatching, the nestlings of a female White-vented Euphonia were brooded at night only for about the first week; thereafter, they were left alone at night, despite their lack of feather development.

Young euphonias leave the nest at between about 17 and 24 days of age. Those of chlorophonias, which are fed almost entirely with fruit, leave at up to 23–24 days. In Costa Rica, Skutch noted that even at 11 days, an age at which most tanagers were feathered and nearly ready to fly, the young White-vented Euphonias were still nearly naked. Feathers on the back and wings began to expand when they were about 13 days old, and at 15 days most of their upper surface, except the head, was covered with feathers.

In their breeding behaviour, *Piranga*, *Mitrospingus*, *Chlorospingus* and *Habia* do not differ greatly from most true thraupids. Members of the genera *Piranga* and *Habia* build rather frail, poorly constructed nests, and the best-known *Chlorospingus* species, the Common Bush-tanager, builds large bulky nests of moss, ferns, dry grass and dead-leaf fragments and, like *Chloro-*



*The **Golden-browed Chlorophonia** perches below the side entrance of its globular nest to feed its downward-leaning young. The young are fed with regurgitated fruit pulp, which the adult produces with an upward and forward movement of the head, accompanied by a gape. The adults regurgitate several batches at each visit, enabling them to feed more than one chick, and sometimes all of them. With this low-protein diet, the nestling period is extremely long for such a small passerine, at 23–25 days. These chlorophonias may begin raising a second brood within two weeks of fledging the first.*

[*Chlorophonia callophrys*, Monteverde Forest Reserve, Costa Rica. Photo: Michael & Patricia Fogden]

phonia and *Euphonia*, occasionally nests at ground level on a steep bank. *Habia*, containing the ant-tanagers, appears to be the only genus for which even a weak distraction display is reported. Willis reported an example of bigamy by the Red-throated Ant-tanager, a male of which mated with two females, these then laying eggs in separate nests. Interestingly, Skutch also reported a case of bigamy by a true thraupid, the Blue-grey Tanager, in which two females laid a total of four eggs in the same nest, and both females incubated and fed the young. In this example, the dominant female assumed a much larger role in all nesting activities, spent more time in incubating, and also brought more food to the nestlings; the single male accompanying these two females followed each one sequentially during incubation, and more often accompanied the dominant female when feeding the young.

Nest helpers have been documented for the Red-throated Ant-tanager in Belize. The helpers were dull-coloured and presumed offspring of a previous generation. In the case of *Mitrospingus*, Skutch found that four or possibly five Dusky-faced Tanager adults fed the same young, and the food items apparently consisted only of insects.



*Observations suggest that the adult **Palm Tanager** feeds the nestlings at least partly by regurgitation. Palm Tanagers often raise multiple broods; in Trinidad, where they nest in all months, pairs have been known to breed four times in a year, with intervals of 1·5–6 weeks between broods. Palm Tanager nests are sometimes parasitized by Shiny Cowbirds* (Molothrus bonariensis). *In one nest in Brazil, two cowbirds and one Palm Tanager hatched; after twelve days one cowbird was left, weighing 33 g. Palm Tanagers have also been seen to feed fledgling cowbirds.*

[*Thraupis palmarum atripennis*, Anorí, Colombia. Photo: Joe Tobias]



*Both **Palm Tanager** parents may be present on the nest at the same time, the later arrival waiting for the first to finish. Nest helpers, presumably the young of the previous season, have been observed to feed nestlings in some species of* Tangara, Habia *and* Mitrospingus, *but not in* Thraupis. *In Costa Rica, however, one male and two female Blue-grey Tanagers* (Thraupis episcopus) *attended a nest with four eggs. Both females incubated and all three adults fed the young.*

[*Thraupis palmarum palmarum*, Mato Grosso, Brazil. Photo: Anita Studer]

Few long-term studies have been conducted on the longevity and site-fidelity of tanagers. The mark-recapture work by the Snows from 1957 to 1961, and later by A. Lill from 1967 to 1971, at about 150 m elevation on the island of Trinidad provides an important published source of information on these aspects with regard to wild-trapped tanagers. While the exact age at the time of first capture was known for only a few birds ringed as juveniles, minimum ages were calculated to the nearest 0·5 years and included the following: one Bay-headed Tanager 5 years old; one Blue-grey Tanager 7 years old; one Palm Tanager 9 years old; and two Silver-beaked Tanagers, one at least 8 years of age and the other exactly 9·5 years old. Furthermore, the first three species were recaptured at the sites where they had first been caught, providing evidence of remarkable site-fidelity. The two Silver-beaked Tanagers were recaptured about 700–800 m and 200–300 m from their original capture sites. Sight records of a ringed White-lined Tanager indicated an age of at least 6–7 years. These data clearly indicate that the species concerned are capable of reaching a considerable age in Trinidad. The highest (minimum) ages at latest recapture ranged from 5 to 11 years for 19 individuals of 13 other species of mostly small insectivorous and omnivorous bird in Trinidad, and these figures are probably representative of many small Neotropical passerines. From a much larger sample of White-bearded Manakin (*Manacus manacus*) recaptures at the same sites as those where the tanagers were ringed, Snow and Lill estimated an annual survival rate of 79–89%, the higher figure believed to represent the more accurate rate. A similar rate may apply to many small Neotropical species, including tanagers, living in forest and forest edge.

A larger data set, comprising some 8500 ringing records, was compiled by H. Loftin from several sites in Panama between 1962 and 1974. For the Silver-throated Tanager Loftin reported eight longevity records, ranging from a minimum age of 2 years 8 months to a maximum of 7 years 6 months. This last individual, from near Cerro Punta, was also caught at least four times between the first and last dates of its capture, always at the same locality. The oldest ringed tanager recovered was a Blue-grey Tanager, found dead 9·5 years after it had first been ringed and less than 1 km from the original ringing site. Other longevity records included a Palm Tanager with a minimum age of 3 years 1 month, five Crimson-backed Tanagers ranging in age from 2 years to 3 years 1 month, a Rosy Thrush-tanager 2 years and 1 month old, and two Common Bush-tanagers with respective ages of 3 years 10 months and 3 years 8 months. In addition, T. C. Crebbs reported three ring returns of Plain-colored Tanagers on Barro Colorado, in central Panama, all more than 6 years after ringing.

A team of researchers working from 1994 to 2004 on Guana Island, in the British Virgin Islands, reported longevity records for migrant and resident birds. The data include a ringed Bananaquit which, when recaptured, was known to be at least 7 years old.

Movements

Any discussion of the movements of a group of birds as complex as the Thraupidae, regardless of the taxonomic boundaries of the family, risks oversimplification. Movements made by members of the family range from essentially none, with species resident on permanent or semi-permanent territories for all or almost all of their adult lives, to minor local shifts in populations, and to significant seasonal south–north migratory movements undertaken by several species that occur in Argentina, Paraguay and southern Brazil. Local movements may involve distances of less than 1 km or of a few tens of kilometres, and include relatively small numbers of individuals. Longer movements can involve all or a significant proportion of an entire population. In addition, movements include elevational shifts on a periodic or regular basis, when all or portions of a population move various distances up or down mountain slopes. Post-breeding dispersal involves yet another type of movement, one that is likely common among tanagers, although poorly documented. There is some recent evidence that a few southerly tanagers may wander widely after breeding, even appearing in areas south of where they breed. Such movements as these may be the result of human-altered environments and new food resources, but the phenomenon has received little attention from ornithologists.

In broadest terms, most tanagers appear to be sedentary, remaining resident throughout their lives in one place or keeping to relatively small home ranges once pairs are established. This statement, however, masks the patterns of an unknown number of species in which short-distance or seasonal movements, or both, are superimposed on the presence of residents. Dynamic and complex population movements of this sort are difficult to



After 20 days, the young ***Sayaca Tanager*** *is ready to leave the nest, though the juveniles remain with their parents during the non-breeding season. They may first breed while still in immature plumage. Nest-sites of this species are usually concealed in thick foliage. Almost all the records of the Sayaca Tanager in Buenos Aires province are from the austral winter months, suggesting a southward post-breeding dispersal by adults or juveniles. Like several* Thraupis *species, the Sayaca Tanager thrives near human settlements and may be increasing its range.*

[*Thraupis sayaca sayaca*, Minas Gerais, Brazil. Photo: Anita Studer]

detect and monitor, and they have been documented for only a few species. Most tanagers have not been studied in any detail, and the majority of the long-term work that has been done involves only a few sites.

While many, perhaps most, species of tanager found in lowland and montane humid forest are relatively sedentary, local seasonal movements do occur, and even populations of sedentary species may shift locally with varying food abundance. Species dependent upon fruit and nectar, in particular, are prone to seasonal and sometimes unpredictable movements. Away from zones of humid tropical forest, as, for example, in lower Central America, the Amazon Basin and the Andes, however, a rather different picture emerges. Among tanagers occurring in areas where environments are more seasonal, or more open, or experience strong dry seasons, there appears to be an increase in the proportion of species that undertake seasonal movements. The pattern is similar in marginal habitats, such as tree-line ecotones, which are prone to extremes of temperature and rainfall and intense fogginess, and in areas outside tropical latitudes where seasonal environmental factors limit resources and favour migratory responses. Thus, the movements that are evident in this family are related in various ways to the habitat and geographical region in which the species occur.

Long-distance migration is undertaken by relatively few species of tanager. The most frequently cited examples are the four species of *Piranga* in North America, but all four have recently been shown to be genetically closer to cardinalids than to thraupids (see Systematics). One of these, the Scarlet Tanager, and the eastern population of another, the Summer Tanager, are intercontinental migrants that migrate seasonally between non-breeding areas in northern South America and Amazonia and breeding areas in North America. The two western breeding species, namely the Northern Hepatic-tanager and the Western Tanager, as well as the western breeding populations of the Summer Tanager, move primarily between non-breeding areas in Mexico and Central America and their breeding areas in northern Mexico and the USA. With the removal of this group, the phenomenon of long-distance migration, movements of more than 1000 km, may be confined among tanagers to, at best, only a few austral species. This is true even with the inclusion of many species currently placed with the emberizids but recently found to be genetically closer to thraupids. Migration into and out of the southern cone of South America is similar to that in North America, but the distances travelled are smaller and the movements less dramatic, because fewer birds are involved. In the extreme south, in Tierra del Fuego, about 50% of all landbirds are migratory, and these migrants are almost entirely flycatchers that depend upon insects for food. No tanager in the present classification occurs so far south. The Blue-and-yellow Tanager, the most southerly one, breeds as far south as Río Negro Province, in Argentina, but it withdraws from these southernmost areas during the austral winter. It is not known where the bulk of these migratory individuals go, but the species is regarded as "more common" around Buenos Aires in the winter months of approximately April through September, suggesting that migratory movements by this species are, at best, moderate and may involve relatively small distances and perhaps only portions of the population. The southernmost populations of the Rust-and-yellow Tanager (*Thlypopsis ruficeps*), those occurring in the vicinity of Tucumán, in northern Argentina, have been reported as moving northwards along the slopes of the Andes during the coldest months, as has the congeneric Orange-headed Tanager, which occurs in the lowlands of Tucumán, although the extent and duration of these movements are not well documented.

In south-central and south-eastern Brazil, tanagers that undertake small seasonal migratory movements are predominantly species of light woodland or dry, semi-open habitats, and their movements may be northward during the coolest austral winter months or, in some cases, may involve elevational shifts. Among those mentioned by Sick and others are the Brown Tanager (*Orchesticus abeillei*), part of the population of which may be migratory; the Cinnamon Tanager (*Schistochlamys ruficapillus*) and the Black-faced Tanager, both of which may move away from parts of their range seasonally; the White-banded Tanager, which may exhibit some migratory and local movements in south-central Mato Grosso; the Orange-headed Tanager, for which seasonal movements have been noted in Mato Grosso; the Ruby-crowned Tanager, which shows seasonal fluctuations in numbers in the former Brazilian state of Guanabana, around Rio de Janeiro; and the Lowland Hepatic-tanager, which is reported as migrating northwards out of southern Brazil when not breeding, although recent observations by Argentinian observers suggest that the reverse may occur in Argentina (see below). Among other southeast Brazilian species that show some seasonal migratory



It has been suggested that, when tanager nestlings are newly hatched, the adults consume their faecal sacs but that, as they get older, their parents carry the sacs away, as this ***Orange-headed Tanager*** *is doing. Studies of the Beryl-spangled Tanager* (Tangara nigroviridis), *however, found that adults consumed a small proportion (13·6%) of all the faecal sacs produced, with no discernible trend as the nestlings grew. What changed was the number of faecal sacs produced in the presence of the adults: 100% in the first days, falling to 20% by the day of fledging.*

[*Thlypopsis sordida sordida*, Alagoas, Brazil. Photo: Anita Studer]

movements, including elevational shifts, are the Azure-shouldered Tanager (*Thraupis cyanoptera*), Golden-chevroned Tanager, Blue-and-yellow Tanager, Brassy-breasted Tanager, Burnished-buff Tanager, Black-backed Tanager, Chestnut-backed Tanager, and Black-legged Dacnis (*Dacnis nigripes*), the last being apparently absent from parts of its small range in Rio de Janeiro during the April–August winter months.

Willis, in a summary of landbird migration in São Paulo, in south-east Brazil, provides some perspective on southern-latitude bird migration. He estimated that in the state of São Paulo about 24% of all landbirds, which totalled some 584 species, were known to migrate or wander seasonally. About 60 moved northwards during the coldest months, twelve of these being North American breeders, and ten species arrived from the south. The percentage of migrants increased to the south, reaching 33% in Paraguay and 35% in the north-central Argentinian province of Córdoba. These figures are smaller than those at comparable latitudes in North America, but larger than may be generally realized. Unsurprisingly, species that depend upon flying insects were the most highly migratory, while frugivores were mostly local migrants and some omnivorous species exhibited local movements. Bananaquits, as well as hummingbirds, sometimes showed local and altitudinal movements, but the sum of their movements was near zero, departing species often being replaced by arriving species with different bill and body sizes that were better able to exploit the existing resources at that time of the year. Seed-eating emberizids, most of them now believed to be tanagers (see Systematics), were highly migratory, two southern species, four breeders and seven wandering species all exhibiting movements. Most frugivorous/insectivorous species, including ten Thraupidae, were primarily elevational migrants, descending to coastal areas during the winter months, these populations then returning to higher altitudes to breed. Although these elevational movements have been little studied by scientists, they are well known to cagebird-trappers. Willis notes that altitudinal movements are particularly difficult to verify because they often do not involve entire populations but, instead, migrants overlap with resident individuals in various ways. For example, some individuals may stay, rather than migrate, making this a partial migration, or individuals may migrate into the ranges of the residents at various sites, an "overlap migration".

With regard to Paraguay, F. E. Hayes and others describe two kinds of migration. The first, involving what they called "northern austral migrants", consisted of birds that breed in Paraguay and migrate northwards during the austral winter. The second, by "southern austral migrants", consisted of birds that breed primarily south of Paraguay and migrate north into or beyond Paraguay during the austral winter. These patterns provide a broad view of seasonal bird movements in Paraguay, but they mask more complex patterns, such as species for which both types of migratory movement occur at the same time, as well as a few species that are primarily or entirely transients through Paraguay. Hayes regarded the Swallow Tanager as a rare northern austral migrant. Although the number of records is small, the species is a rare non-breeding migrant in the Chaco, in west Paraguay, and is an uncommon breeder only in the eastern part of the country. A single July record in western Paraguay, during the heart of the austral winter, could represent one of several possible scenarios: a southerly breeder moving north, a Paraguay breeder that failed to migrate, a wandering individual, or an early-returning migrant. Among the group of birds regarded by Hayes and colleagues as southern austral migrants, only two are tanagers, these being the Lowland Hepatic-tanager and the Blue-and-yellow Tanager. The Lowland Hepatic-tanager is a rare to uncommon breeder in Paraguay, but its small breeding population is swamped by an influx of individuals that breed to the south and move varying distances northwards during the coolest months. For example, 61% of the Lowland Hepatic-tanager records fell between May and August, while only 15% of all records were between November and February. Blue-and-yellow Tanagers occur primarily as migrants into and through Paraguay, most records falling between the end of March and early October. Significantly, six species currently placed in Emberizidae but now thought, on the basis of molecular-genetic studies, to be closest to tanagers, are austral migrants to Paraguay, namely the Black-crested Finch (*Lophospingus pusillus*), Black-and-rufous Warbling-finch (*Poospiza nigrorufa*), Ringed Warbling-finch (*Poospiza torquata*), Grassland Yellow-finch (*Sicalis luteola*), Marsh Seedeater (*Sporophila palustris*) and Chestnut Seedeater (*Sporophila cinnamomea*). Most are rare or irruptive migrants in Paraguay from more southerly breeding sites, but their presence, and possibly that of others, points to a relatively widespread pattern of northward movement out of



Brood parasitism by Shiny Cowbirds (Molothrus bonariensis) *has been reported as affecting the* ***Bicolored Conebill*** *in Suriname and Trinidad, and is here shown in Brazil. Black-faced Tanagers* (Schistochlamys melanopis) *are reported as being frequently parasitized by Shiny Cowbirds in Brazil, and some* Thraupis *species are frequent victims, particularly in Trinidad, where the cowbirds are recent arrivals and the hosts consequently naive. Forest fragmentation may be exposing some species previously immune: Scarlet Tanager* (Piranga olivacea) *populations are in decline, and cowbird parasitism may be a factor.*

[*Conirostrum bicolor bicolor*, Mangroves of Santos, São Paulo, Brazil. Photo: Robson Silva e Silva]

southern latitudes by small nine-primaried oscines during the austral winter.

Although it has been noted that tanagers migrate northwards out of higher austral latitudes during the southern winter months, these movements may be more complicated than simple northward travel. While the Swallow Tanager, a common breeder in north-east Argentina, mostly migrates north after breeding and is regarded as scarce and hard to find during the winter months, the opposite may be true for some species. In their evaluation of the distribution of birds in Buenos Aires province of Argentina, T. Narosky and A. Di Giacomo note that, while some tanager populations are mobile during the cooler non-breeding season, from approximately March or April to October, a wholesale exodus of tanagers during the winter months, as made by many bird species in North America, does not occur. On the contrary, the populations of some species may simply undertake local reposi-

Beginning with the publication of a catalogue of eggs in 1899, a series of otherwise authoritative books claimed that the ***Red-legged Honeycreeper*** *laid black eggs and built a pensile "bag" nest, hanging from a branch over water. The nest had already (1857) been correctly described as the kind of open cup containing whitish, speckled eggs that is typical of almost all thraupids. Both sexes of Red-legged Honeycreeper feed the young, bringing mostly fruit, with some insects, but the male's contribution is irregular. The nestling period is 14 days, but in one case in Brazil the interval between nest completion and fledging was just 22 days.*

[*Cyanerpes cyaneus carneipes*, Panama. Photo: Kathy Kinnie]





Many, if not most, tanager species have a distinct juvenile plumage, but the newly fledged ***Magpie Tanager*** *is barely distinguishable from the adult. Once fledged, the period for which young tanagers remain dependent on their parents varies among species. Young Bananaquits* (Coereba flaveola) *are said to leave their parents almost immediately, while Blue-necked Tanagers* (Tangara cyanicollis) *are independent within three weeks and Silver-throated Tanagers* (T. icterocephala) *continue to be fed for more than a month. The young may remain with their parents well beyond the period of dependency, and in some species may contribute as helpers in the next breeding season.*

[*Cissopis leverianus major*,
Itatiaia City,
Rio de Janeiro, Brazil.
Photo: Edson Endrigo]

tioning, rather than long-distance migration, after the breeding season. For example, the Diademed Tanager of south-east Brazil and north-east Argentina undertakes a generalized post-breeding dispersal out of the coastal *Celtis* woodlands and gallery and riverine forests where it breeds in Argentina, and moves into a wider range of habitats than those in which it breeds, but the population as a whole does not make a northward migration. Observations by Argentinian observers G. Pugnali, K. Roesler and H. Casañas suggest that the abundance of some tanagers around Buenos Aires and Córdoba changes seasonally, but not in the way one might expect. Several species that breed to the north of Buenos Aires are commoner and more widespread around Buenos Aires during the cooler winter months, a pattern suggesting a southward post-breeding dispersal by adults or juveniles. For example, almost all of the records of Sayaca and Guira Tanagers in Buenos Aires province and of Orange-headed Tanagers in Entre



The ***Black-chinned Mountain-tanager*** *is a restricted-range species, found in a rather narrow elevational band of Pacific-slope montane forest (the Chocó Endemic Bird Area) in Colombia and Ecuador. Deforestation, farming and illegal cultivation of coca and marijuana are ongoing threats, and this species, though not yet regarded as globally threatened, is almost certainly declining. It is found in a number of protected areas in both countries. It is sometimes found together with the similar Blue-winged Mountain-tanager* (Anisognathus somptuosus), *which favours forest edges for breeding, while the Black-chinned Mountain-tanager needs undisturbed, epiphyte-laden forest.*

[*Anisognathus notabilis*,
Mindo Loma Cloud Forest Reserve, Pichincha, Ecuador.
Photo: Glenn Bartley]

Rios province are of birds present during the austral winter months. Similarly, the Chestnut-backed Tanager, a species that occurs in semi-open habitats from south of Brasília and Goiânia southwards to Buenos Aires, moves around seasonally, and there are more records of this species in the southern part of its range in the winter months than at other times of the year. A similar pattern may occur with the Lowland Hepatic-tanager, which is a widespread breeder in northern and north-western Argentina but is, during the post-breeding winter months, more numerous in the southern parts of its range, around Buenos Aires. The Fawn-breasted Tanager is another species which exhibits a significant post-breeding dispersal southwards during the winter months. Di Giacomo has noted that Fawn-breasted Tanagers could be coming from the Atlantic Forests of Brazil, some moving as far south as Buenos Aires province during the winter months, although he cautions that much remains to be learnt about the post-breeding movements of these and others tanagers. The possible influence of human-altered environments, such as planted ornamental or non-native fruiting trees and shrubs, accompanied by increased insect infestations of non-native plants, which may lead to more exploitable food resources, looms as one possible cause of these curious movements, but the topic remains unstudied.

Away from austral latitudes, migratory movements have been reported for relatively few tanagers. The Black-and-white Tanager is unusual in that it breeds in arid regions of western Ecuador. It is one of the few tanagers to utilize an arid habitat, but it does so only when periodic rainfall creates a flush of vegetative growth and insects, and breeding times are consequently variable and unpredictable from year to year. Outside the breeding period this tanager is possibly nomadic, or there may be a regular trans-Andean migration into Amazonia, but movements of the species are poorly understood. The Flame-colored Tanager of the mountains of Mexico south to western Panama moves to lower elevations seasonally. Also, the Plain-colored Tanager's seasonal fluctuations in numbers in central Panama are well documented. The Yellow-collared Chlorophonia (*Chlorophonia flavirostris*), although now generally placed with the Fringillidae, is unusual in that its distribution in western Colombia and north-western Ecuador coincides with one of the wettest and least seasonal regions in the Western Hemisphere, yet this species, when not breeding, wanders widely, apparently in search of suitable fruiting trees with small berries. In Colombia, single-species flocks of 30 to over 80 individuals have been repeatedly seen at fruiting *Miconia* trees at various times of the year in the department of Valle del Cauca, both in the lowlands and in the foothills up to an elevation of 1050 m. Even larger flocks, estimated to contain up to 150 individuals, have been observed in western Ecuador. These large monospecific flocks associate incidentally with mixed-species flocks at fruiting trees, especially *Miconia*, but otherwise move largely independently of them and have been seen to fly high over foothill-forest canopy and move long distances across deep valleys and along steep, forested slopes.

The seasonal elevational movements of the Scarlet-thighed Dacnis (*Dacnis venusta*) are well known in lower Central America. This species breeds in the mountains, usually above 500 m, and on the Pacific slope above 900 m, but wanders to sea-level in search of fruiting trees when it is not breeding. In western Colombia the post-breeding pattern may be similar, although the species is most numerous at somewhat lower elevations and post-breeding dispersal may involve movements both to higher and to lower elevations. For example, during a 15-month period of intensive observation at an elevation of 1050 m in the Anchicayá Valley, Hilty noted the species only in December, but for a short period of time several were present. Local seasonal movements have been reported also for the Blue Dacnis in Brazil. Some *Cyanerpes* honeycreepers are known to migrate away at the conclusion of breeding, but their dramatic and sometimes puzzling arrivals and departures, especially those of the Red-legged Honeycreeper, as well as their ultimate destinations, are poorly understood. Nectar-eating birds are notoriously sensitive to changes in resource levels, and this is perhaps best illustrated with hummingbirds, the populations of which can appear or disappear overnight in response to flower abundance. Similarly, many flowerpiercers rely heavily on nectar and their populations are sensitive to flower abundance and the nectar contained therein. Some, such as the Cinnamon-bellied Flowerpiercer of Middle America, are reported as moving up or down mountain slopes, presumably in response to nectar abundance. Some Andean flowerpiercers, especially high-elevation "black" species with a smaller and more strongly hooked bill, are intensely territorial, the males and females holding separate feeding territories, and engaging in fiercely competitive interactions with other



*The **Emerald Tanager** is a restricted-range species, patchily distributed across an area of about 38,500 km². It is fairly common in Costa Rica and Colombia, but more local in Panama. There is still extensive humid forest along the foothills and lower slopes of the mountains of its range, but most is unprotected, and cattle-ranching, gold-mining and legal and illegal crops are all encroaching. When foraging for arthropods, the Emerald Tanager is a mossy-branch specialist and favours primary forest, though it is also found in adjacent older second growth. The population is suspected to be declining, but does not approach the threshold for listing as globally threatened.*

[*Tangara florida*, Río Canandé Reserve, Esmeraldas, Ecuador. Photo: Doug Wechsler/ VIREO]



The lower slopes of the tepuis of southern Venezuela, Guyana and northern Brazil consist of rock debris fallen from above. They are covered in tropical and subtropical forest, which is kept wet by the clouds that form around the cliffs overhead. Because they are so inaccessible, there has so far been relatively little human impact, and the high number of endemic and restricted-range species found on and around them, including the ***Olive-backed Tanager****, are mostly considered stable and of Least Concern. Much of the Olive-backed Tanager's range is covered by the Canaima National Park, in Venezuela.*

[*Mitrospingus oleagineus obscuripectus*, La Escalera, Bolívar, Venezuela. Photo: Andrew Moon]

flowerpiercers and other competitors, such as hummingbirds and conebills. Larger "blue" flowerpiercers, and others with a longer, thinner bill and a less strongly hooked bill, supplement their diets with many kinds of small fruit and even flying insects, and are less dependent upon nectar resources. These species are markedly less territorial, they regularly travel with mixed-species flocks, and their seasonal numbers are likely to reflect the abundance more of fruit resources than of nectar. The extent to which flowerpiercers, large or small, move seasonally or engage in vertical migrations up and down mountain slopes remains unknown. Small movements do occur as populations adjust locally to shifting nectar resources, but larger-scale movements are poorly documented. In Venezuela, Hilty observed a flock of approximately 25 Masked Flowerpiercers, a species that includes more fruit than nectar in its diet, as it moved rapidly upslope in the Mérida Andes, this being one of the few reports of a mass elevational migration by a flowerpiercer.

The small size of many islands in the Caribbean may limit opportunities for anything but local movements unless a species leaves an island. The four species of *Spindalis*, as currently recognized, are well known for seasonal movements within their own island or island group, including, respectively, the Bahamas and Cuba, Jamaica, Puerto Rico, and Hispaniola. The Western Spindalis was formerly reported in large flocks on Cuba, and birds from the Bahamas occasionally wander to Florida, on the USA mainland, suggesting that significant periodic or irruptive inter-island movements occur.

Despite the fact that many tanagers are widespread, and common and easy to observe, there are few published studies of the daily or seasonal movements of tanagers, or of the stability of pair-bonds. Most of what has been published in this regard comes from the meticulous observations of Skutch in Costa Rica, but Skutch did not individually mark birds, a fact that prevents the obtaining of long-term information. He did attempt, with very limited success, to mark a few birds individually with wet paint placed on nest rims, but his comments on seasonal or longer-term movements and pair-bond stability of members of the family are limited to generalized comments.

Some insight into population stability in a community of tanagers can be gleaned from a study in Colombia. During 15 months of intensive observation Hilty, working on Colombia's Chocó–Pacific slope, colour-marked 330 tanagers of 17 species. This population was resampled two years later, when ten individuals of eight species were located again. One Yellow-throated Bush-tanager was present for the full 3 years and 1 month, and was located less than 50 m from its original capture site. A second individual with a minimum age of 2 years 8 months was less than 200 m from its original capture site. Other species present for a minimum of 3 years and 1 month included a Palm Tanager, a Blue-necked Tanager and an Orange-bellied Euphonia; the Palm Tanager was found less than 200 m from its original capture site, and the other two were less than 50 m from their original sites. Other species present on the site for more than 2 years included a Rufous-throated Tanager, present for 2 years 3 months; a Blue-necked Tanager, for 2 years 2 months; a female Scarlet-and-white Tanager, for at least 2 years 8 months; and a Bananaquit, present for 2 years 8 months. A ringed female Bay-headed Tanager was mated with a ringed male when captured near the outset of the study, but it was with an unringed male 2 years and 10 months later. No individuals ringed as juveniles or immatures were recaptured or seen more than a few months later. Consequently, the ages of the marked adults cannot be determined, but the recaptures and sightings of the colour-ringed birds provide minimum ages and some insight into population stability in this community of tanagers. These records, although limited in duration, suggest that at least some adult tanagers in this community are quite sedentary.

This Colombian Chocó–Pacific site, at 950–1050 m in the Anchicayá Valley, experienced high annual rainfall, with minor peaks in March-April and September–December. A corresponding small, bimodal peak in fruit abundance was evident. In this relatively non-seasonal environment, tanager populations were fairly stable. Net capture-recaptures and transect counts revealed almost constant numbers of species and individuals present throughout the initial 15-month study, although there was considerable population turnover, especially among immatures, which were seldom recaptured. Average foraging distances expanded somewhat during periods of reduced fruit availability, in July–August, and contracted during a November–December peak. Thirteen additional non-breeding species from higher or lower elevations were also recorded; eleven of these were present for less than 1–3 months, and the other two for up to 6 months. Seven were highland breeders dispersing downslope, and six were lowland breeders dispersing upslope. These elevational upslope and downslope migrations accounted for 13 of 41 species of tanager



*The **Scarlet-thighed Dacnis** appears always to have been patchily distributed and uncommon, or seasonally common, over most of its 201,000 km² range. Outside the breeding season, it disperses in search of fruiting trees and shrubs, appearing both on Colombia's coastal plain and in smaller numbers at up to 1100 m. It is not currently regarded as threatened, but deforestation in the lowlands and foothills of lower Central America is extensive and ongoing. In western Ecuador, loss of lowland forest outside protected areas is approaching 100%. The Scarlet-thighed Dacnis is found in a number of protected areas.*

[*Dacnis venusta fuliginata*, Río Canandé Reserve, Esmeraldas, Ecuador. Photo: Doug Wechsler/ VIREO]

recorded at the site. There was only a single elevational migrant present during the period August–October. The greatest number of highland species recorded simultaneously was three, in November, March and May; for lowland species moving upslope, a maximum of three was recorded in April and June. Overall, slightly more upslope and downslope movement of tanagers in the Anchicayá site occurred during the months of November and January–June. These data provide a snapshot of seasonal movements over an annual cycle, but a fuller picture can be gained only with longer-term observations. What emerges from study in Costa Rica, and this study in Colombia, is that these avian communities are dynamic, the species constantly adjusting to changing resource levels, and non-breeding individuals, as well as immatures, or "floaters" in populations, contributing to a continuous population turnover. Thus, broad generalizations about seasonal population changes and movements are likely to obscure underlying complexity.

Mark-recapture details for the Ochre-breasted Tanager revealed that this species, now shown to be genetically unrelated to thraupids (see Systematics), regularly ranged over larger areas and exhibited greater mobility than any of the other 17 tanagers under observation. Eleven days after capture, one individual was sighted 700 m away, and marked individuals were routinely found 450–600 m from their respective capture sites. Colour-ringed Scarlet-and-white Tanagers also were evidently resident on the Colombian site, with four of six birds present for more than twelve months and 12 of 16 present for at least six months, but some local movements were complex and unexpected. For example, one family of this species, consisting of an adult pair and an immature, remained near its original capture site for eleven months, and then abruptly moved to a new area some 300 m distant and partly within the home range of a second family resident there for at least seven months. One male Scarlet-and-white Tanager was found, three months after capture, more than 850 m from its original site, the greatest distance for any small passerine in the study.

Although *Chlorophonia* and *Euphonia* are now thought to be closest to fringillids (see Systematics), the seasonal movements of these "former tanagers" are instructive. Members of both genera breed in pairs, but, when not breeding, most chlorophonias form small flocks that spend much of their time in eating mistletoe berries and sheltering inside large bushy clumps of canopy mistletoe. One exception within this genus is the Yellow-collared Chlorophonia, which forms large post-breeding flocks that may wander widely and feed extensively on small berries of *Miconia*, rather than mistletoe. Little is known about seasonal movements or pair-bonding of *Euphonia*, but colour-marked Orange-bellied Euphonias were followed for 15 months in the Anchicayá Valley of western Colombia and, of twelve individuals colour-ringed for a year or more, six were present at least 12 months later; 18 of 26 birds, about 69%, were present at least nine months after marking, and 36 of 42 birds, almost 86%, were observed at least

*There are four races of the restricted-range **Greater Flowerpiercer**, largely or entirely isolated from one another on the tepuis of south-eastern Venezuela, Guyana and northern Brazil. Although found as low as 1300 m, they become common to abundant only at higher elevation, for example, above 2000 m on Cerro Roraima in Brazil. Their total range is small, but there are few human settlements within it. The population appears to be declining because of habitat loss, but the species is not regarded as globally threatened. The Greater Flowerpiercer is found in Venezuela's Canaima National Park and in the Kaieteur National Park, in Guyana.*

[*Diglossa major major*, Sierra de Lema, Bolívar, Venezuela. Photo: David Southall]



three months after initial capture. No recaptures or resightings of any of 36 marked individuals were at more than 600 m from the original marking site. One marked adult male recorded 20 times during a 15-month period was never more than 200 m from his original capture site, and another male, recorded 31 times during a ten-month period, was never more than 250 m from where he had originally been captured. A marked female observed twelve times in 15 months was even more sedentary, never straying more than about 150 m from her original capture site. These data suggest that some small frugivores are highly sedentary in these Chocó–Pacific pre-montane wet forests, where abundant rainfall is distributed fairly uniformly throughout the year, and where no annually recurring periods of severe fruit-resource scarcity are evident. Orange-bellied Euphonias were almost always seen singly or in pairs and often with mixed-species flocks, but they did not gather in groups of their own.

Relationship with Man

Tanagers are widespread throughout the American tropics and extend, in decreasing numbers, somewhat beyond tropical latitudes. Being generally small, they are of little interest to native hunters as a source of food. Likewise, they are usually not serious pests of agricultural crops, although Blue-grey and Palm Tanagers, Silver-beaked Tanagers and a few other species may inflict minor damage locally to fruit crops such as bananas and papayas (*Carica papaya*) in gardens and small orchards. Although this activity does not endear them to humans, these birds do also eat many harmful insects. As some tanagers live in close association with human beings, their lives and fates are, for better or worse, often closely tied to those of humans, who almost constantly modify and reshape the environment, shoot at them with sling-shots, trap them for use as cagebirds, keep pets that may harass or kill them, and generally give little thought to the welfare of this colourful and engaging and sometimes songful group of birds.

The name "tanager" appears to have been derived from a Tupí-Indian word *tangará*, a local name used in Pernambuco, and perhaps elsewhere in eastern Brazil, for the Seven-colored Tanager. The original name survives today among some native cultures, but, at least in Brazil, various indigenous groups now more often use the word *tangará* to denote certain manakins, especially the *Chiroxiphia* species, and in parts of Amazonia local inhabitants apply it to the Red-capped Cardinal (*Paroaria gularis*). This same word, *tangará*, is used by other native groups in present-day Paraguay and adjacent areas for birds that are today referred to as "tanagers". The first mention of the word *tangará* in scientific writing is found in Marcgraf's treatise on plants and animals, written in 1648.

Over much of their geographical range, tanagers have had an important relationship with humans because so many species have colourful plumage and because a few of them also sing nicely. This relationship, unfortunately, has been detrimental to those species most highly sought for their brilliant plumage. As pointed out by Sick, the renowned German ornithologist domiciled in Brazil, tanagers have suffered in disproportionate numbers at the hands of native human populations, especially in the Amazonian region, where their bright feathers are valued for use in adornments. The brilliant, glistening feathers of the Masked Crimson Tanager, honeycreepers and others, along with those of parrots and macaws (Psittacidae), toucans and cotingas, have long been valued for their colours, and feature prominently in many handmade adornments. Among extant indigenous populations, these traditions continue today. The relatively small number of birds taken for these purposes, however, has likely had little overall effect on the populations of the tanagers most favoured. Unfortunately, this practice sometimes extends beyond local use. When indigenous communities have access to tourist markets, the brightly coloured feathers of many species of bird turn up as adornments on native products ranging from hand-made bows and arrows to combs, ear-rings and small purses, and these are eagerly purchased by national and international visitors.

Indigenous people have not been the only humans to admire the brilliant feathers and plumages of some tanagers. Following the colonization of South America by Europeans, the plumes and skins of many small, colourful tropical birds became objects of considerable economic value when, in the late 1700s and early 1800s, a growing European fashion industry began to incorporate plumes and even dried bird skins into ornaments for ladies' hats. At the peak of this fashion, hundreds of thousands of small colourful tropical birds, especially hummingbirds, tanagers, honeycreepers and cotingas, were killed by native hunters. The specimens, and feather samples, were shipped to Europe for resale to the growing plume market. These bright feathers became



*The **Blue-whiskered Tanager** is a restricted-range species and has been described as the least numerous of the Pacific lowland* Tangara *species. It is found at low densities from north Antioquia, in Colombia, south through north-west Ecuador to Los Ríos; in Colombia, however, it is common in several areas in Nariño. It may be present in other protected areas in Colombia and Ecuador, but there are few in its range. It is believed to be in decline because of the loss of its forest habitat in the Chocó–Pacific lowlands, and so it is considered Near-threatened. It is, however, able to use various stages of secondary forest habitats, including the regrowth around slashed clearings.*

[*Tangara johannae*, Playa del Almejal, Bahía Solano, Chocó, Colombia. Photo: Rodrigo Gaviria]



*The **Green-chinned Euphonia** is still thought to be fairly common in what remains of the Atlantic Forest of south-east Brazil, eastern Paraguay and north-east Argentina. It stays well up in tall trees, favouring epiphytic fruits and also appearing to depend on epiphytes for nest-sites. Although it occurs in numerous parks and reserves, it is assumed to have declined substantially with the loss of much of the Atlantic Forest, and it is considered Near-threatened. All unprotected forest left in its range is at high risk from a further range of threats, including settlement, industrial development and fragmentation by roads.*

[*Euphonia chalybea*, Volta Velha Special Reserve, Itapoá, Santa Catarina, Brazil. Photo: Edson Endrigo]

highly prized as fashion ornaments and contributed to an unfortunate and particularly destructive era of fashion. Ironically, it was from some of these large shipments of bird specimens arriving at European ports from northern South America that a few enterprising scientists, such as J. Gould, ultimately described many birds new to science.

Several tanagers figure importantly in the lives of humans because they have readily adapted to the changes that humans make in the environment. As a result, they are common residents around settled areas and familiar to almost everybody. One of these is the Blue-grey Tanager, widely known as *Azulejo* to Spanish speakers and as *Sanhaço da amazônia* in Brazil. Blue-grey Tanagers often use crannies in homes or other buildings for nesting sites, forage for fruit and insects in gardens, and are conspicuous almost wherever humans live. Their songs are energetic, though squeaky and unmusical, and the birds occasionally make a nuisance of themselves by damaging fruit, especially bananas and papayas, in orchards. Their ubiquitous presence in settled areas also places them at risk from mischievous young boys, who shoot at them with sling-shots. Several species of *Ramphocelus*



*A single-country endemic species, the **Sooty Ant-tanager** has a restricted range within northern Colombia, from the upper Sinú valley at the north end of the western Andes east to the middle Magdalena Valley. It was once believed to be approaching the threshold for listing as globally Vulnerable, but its range is now known to be larger than previously thought. It is found in Reserva El Paujíl and Reserva Bellavista, and is also present in scattered patches of unprotected forest, surviving locally in dense and surprisingly young second-growth scrub and palmetto. But because of the extensive destruction of suitable habitat, it is thought to be in moderately rapid decline and is listed as Near-threatened.*

[*Habia gutturalis*, La Victoria, Colombia. Photo: Ketil Knudsen]



Known from a small area on the northern and western slopes of the central Andes in Antioquia, in Colombia, the ***Black-and-gold Tanager*** *went unrecorded there for more than 50 years, until it was rediscovered in 1999 on the western side of the River Nechí. A second, discrete population is found on the Pacific slopes of the western Andes, on the Chocó–Risaralda–Valle del Cauca border. It is regarded as common in Tatamá National Park, in the western Andes, but this area has been severely deforested. The total population is fewer than 2500 and is almost certainly declining; the species is considered Vulnerable.*

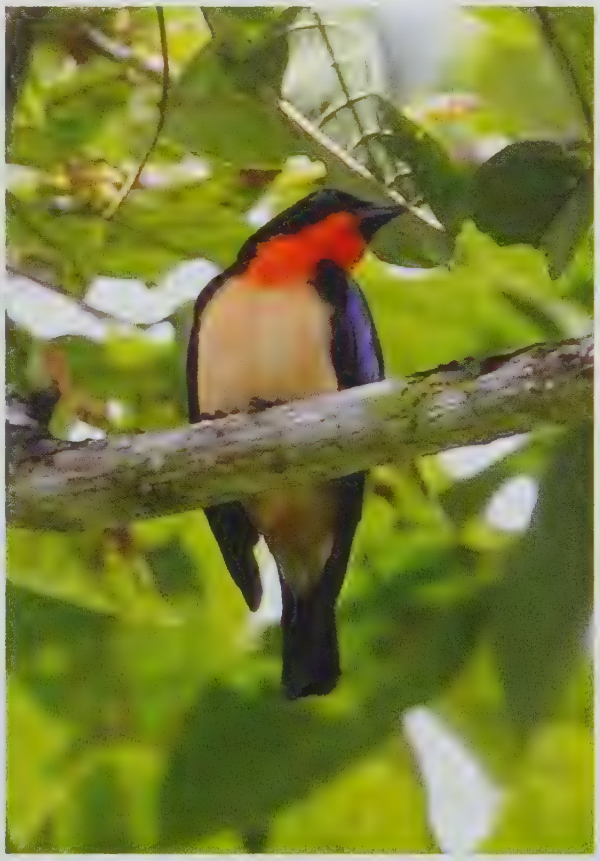
[*Bangsia melanochlamys*, El Cairo, Valle del Cauca, Colombia.
Photo: Ketil Knudsen]

tanager also thrive in settled areas, and are well known to residents of rural areas and smaller villages. The name *pico de plata* is commonly applied to any of several species in this genus, among them the Silver-beaked Tanager and the Crimson-backed Tanager, because the males have a large whitish lower mandible which is conspicuous (see Morphological Aspects).

Less familiar to the public in general, but well known to biologists and naturalists, is the phenomenon of mixed-species flocks, which comprise an important component of avian ecosystems in both lowland and highland forests. While mixed flocks in lowland forests are apt to be composed of an array of species from many families, those in the highlands are often made up predominantly of tanagers. Moving restlessly through the canopy of misty cloudforest in the Andes and other mountainous areas, these fast-moving flocks typically include many tanagers with dazzling colours. On occasion, eight to ten species of colourful *Tangara* or allied thraupids may swarm around a small fruiting tree and, for a few moments, feed frantically, each bird moving and fluttering quickly in search of berries. It is an unforgettable sight, and a spectacle that has moved more than one observer to comment that the birds seemed like a swirl of colourful decorations on a Christmas tree. While birders and ecotourists may not undertake a foreign trip solely for the purpose of observing mixed-species flocks and feeding assemblages, such flocks are an important component contributing to the allure of highland regions in Middle and South America, and visitors to these places do provide a very real economic benefit to the local native communities.

Tanagers have endured a long and tragic relationship with humans in the form of the cagebird trade, both legal and illegal. It is, in large measure, due to their beautiful plumages and, to a lesser extent, because some have pleasing songs or are fairly accomplished mimics that they are so often pursued. Euphonias, probably better placed in Fringillidae (see Systematics), also are widely sought by trappers, as are seedeaters and various allied species mostly still placed with the emberizids but now believed to be closest to thraupids (see Systematics). In some areas, such as small Amazonian villages, bird-trapping is relatively insignificant and may involve little more than an occasional bird held in a crudely fashioned cage for personal pleasure. In areas where trappers have access to large city markets or to illegal international bird trade, on the other hand, the number of birds taken from the wild can have an impact on populations locally and then becomes a conservation issue. Bird-trapping as a conservation concern is discussed in greater detail below (see Status and Conservation).

Of all interactions between humans and tanagers, however, the most significant one, and the one affecting the greatest number



First described in 1964 in Peru, and more recently found in Ecuador, the ***Orange-throated Tanager*** *has a tiny global range of just 4200 km². It is present in the Andean Ridge-top Forests Endemic Bird Area, in mature humid forest, and in* terra firme *forest in adjacent lowlands. None of the land in its range is protected. It still appears common in suitable habitat in Peru. No estimates are available for Ecuador, but some authors believe it to be in serious trouble there because of deforestation, and it is considered Vulnerable. Much of its range lies in the territory of the indigenous Aguaruna tribe, who also report it from the headwaters of the River Nieva, some distance from its known range.*

[*Wetmorethraupis sterrhopteron*, Ecuador.
Photo: Terry S. Baltimore/ VIREO]



A restricted-range species, present in the Central Andean Páramo Endemic Bird Area, the ***Masked Mountain-tanager*** *has an estimated global population not exceeding 5000 individuals and is probably declining because of habitat loss. It is considered Vulnerable. The scattering of records from south-west Colombia, Ecuador and north-west Peru suggests that it is very localized. It is found at 2900–3650 m in low mossy forest, very humid elfin woodland, bamboo and giant grasses at or near the tree-line (the* páramo–*forest ecotone). But regular burning of* páramos *adjacent to elfin forest, to promote new shoots for livestock, has lowered the timber-line by several hundred metres.*

[*Buthraupis wetmorei*, Papallacta, Ecuador. Photo: Björn Anderson]

of tanagers, involves the loss of habitat through deforestation or habitat alteration. While a few species have benefited from human intervention in the landscape, far more have been adversely affected, a topic also discussed in the next section (see Status and Conservation).

Status and Conservation

Altogether some 283 species are included in the present treatment of Thraupidae. Recent molecular-genetic studies suggest that up to 20% of these species really belong in other families (see Systematics), whereas even more species currently in other families should ultimately be placed with the true tanagers in Thraupidae. Of the 283 tanagers in the family as presently constituted, 23 are considered to be threatened. Two, the Cherry-throated Tanager (*Nemosia rourei*) and the Cone-billed Tanager (*Conothraupis mesoleuca*), are listed as Critically Endangered. The historical distribution of the Cherry-throated Tanager may never have been large, while that of the Cone-billed Tanager is unknown. Today, the distributions of both species are alarmingly small.

The Cherry-throated Tanager was rediscovered in 1998, having not been definitely reported by anyone since 1941. Since its rediscovery, a concerted effort has been made by many observers to locate this species at additional sites, and it is now confirmed as being present at a minimum of three localities, and probably one or two more, but it occurs in very low numbers at all sites. Its world population is estimated to be, at best, a few hundred individuals, and perhaps as few as 50 birds. The south-eastern Atlantic Forests, where this species lives, are among the most severely deforested on the continent, and little pristine habitat remains outside parks and protected areas in south-eastern Brazil. Ironically, however, one site where the species has recently been found is on privately held land. Most forest tracts, whether private or public, are relatively small and isolated, and lack corridors connecting them to other forested sites, a situation which complicates the species' long-term survival prospects.

Similarly, the Cone-billed Tanager went undetected from 1938 until 2003, before being rediscovered in semi-deciduous gallery forest in Das Emas National Park, in the Brazilian state of Mato Grosso. This species remains one of the rarest and most poorly known passerines on the continent, and there still are only a handful of records from the park. The whereabouts of this enigmatic species have long been of interest, and at least one book has been devoted to documenting efforts to locate the species. Recently, it has been found at a second site nearly 900 km distant from the original location, but there is little information on its status in this new area, where at least 40 individuals were recorded at a total of 18 sites and the total population in this region is thought to number fewer than 100 individuals.

In addition to these two Critically Endangered species, six tanagers are classified as Endangered. These are the Gold-ringed Tanager, Golden-backed Mountain-tanager, Chestnut-bellied Flowerpiercer (*Diglossa gloriosissima*), Venezuelan Flowerpiercer (*Diglossa venezuelensis*), Azure-rumped Tanager and Black-cheeked Ant-tanager (*Habia atrimaxillaris*). Each of these species has a small historical range, less than 5000 km^2 or so, and the area of its occurrence within this historical range is believed to be declining. The ant-tanager, now shown to more closely related to Cardinalidae than to Thraupidae (see Systematics), is found only in portions of the humid Osa Peninsula lowlands of south-western Costa Rica; it is the only lowland species among the six classified as Endangered. The remaining five all are highly localized in montane sites, the Azure-rumped Tanager in humid montane forest in the foothills and slopes of extreme southern Mexico and adjacent Guatemala, the Venezuelan Flowerpiercer in humid and wet pre-montane forest in north-east Venezuela, the Chestnut-bellied Flowerpiercer near the tree-line in isolated sites in the western and central Andes of Colombia, the Gold-ringed Tanager in the western Andes of Colombia, and the Golden-backed Mountain-tanager in tree-line elfin woodland in the Andes of central Peru. Each of these species has a global range that is extremely small and lies only partly within protected areas. Each continues to suffer from loss of habitat outside protected areas, and from intermittent and unstable protection even within protected areas.

A further fifteen tanagers are listed as Vulnerable. Ten of these are found in the Andes, namely the Slaty-backed Hemispingus (*Hemispingus goeringi*), Rufous-browed Hemispingus, Black-and-gold Tanager (*Bangsia melanochlamys*), Masked Mountain-tanager, Multicolored Tanager (*Chlorochrysa nitidissima*),



The majority of tanager species currently considered to be at risk are from the Andes. This is because the greatest diversity of tanagers is in the Andes and many of these species have small and ecologically restricted ranges. The Chocó Endemic Bird Area alone holds 18 restricted-range species, including the ***Multicolored Tanager****, which is also found in the Colombian Inter-Andean Slopes Endemic Bird Area. A few large tracts of intact habitat remain within its range, but an expanding network of roads is opening up ever more remote areas to logging. Formerly common, the Multicolored Tanager is now recorded only infrequently and very locally. It is listed as Vulnerable.*

[*Chlorochrysa nitidissima*, Valle, Colombia. Photo: John S. Dunning/ VIREO]

Green-capped Tanager, Turquoise Dacnis (*Dacnis hartlaubi*), Scarlet-breasted Dacnis (*Dacnis berlepschi*), Tamarugo Conebill (*Conirostrum tamarugense*) and Yellow-green Bush-tanager. In each case, the species' population is small and/or fragmented and is elevationally restricted. These ten are scattered from Colombia south to southern Peru, and their populations tend to be heavily and adversely affected by deforestation or other human activities. With the exception of the Tamarugo Conebill of shrubby woodland, they are found in montane forest, which lies precisely within the zones that have been subject to much deforestation and alteration by rural people expanding their populations. Much of the land on which this expansion is occurring is steep, excessively humid, and largely unsuitable for subsistence agricultural practices. Of the remaining Vulnerable species, the Orange-throated Tanager occurs in the lowlands adjacent to the Andes, the Black-backed Tanager lives in montane Atlantic Forests of south-eastern Brazil, the Seven-colored Tanager is found in Atlantic lowland forests of Bahía, in east Brazil, and the last two constitute a Caribbean complex, the Eastern and Western Chat-tanagers, often regarded as conspecific.

The Seven-colored Tanager occurs in a number of protected areas, but is widely sought for the cagebird trade, suffers heavily from loss of habitat, and continues to be captured even inside protected areas, which often are not well patrolled. It may deserve to be accorded the status of Endangered. The heart of this species' range lies within the Atlantic Forests of north-east Brazil, and it is now estimated that less than 2% of the original forest remains in this area. The two chat-tanagers are restricted to Hispaniola. The Western Chat-tanager is composed of two subspecies found in Haiti and on Gonâve Island, respectively. Both races are seriously endangered, if not already extinct, and current information on their status is urgently needed. The species should perhaps be considered Critically Endangered. The Eastern Chat-tanager also consists of two subspecies, which comprise three highly fragmented populations in the Dominican Republic. Although having a range that is small in extent, one population apparently is still relatively numerous. Information on the status of the other populations is scanty, but suggests that the two are declining. From recent molecular-genetic studies, it appears likely that the chat-tanagers may not be true thraupids (see Systematics). Regardless of their taxonomic classification, however, all subspecies within this complex are in urgent need of study. Both of these Caribbean countries have suffered a heavy impact from human activity, Haiti ranking among the most environmentally devastated anywhere in the world and having been subjected to the further impact of recent earthquake damage.

Seventeen additional species of tanager are classified as Near-threatened, bringing to 40 the number of tanagers presently listed by IUCN as threatened or close to qualifying as such. This is approximately 14% of all species of Thraupidae as constituted herein. Of these 40, some 23 (57·5%) are Andean in distribution, nine are Brazilian, three are Caribbean, and one occurs in each of southern Mexico, south-western Costa Rica, eastern Panama, north-eastern Venezuela, and northern Peru.

Moreover, it is a sobering thought that, of the family's 283 species, as many as 85, 30% of the total, are restricted-range species. The Chocó EBA alone holds 18 such species.

One of the most important facts that emerges from the above details is that the Andes hold the greatest number of tanager species currently considered to be at risk. This is not surprising, for two reasons. First, the greatest diversity of tanagers is in the Andes, and many of these species have small and ecologically restricted ranges. Secondly, large human populations have been present in the Andes, at least locally, for centuries and have had a larger and often more negative impact on the environment than has been the case in some lowland areas such as the Amazon Basin and even the lowlands of Panama. As a result of this long history of colonization and settlement, anthropomorphic degradation of habitat is extensive in the Andes, and is evident from the lowlands and foothills to the tree-line and even higher. Human-generated habitat degradation in the Atlantic Forest region of east and south-east Brazil, however, is even more severe than that in the Andes, but the total number of affected species is smaller because the region, overall, supports a lower species diversity than the Andes. The destruction of Atlantic Forest on private property in south-eastern Brazil is today almost complete, only a few small, privately held tracts remaining. These and a sprinkling of parks and protected areas scattered the length of this region are all that remains of these once extensive forests.

In virtually every case in which populations of tanagers are declining, the root cause can be traced to anthropogenic disturbances. Deforestation and the conversion of land, including



Human-generated habitat degradation in the Atlantic Forest of eastern and south-eastern Brazil is even more severe than in the Andes. But the number of tanager species affected is smaller, because the region supports a lower species diversity than the Andes. The ***Black-backed Tanager*** *is found in the Atlantic Forest Lowlands Endemic Bird Area, where its total population is estimated at fewer than 10,000 individuals and declining. It is considered Vulnerable, although its distribution is complex and not yet understood. When breeding, it uses coastal sandy-soil forest and scrub, a habitat which is being cleared for beachfront real-estate development.*

[*Tangara peruviana*, Patrimônio Natural de Volta Velha Special Reserve, Itapoá, Santa Catarina, Brazil. Photo: Edson Endrigo]

wetlands, to agricultural use have been and continue to be the most important threats. As human populations expand throughout Latin America, there is continued pressure to convert land for agricultural exploitation. Inevitably, the result is a mosaic of fragmented habitat, which over time places an increasing number of species at risk.

Trapping of birds for the cagebird trade is an additional problem that affects many tanagers, including an unknown number of the species mentioned above, as well as commoner, more widespread ones. The practice continues on an alarming scale, with dozens to hundreds of tanagers, dacnises, honeycreepers and euphonias, as well as cardinalids, fringillids and other small finches, and even fruiteaters (*Pipreola*), offered for sale in thousands of markets all across Latin America on almost any market day. The most highly prized species on offer are, almost invariably, brightly coloured ones, no matter now unsuitable they may be as caged birds. Many of these colourful species are, of course, tanagers, as well as cardinalids, fringillids, emberizids, fruiteaters, parrots and toucans. In addition, a few species are highly sought because they are excellent singers. Tanagers and other small songbirds are, in general, relatively easy to capture by means of a simple and inexpensive technique that involves the placing of a captive, singing bird in a small wooden cage that has several long projecting perches fastened on the outside. The perches are covered with sticky, glue-like tree sap, such as that from a breadfruit tree (*Artocarpus altilis*) or other suitable species; the sap effectively immobilizes any small bird that alights on the perch. In this manner, a single trapper, with a few cages, can capture a remarkable number of birds.

Although many tanagers, as defined by the traditional taxonomy of Thraupidae (see Systematics), are not gifted singers, they are widely sought by trappers for their beautiful colours. A number of species currently classified as emberizids, but genetically closer to tanagers, are excellent singers, among them the seedeaters in the genus *Sporophila* and the seed-finches in *Oryzoborus*. Some of these are highly desired as cagebirds, the Chestnut-bellied Seed-finch (*Oryzoborus angolensis*) being perhaps the most valuable of all because of its beautiful song and its ability to thrive in cages. Indeed, so popular is this species in Suriname and locally in Guyana that an entire subculture of bird-keeping has arisen, one that includes weekend bird singing contests. Champion birds at contests are exchanged for large sums of money and are widely, albeit illegally, exported, as well. The pressure to capture this seed-finch in the wild is so intense that the species is now extremely rare in settled areas across northern Suriname and Guyana, and poachers are expanding their operations illegally into bordering areas where human populations are low and the policing of such large areas is nearly impossible. Many tanagers eat large amounts of fruit in the wild and, perhaps unfortunately, they readily accept it in captivity. Such behaviour makes it relatively easy to keep them in cages. In the same man-

A restricted-range species from the Chocó Endemic Bird Area, the ***Scarlet-breasted Dacnis*** *has an extremely limited distribution in Colombia, where its forest habitat is being lost to a combination of oil palm planting, settlement, logging, ranching and mining, at a rate of 3·8% per year. The bulk of the species' range is in Ecuador, but there its habitat has almost entirely disappeared or become extremely fragmented. Key reserves in both countries are poorly protected. The tanager's population may have fallen by as much as 30% in a decade and it is considered Vulnerable.*

[*Dacnis berlepschi*, Río Silanche Bird Sanctuary, Pichincha, Ecuador. Photo: Dusan Brinkhuisen]





Listed as Vulnerable, the estimated global population of the ***Tamarugo Conebill*** *is around 35,000 individuals. In 1993, its entire breeding range was thought to be just 108 km² of mature tamarugo* (Prosopis tamarugo) *plantations in Chile. Its breeding is timed to coincide with the blooming of tamarugo flowers and the caterpillars which feed on them. Attempts to control these caterpillars with pesticides could affect the entire population. In the meantime, the tamarugo plantations are regenerating and the species may be increasing.*

[*Conirostrum tamarugense*, Chava Valley, Arica, Chile. Photo: Andy & Gill Swash/ WorldWildlifeImages.com]

ner, seedeaters and seed-finches can be maintained on a simple diet of seeds. Irrespective of diet and of appropriateness of a species for confinement, however, a great many of the birds captured and offered for sale die prematurely. Mortality among small passerines in captivity is often extraordinarily high, this being due to a combination of inexperience, neglect and ignorance, on the part of both sellers and buyers, of what is required to keep small, wild-caught songbirds healthy in captivity. Often, the birds are poorly treated, confined in cages that are too small, confined in close quarters with incompatible or inappropriate species, fed inappropriate food items, and subjected to rough transport and handling, excessive noise and heat, poor sanitation, and other abuses. All of these factors can increase stress, result in poor plumage condition and cause abnormally high mortality. Many birds die in transport to markets, even before they can be sold. Still more die as they await the selling process in markets.

The transporting of live birds to markets has taken a heavy toll on a few highly prized species. This is especially true of the large consignments that are transported internationally, often in highly inappropriate ways in order to avoid detection by immigration authorities. The welfare of the individuals being transported is typically of secondary consideration. Euphonias seem always to be in great demand, as are colourful species such as the Seven-colored Tanager, which is intensively pursued in eastern Brazil. Colourful mountain-tanagers, and even such common species as the Blue-grey Tanager, are taken with reckless disregard for the damage being done to wild populations. Sadly, some small seed-eating birds and tanager species are now rare or locally extirpated in areas where trappers have access to large markets. As pressure to capture certain species increases, and because international buyers often pay handsomely for coveted species, trappers now range farther afield, and employ ever more sophisticated methods by which to capture and transport the birds, and to avoid detection by authorities. In certain areas, such as Guyana and eastern Venezuela, trappers now illegally cross international borders on a regular basis in search of productive trapping areas.

There are few data on the number of trapped birds being sold in public markets or being funnelled directly into international smuggling conduits, but the numbers are surely large. Similarly, little information, beyond qualitative observations, is available on the effects of intensive, uncontrolled trapping on bird populations, and there are few baseline data on and little monitoring of numbers passing through markets in heavily trapped areas such as the island of Trinidad, eastern Venezuela, the Andes, the Guianas and Brazil, or of birds being smuggled into countries where international shipment is easier. In Trinidad, for example, where euphonias are widely trapped, the Trinidad Euphonia (*Euphonia trinitatis*), once apparently a common and widespread species, is now rare and difficult to find. Comparable examples exist in many areas across Middle and South America.



The ***Eastern Chat-tanager*** *and the Western Chat-tanager* (Calyptophilus tertius) *are regarded as conspecific by IUCN, which classifies them as Vulnerable. The two subspecies of the Western Chat-tanager are certainly seriously endangered, if not extinct. The nominate race of the Eastern Chat-tanager, from the northern coast of the Dominican Republic, has not been seen in recent years and, it, too, may be extinct. The race* neibae *has reportedly declined dramatically, with recent records mainly from Sierra de Neiba and Ebano Verde Scientific Reserve. Given its very small distribution and rapid decline, the species probably deserves to be ranked as Endangered.*

[*Calyptophilus frugivorus neibae*, Sierra de Bahoruco, Dominican Republic. Photo: Doug Wechsler/ VIREO]



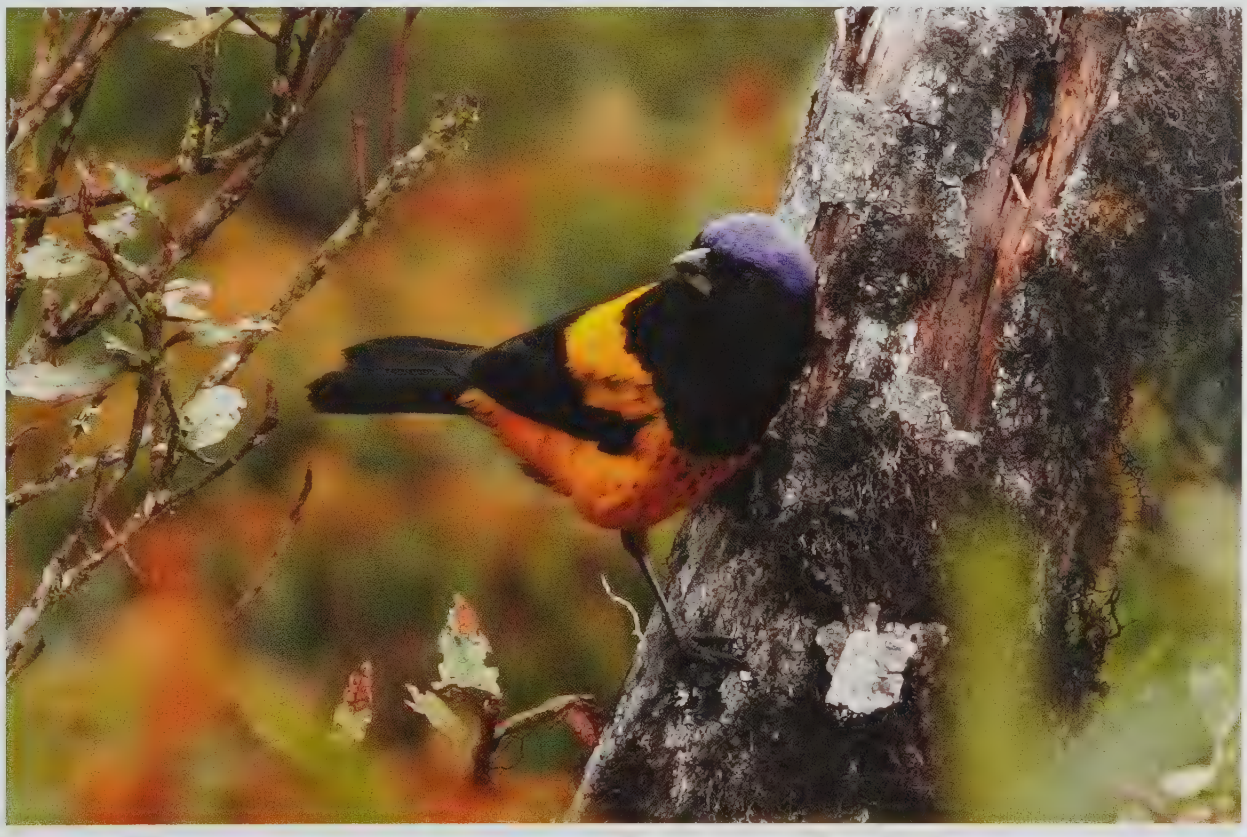
*The **Gold-ringed Tanager**, one of six tanager species listed as Endangered, occurs on the Pacific slope of the western Andes of Colombia, in the Chocó Endemic Bird Area. At Cerro Caramanta, on the Antioquia–Risaralda border, it is common to very common in a large forest block, which is intact from 800–1000 m up to 2000 m or more. A proposed highway, however, will run nearby, opening up the area to logging, mining and settlement. Deforestation has been widespread throughout this species' presumed former range, and has been severe on Cerro Tatamá, where the type locality lies within the Tatamá National Park.*

[*Bangsia aureocincta*, El Cairo, Valle del Cauca, Colombia. Photo: Ketil Knudsen]

While human activities such as deforestation and trapping have had a particularly adverse effect on many tanagers, the impact of some anthropogenic changes has been more benign. For example, the partial clearing of middle-elevation mountain forest for shade-grown coffee production in lower Central America and the northern Andes has had far less impact on the environment and on bird populations than has the production of sun coffee, the planting of bananas or oil palms (*Elaeis guineensis*), or cattle-raising, all of which require complete deforestation. Various tanagers in the genera *Hemispingus*, *Eucometis*, *Tachyphonus*, *Ramphocelus*, *Thraupis*, *Pipraeidea*, *Tangara*, *Tersina*, *Cyanerpes*, *Chlorophanes*, *Hemithraupis* and *Conirostrum* utilize or tolerate shade-grown coffee vegetation and make use of the combination of overstorey trees, shrubby edges and, in some cases, the coffee shrubs themselves. Species of *Euphonia* and *Piranga*, now known to be allied genetically with fringillids and cardinals, respectively (see Systematics), also exploit the layered mosaic of vegetation created by shady coffee plantations. While there are few quantitative studies comparing species richness and persistence over time in these habitats, coffee plantations have been widely cultivated for almost two centuries. In the absence of mature forest, shade-grown coffee plantations provide a habitat that, while anthropogenically compromised, is still capable of supporting a surprisingly rich avifauna, albeit one somewhat different from that which may originally have been present. In contrast, sun-grown coffee and other monocultures now widely planted require no overstorey trees and offer few or no opportunities for utilization by birds. Sun-coffee plantations, as well as oil palms, bananas and other monocultures, are ecologically as disastrous to wildlife as is complete deforestation.

A small number of tanagers have profited from human activities and from degradation and alteration of the landscape caused by humans. Several *Thraupis* species, including the Blue-grey, Sayaca, Palm and Blue-capped Tanagers, several species of *Ramphocelus*, including the Scarlet-rumped, Cherrie's, Lemon-rumped and Crimson-backed Tanagers, and one or more *Tachyphonus*, notably the White-lined and Ruby-crowned Tanagers, are today flourishing in numbers almost certainly higher than those historically. In various ways, each of these species is able to use the mosaic of fields, scattered trees, gardens, shrubs and exotic vegetation that now characterize many rural and urban landscapes. Similarly, Black-faced Tanagers, Burnished-buff Tanagers and Scrub Tanagers, all of which thrive in drier open areas and ranchland, have profited from deforestation and have expanded their ranges into areas previously covered by forest.

There are other thraupids that have adapted to, or are able to utilize human-altered environments to varying extents, but it is unclear whether these species, as a whole, have profited or declined significantly. Examples of these include the Magpie Tanager, Hooded Tanager, Flame-rumped Tanager (*Ramphocelus*



*The estimated global population of the **Golden-backed Mountain-tanager** is just 250–2500 mature individuals and is likely to be declining further as a result of loss of habitat, especially tree-line* Polylepis *and other trees and shrubs of elfin woodland. Restricted to the North-east Peruvian Cordilleras Endemic Bird Area, it is known from five areas on the Cordillera Central, in the Peruvian departments of San Martín, La Libertad and Huánuco. It presumably occurs in the unexplored intervening regions, but has not been found in similar habitat farther north. It is possibly to be found most easily in the Carpish Ridge region at Quilluacocha and Bosque Unchog, in Huánuco.*

[*Buthraupis aureodorsalis*, Bosque Unchog, Huánuco, Peru. Photo: Gunnar Engblom]



*The **Azure-rumped Tanager** is confined to the mountains of the Sierra Madre de Chiapas, in Mexico and neighbouring Guatemala. Unfortunately for the species, its altitudinal range coincides with the optimal land for coffee cultivation. Extremely localized and declining, it is listed as Endangered. All recent Mexican reports are from the buffer zone of El Triunfo Biosphere Reserve. In Guatemala, it is known from eight sites, most of which have some legal protection, and within these very restricted areas it appears to be locally common. Revenue from birdwatching tourism is encouraging local communities to conserve these sites.*

[*Tangara cabanisi*, Los Tarrales Reserve, Atitlán Volcano, Guatemala. Photo: Knut Eisermann]

flammigerus), Blue-and-yellow Tanager, Golden-hooded Tanager, Blue-necked Tanager, Plain-colored Tanager, Red-legged Honeycreeper, Rusty Flowerpiercer and Black Flowerpiercer (*Diglossa humeralis*). The expansion and abundance of a few species, which have profited from human activities, however, mask a less sanguine future for the majority of the Thraupidae, which continue quietly to decline in numbers year after year, along with the magnificent forests that have nurtured and sheltered them for millennia. Over time, some of these declining species may disappear completely. Sadly, their loss is often so gradual that their absence, from one human generation to the next, is scarcely noticed, and the fact that they ever existed at all can fade with succeeding generations.

On the positive side, it is remarkable that, given such extensive environmental change across the Neotropics, extinctions are rare, with far fewer recorded than in northern latitudes. The number of species listed as Critically Endangered or Endangered is also comparatively small. Fortunately, environmental awareness is increasing throughout tropical America and, through the efforts of concerned individuals, conservation organizations and national governments, there is hope that these lovely and interesting birds will continue to enrich our lives and find a place for themselves.



*With a global range of about 1000 km², the Endangered **Black-cheeked Ant-tanager** is found only on the Osa Peninsula and around the Golfo Dulce, in south-west Costa Rica. Its range has been halved by deforestation since 1960. As recently as 1989, it was still fairly common in unprotected forest in the Osa Peninsula area. Since then, it has become increasingly scarce and local outside the Corcovado National Park, Golfito Wildlife Refuge and Golfo Dulce Forest Reserve. Populations in these protected areas remain stable and it is still common in Corcovado, but the Golfito Faunal Refuge is increasingly disturbed and fragmented.*

[*Habia atrimaxillaris*, Costa Rica. Photo: Mike Danzenbaker/ AGAMI]

*Listed as Critically Endangered, the **Cone-billed Tanager** was known only from the type specimen, a male, from an uncertain locality in Mato Grosso, in Brazil, in 1938. It went unrecorded until 1993, when what was thought to be a juvenile or female was seen in Noel Kempff Mercado National Park, in Bolivia. From 2003, there were sightings in Das Emas National Park, in Goiás (Brazil) and in 2006 a population estimated at 100 was found 900 km away in Mato Grosso. There could be as much as 1500 km² of suitable habitat in Emas, where the population is unlikely to be fewer than 50. It may prove more widespread and common than was previously thought.*

[*Conothraupis mesoleuca*, Das Emas National Park, Goiás, Brazil. Photo: Edson Endrigo]



General Bibliography

Anon. (2009a, 2009b, 2010a), Bauer, Pacheco, Venturini, Paz *et al.* (1998), Bauer, Pacheco, Venturini & Whitney (2000), Bellemain *et al.* (2008), Belton (1985), Berlepsch (1911), Bledsoe (1988), Bledsoe & Raikow (1990), Bock (1994), Bohórquez & Stiles (2002), Boie (1826), Brumfield & Edwards (2007), Burns (1997a, 1997b, 1998a, 1998b), Burns & Naoki (2004), Burns & Racicot (2009), Burns, Barker *et al.* (2010), Burns, Hackett & Klein (2002, 2003), Buskirk (1976), Buzzetti & Carlos (2005), Cadena, Córdoba-Córdoba *et al.* (2007), Campbell & Lack (1985), Capparella (1988), Cavalcanti & Alves (1997), Chapman (1917, 1926), Chesser (1994), Chesser & Levey (1998), Clark (1986), Collar *et al.* (1994), Crebbs (1965), Dickinson (2003), Eddleman (2002), Eisenmann (1952), Ellis (1976), Fjeldså & Krabbe (1990), Fjeldså & Rahbek (2006), García-Moreno & Fjeldså (2003), García-Moreno, Navarro-Sigüenza *et al.* (2004), García-Moreno, Ohlson & Fjeldså (2001), Garrido *et al.* (1997), Gelis *et al.* (2006), Gochfeld & Tudor (1978), Gonzaga & Castiglioni (2006), Graves (1982a), Graves & Weske (1987), Greenberg (1981a, 1981c), Greeney (2005), Greeney & Gelis (2006b), Greeney & Nunnery (2006), Greeney & Sheldon (2009), Greeney, Freeman *et al.* (2008), Greeney, Juiña & Sornoza (2006), Greeney, Simbaña *et al.* (2007), Hackett (1996), Haverschmidt & Mees (1994), Hayes *et al.* (1994), Hilty (1974, 1985, 1997, 2003), Hilty & Brown (1986), Hudon (1999), Isler & Isler (1999), Joseph (1996, 1997), Klicka, Burns & Spellman (2007), Klicka, Johnson & Lanyon (2000), Leck (1971b, 1972c, 1975), Levey & Stiles (1992), Lijtmeir *et al.* (2004), Linnaeus (1766), Loftin (1974), Lovette & Bermingham (2002), Marcgraf & Piso (1648), Mauck & Burns (2009), Morton (1976), Mowbray (1999), Moynihan (1962a, 1962b, 1966), Munn (1985, 1986), Munn & Terborgh (1979), Naoki (2003a, 2003b, 2007), Narosky & Di Giacomo (1993), Narosky & Yzurieta (1987), Nores & Yzurieta (1980), O'Neill & Parker (1978), Pacheco (1999), Parker & Goerck (1997), de la Peña (1996b), Pugnali (2007), Raffaele *et al.* (1998), Rahbek *et al.* (1993), Raikow (1978), Remsen & Parker (1984), Remsen *et al.* (2010), Renjifo *et al.* (2002), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 1994, 2009), Robinson, W.D. (1997), Rojas-Nossa (2007), Rosenberg (1990), Sánchez-González *et al.* (2007), Sato, O'hUigin *et al.* (1999), Sato, Tichy *et al.* (2001), Sazima & Sazima (2007), Schaefer *et al.* (2003), Schondube & del Rio (2003, 2004), Schulenberg *et al.* (2007), Sclater (1886), Sclater & Salvin (1859, 1879), Scott & Brooke (1985), Sedano & Burns (2010), Seutin & Bermingham (1997), Seutin *et al.* (1994), Shepard & Burns (2007), Sibley, C.G. (1996), Sibley, C.G. & Ahlquist (1985, 1990), Sibley, C.G. & Monroe (1990, 1993), Sick (1983, 1993), Skutch (1954, 1961, 1962b, 1967a, 1968, 1972, 1976, 1980a, 1984, 1989b), Snow, B.K. (1974), Snow, B.K. & Snow (1971), Snow, D.W. (1976), Snow, D.W. & Collins (1962), Snow, D.W. & Lill (1974), Snow, D.W. & Snow (1964), Stattersfield & Capper (2000), Stattersfield *et al.* (1998), Stiles & Skutch (1989), Storer (1969, 1970a, 1970b), Stotz *et al.* (1996), Terborgh (1989), Terborgh *et al.* (1990), Todd & Carriker (1922), Vandieken (2009), Venturini *et al.* (2005), Vuilleumier (1984a), Webster (1988), Weir *et al.* (2008), Wetmore (1914), Willis (1960a, 1960b, 1960c, 1961, 1966b, 1972), Willis & Oniki (2002), Yuri & Mindell (2002), Zimmer (1942a, 1943a, 1943c, 1944).

*Until a 1998 sighting, the **Cherry-throated Tanager** had not been positively seen in more than 50 years. It was listed as Critically Endangered, but feared extinct. A restricted-range species from the Atlantic Forest Lowlands Endemic Bird Area, it is known from a handful of sites and not reliably found at any of them. Only two groups are definitely known, though a third has recently been confirmed, all at sites in the Espírito Santo montane forest. The Cherry-throated Tanager has been adopted as the symbol of the region, and in 2010 a 37,000 ha "ecological corridor" was designated for the species, with the objective of connecting forest remnants through forest conservation and restoration actions.*

[*Nemosia rourei*, Espírito Santo, Brazil. Photo: Gustavo Magnago]



PLATE 1

inches 2
cm 5



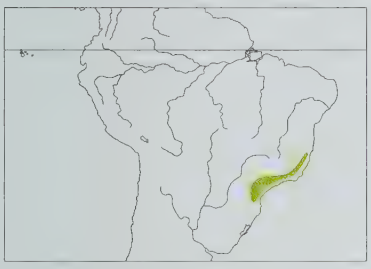
Genus *ORCHESTICUS* Cabanis, 1851

1. Brown Tanager

Orchesticus abeillei

French: Tangara brun **German**: Fuchstangare **Spanish**: Tangara Parda

Taxonomy. *Pyrrhula Abeillei* Lesson, 1839, Rio de Janeiro, Brazil.
Monotypic.
Distribution. SE Brazil from S Bahia S to E Paraná and NE Santa Catarina.



Descriptive notes. 17–18 cm; 31·5 g. Plumage closely resembles that of a *Philydor* foliage-gleaner, but bill thicker, slightly swollen and blackish. Has forecrown, broad eyebrow and face cinnamon, long narrow blackish line from lores extending back through eye to nape; mid-crown and nape brownish, strongly tinged grey, mantle, back and rump medium brown, upperwing-coverts cinnamon-rufous, primary coverts dusky, heavily edged rufous; flight-feathers dusky, edged cinnamon-rufous, more broadly so on inner feathers, tertials mostly cinnamon-rufous with dusky inner webs; tail medium length, squarish, dusky, heavily tinged rufous; throat and underparts, including undertail-coverts, dull cinnamon-buff, underwing-coverts orange-buff; iris dark red; bill blackish; legs horn. Sexes similar. Immature is much like adult, but duller. Voice. Dawn song an extremely high-pitched "sis-sis-sis-sis'sis'sssssssssssssst", the last extended phrase a buzzy, rising hiss, weak and easily overlooked (thin rising phrases, at a distance, resemble some vocalizations of *Thraupis*); day song may be similar to dawn song or varied somewhat, e.g. a few buzzy or lisping notes preceded or followed by very high-pitched, thin jumble of notes. Calls during foraging extremely high-pitched and weak "tsee" or "tee" notes.
Habitat. Mainly humid pre-montane and montane forest; also upper levels of thinned or open woodland, second growth and tall trees around settled areas. At 750–1600 m.
Food and Feeding. Insects; reported also as taking fruit. Forages in pairs and small groups high in canopy. Hops or clambers along shady branches and in foliage; peers at leaf surfaces, probes dead-leaf clusters, bromeliads, moss, lichens, even spider webs, then lunges or sallies for insects. Habitually forages with mixed-species flocks and tends to perch in rather upright posture; in SE Brazil, frequently found in same mixed flocks as very similar-looking Buff-fronted Foliage-gleaner (*Philydor rufum*).
Breeding. Season at least Oct in Rio de Janeiro. In possible instance of courtship display, male and female faced each other, motionless and upright, with wings drooping, tail depressed and spread. One nest found, in bromeliad on side of tree trunk; 2 eggs, presumably from same clutch, were pinkish-white, blotched pale chestnut and dark reddish-brown, with a few lavender specks, mostly at larger end. No other information.
Movements. Not well documented. Birds from at least Espírito Santo and Rio de Janeiro reported as migrating N to S Bahia during coolest months of year.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to fairly common. Inhabits montane forests in Atlantic coast region, and these have suffered less from deforestation than have nearby lowland areas; in N part of range, in Bahia (especially in wintering area), deforestation has been extensive and, moreover, most remaining patches of forest have been damaged or cut and burnt for conversion to agricultural crops and cattle ranching. Occurs in several protected areas, among them Itatiaia and Serra dos Órgãos National Parks, but is now vulnerable because remaining protected areas are isolated, and almost all unprotected areas are at risk of deforestation.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Davis (1945b, 1946), Diamond & Lovejoy (1985), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Ogilvie-Grant (1912), Parker & Goerck (1997), Pelzeln (1869), Pimental (2006), Planqué (2005), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Stattersfield & Capper (2000), Willis (1976b, 1989).

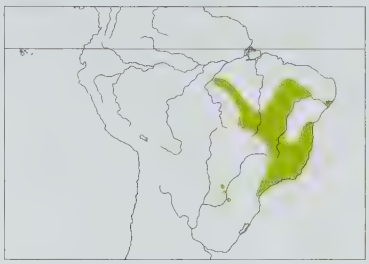
Genus *SCHISTOCHLAMYS* Reichenbach, 1850

2. Cinnamon Tanager

Schistochlamys ruficapillus

French: Tangara cannelle **German**: Gimpeltangare **Spanish**: Tangara Canela

Taxonomy. *Saltator ruficapillus* Vieillot, 1817, Rio de Janeiro, Brazil.
Recent molecular data indicate that present genus, *Cissopis* and *Neothraupis* are one another's closest relatives. Three subspecies recognized.
Subspecies and Distribution.
S. r. capistrata (Wied, 1821) – E Brazil from S Pará, S Maranhão, C Piauí, N Goiás and S Bahia (also E Pernambuco and Alagoas) S to C Minas Gerais.
S. r. sicki Pinto & Camargo, 1952 – E Mato Grosso, in S Brazil.
S. r. ruficapillus (Vieillot, 1817) – E Paraguay, NE Argentina (N Misiones) and SE Brazil (S Minas Gerais S to E Paraná).
Descriptive notes. 16–18 cm; 24–39 g. Nominate race has forehead, lores, ocular area and chin black, forming small but prominent mask, this surrounded by cinnamon-buff which extends to side of head, neck and middle breast; central crown and nape dusky grey, nape and upperparts pearly



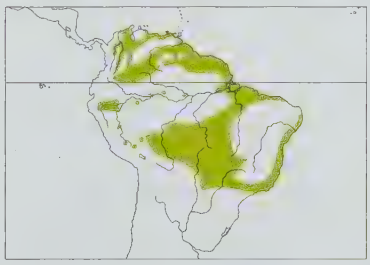
bluish-grey to medium grey; tail dusky grey, medium length; upperwing-coverts mostly grey (inner feather webs dusky, outer webs mostly grey), primary coverts blackish; flight-feathers dusky, edged grey, inner flight-feathers (especially tertials) more broadly edged grey, outer web of tertials entirely grey; flanks light grey to greyish-white, centre of lower breast and belly white, undertail-coverts contrasting rich cinnamon-buff; iris reddish-brown; bill thick, blue-grey, distal half of upper mandible and tip of lower mandible black; legs dusky. Sexes similar. Immature and subadult are similar but duller, with foreface dusky, throat and breast dull buffy yellow (paler than adult). Races differ minimally: *capistrata* is smaller and shorter-tailed than nominate, also duller on head, much paler cinnamon on throat and breast; *sicki* is generally richer and slightly darker in colour tone. Voice. Song a leisurely and exceptionally sweet, musical series of phrases, typically at least some phrases repeated once or twice, e.g. "wee-chur-chur, pur-tee, pur-tee, we-chur, we-tur-tur...", duration c. 4 seconds; some geographical variation in song phrases, but pattern and rich melodic tone easily recognizable; reminiscent of song of a number of *Sporophila* seedeaters. Call rather low-pitched, reedy or slightly hoarse, "jreeet", occasionally doubled; resembles calls of various *Ramphocelus* tanagers.
Habitat. Scrub and bushes in *cerrado* and *caatinga*, low open woods and park-like areas, forest edges, riparian woodland, and brushy partly open terrain. Often in damp or wet areas within dry regions, and reported as numerous in high-elevation grassy meadows and openings in wooded areas. Occurs in open low woody scrub vegetation mixed with grass (*campo sucio*) at W end of range in Chapada region of Mato Grosso. Common in high, cold, montane meadows in Serra do Caparaó and Minas Gerais, and in some areas occurs together with *S. melanopis*. Sea-level to c. 1200 m; locally to 2050 m.
Food and Feeding. Feeds heavily on fruit, including *Morus*, herbaceous pokeweed (*Phytolacca*), also some insects. Of four stomachs examined, one contained only vegetable matter, one only animal matter, and two contained both, including seeds, fruit, Hymenoptera (bees and ants) and beetles (Coleoptera). Forages alone and in pairs in bushes and thickets; may move higher along forest borders.
Breeding. One record of breeding in Dec in S Brazil (Minas Gerais). Clutch 2 eggs, yellowish-white, densely spotted with dark brown. No other information.
Movements. Few data. Possibly migrates seasonally away from parts of C Brazil. In winter months when not breeding, may move locally, gathering around palms planted in settled areas.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Race *sicki* known only from type locality, Xavantina, in E Mato Grosso. Extensive human disturbance and settlement occurs within this species' range as native habitat converted into pastureland and cropland. This species tolerates or is able to utilize a variety of intervened habitats, and is therefore buffered somewhat from near-term risks. Occurs in a number of protected areas, among them Augusto Ruschi Biological Reserve and Itatiaia National Park, both in Brazil. Several recent sight records in and close to Iguazú National Park, in NE Argentina.
Bibliography. Albano (2004), Burmeister (1856), Burns (1997a), Diamond & Lovejoy (1985), Dunning (1982), Erickson & Mumford (1976), Forbes (1881), Fry (1970), Goeldi (1894), Gagliardi (2007a), Ihering (1902), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Moojen *et al.* (1941), Parker & Goerck (1997), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schubart *et al.* (1965), Sick (1985, 1993), de Vasconcelos *et al.* (2005), Zapata (2002).

3. Black-faced Tanager

Schistochlamys melanopis

French: Tangara à camail **German**: Schleiertangare **Spanish**: Tangara Carinegra

Taxonomy. *T.[anagra] melanopis* Latham, 1790, Guiana.
Recent molecular data indicate that present genus, *Cissopis* and *Neothraupis* are one another's closest relatives. Five subspecies recognized.
Subspecies and Distribution.
S. m. aterrima Todd, 1912 – Colombia in middle (probably also lower) Cauca Valley, middle and upper Magdalena Valley, locally Sierra Nevada de Santa Marta area, Perija Mts, and E of Andes in *llanos* (Casanare S to Caquetá and Putumayo and E to Vichada, Guainia and Vaupés), E locally through parts of N & S Venezuela to W Guyana and N Brazil (Cerro Uei-tepui).
S. m. melanopis (Latham, 1790) – E Guyana, Suriname, French Guiana and NE Brazil.
S. m. grisea Cory, 1916 – extreme S Ecuador, and E Peru on E slope of Andes (very locally from Moyobamba and Huarandosa S to Marcapata).
S. m. olivina (P. L. Sclater, 1865) – extreme SE Peru (Pampas del Heath) and adjacent N Bolivia E to SC Brazil (Mato Grosso).
S. m. amazonica J. T. Zimmer, 1947 – Brazil S of R Amazon E to N Ceará, then S to Mato Grosso, São Paulo and Rio de Janeiro, and up E coast to Pernambuco.



Descriptive notes. 17–18 cm; 29–40 g. Slender open-country tanager with grey body and black foreparts. Nominate race has forehead to mid-crown, side of head, throat and chest brownish-black, rear crown and upperparts to uppertail-coverts dull medium grey; central tail feathers dark grey, rest of tail feathers dusky, edged grey; bend of wing white mixed with grey; upperwing-coverts dusky, broadly edged and tipped grey, primary coverts medium grey; flight-feathers brownish-dusky, narrowly edged grey, tertials mainly brownish-grey, outer half of tertial feathers dull grey; underparts below chest pale grey (paler than

On following pages: 4. Magpie Tanager (*Cissopis leverianus*); 5. White-banded Tanager (*Neothraupis fasciata*); 6. Black-and-white Tanager (*Conothraupis speculigera*); 7. Cone-billed Tanager (*Conothraupis mesoleuca*); 8. Red-billed Pied Tanager (*Lamprospiza melanoleuca*); 9. Scarlet-throated Tanager (*Compsothraupis loricata*); 10. White-capped Tanager (*Sericossypha albocristata*); 11. Hooded Tanager (*Nemosia pileata*); 12. Cherry-throated Tanager (*Nemosia rourei*); 13. Rufous-crested Tanager (*Creurgops verticalis*); 14. Slaty Tanager (*Creurgops dentatus*).

upperparts), becoming whitish on centre of belly; underwing-coverts white mixed with grey; iris reddish brown; bill thick, blue-grey with broad blackish tip; legs blackish. Sexes similar. Immature is distinctive, entirely olive with slight yellowish tinge above, paler olive-yellowish below, with narrow eyering (sometimes broken at front and rear) yellowish, tail dusky with olive tinge, wing-coverts and flight-feathers dusky brown with dull olive yellow edgings; older immature has variable amounts of black mottling on face and bib while still in olive plumage. Race *aterrima* is slightly larger than nominate, distinctly black (not brownish-tinged) on head and throat, and back duller grey; *amazonica* is overall darkest race, with more bluish-tinged back, and with face and throat colour intermediate between previous and nominate; *grisea* is like nominate but larger and darker, with slightly bluer tinge on back; *olivina* is intermediate in size and colour between previous and nominate. Voice. Song a musical, rambling series of whistled notes, "Swéet, right here for me", or similar phrase, rising, falling, and often repeated 3–4 times in succession; also a rather weak "tee-tseet-tseet-tseet" and other rambling, disconnected phrases; in Peru described as resembling song of a *Pheucticus* grosbeak or saltator (*Saltator*) but shorter and simpler in structure, "weeo wurchick weeo wurchick, twee-twee-twee". Calls include sharp "swik" and "spit-churt".

Habitat. Dry to moist grassland with scattered shrubs, bushes and scrubby trees, and grassland or grassy slopes with patches of scrubby woody vegetation; less often in low open or thinned woodland. In Brazil in *cerrado*, *restinga*, brushy open country and marshes with patches of shrubs. In all areas readily invades deforested areas opened for pasture and cultivation; now occupies many deforested areas in Andean foothills. Widespread at low elevations, also locally in Andes to at least 1800 m in Venezuela, 1700 m in Colombia; in S Ecuador reported at 650–1700 m (once to 1800 m); in Peru mainly 900–1800 m, but also very locally in E lowlands.

Food and Feeding. Variety of fruits, seeds and arthropods. Stomach contents fruit, berries, seeds, also ants (Formicidae) and other insect remains; of six stomachs examined, two contained only vegetable matter and two only animal matter, and two contained both. A pair in NW Bolívar (Venezuela) regularly ate small, very hot peppers in a garden. Forages singly and in pairs; also, family groups of three or more regularly seen. Perches in shrubs and bushes, often within vegetation, where inconspicuous. Peers around, but not an active forager; most searching consists of some lethargic hopping within confines of a shrub, and then often apt to fly off some distance to another shrub or patch of scrubby vegetation.

Breeding. Recorded in Jan in Suriname and Sept in Brazil (Mato Grosso); in Colombia, birds in breeding condition in Mar–Jun in Andes and Jan and Apr E of Andes. Open cup-nest of grass placed in shrub or grass in grassland; one in Suriname was 0·4 m above ground in grass. Clutch 2 eggs, greyish-white to yellowish-white, thickly streaked and blotched dark brown; no information on incubation and nestling periods. In Brazil, nests reported as frequently parasitized by Shiny Cowbird (*Molothrus bonariensis*).

Movements. Apparently migrates seasonally from parts of C Brazil; elsewhere no movement reported.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common, and widespread. Has profited from deforestation, especially in Andes. First reported in extreme S Ecuador in 1986, and now extending range there; is expected also to spread S from Colombia into NE Ecuador. Occurs in many protected areas over wide range. Within this range extensive suitable habitat exists and, as deforestation continues, even more is becoming available. No serious short-term risks identified.

Bibliography. Allen (1891), Beebe (1909), Burns (1997a), Fry (1970), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Contreras *et al.* (1992), Dunning (1982), Gilliard (1941), Ginés *et al.* (1951), Haverschmidt (1948, 1952, 1968, 1975), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1983, 1986), Isler & Isler (1999), Lysinger *et al.* (2005), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Naumburg (1930), Novaes (1973), Pacheco *et al.* (2007), Peixoto Velho (1932), de la Peña & Rumboll (1998), Quevedo *et al.* (2006), Remsen *et al.* (2010), Salaman *et al.* (2008), Santos (1948), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snethlage (1935a), Snyder (1966), de Vasconcelos *et al.* (2005), Zimmer (1947b).

Genus *CISSOPIS* Vieillot, 1816

4. Magpie Tanager

Cissopis leverianus

French: Tangara pillurion **German**: Elstertangare **Spanish**: Tangara Urraca

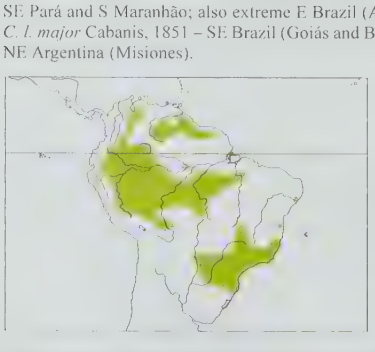
Taxonomy. *Lanius leverianus* J. F. Gmelin, 1788, no locality = French Guiana.

Recent molecular data indicate that present genus, *Schistochlamys* and *Neothraupis* are one another's closest relatives. Two subspecies recognized.

Subspecies and Distribution.

C. l. leverianus (J. F. Gmelin, 1788) – W & E Venezuela (on both slopes of Andes, and S of R Orinoco) E to French Guiana and Brazil (N Roraima), also Colombia (E slope of Andes S from Norte de Santander) S to Bolivia (Santa Cruz) and E across Brazil S of Amazon to C Mato Grosso, SE Pará and S Maranhão; also extreme E Brazil (Alagoas, possibly also Pernambuco).

C. l. major Cabanis, 1851 – SE Brazil (Goiás and Bahia S to N Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).



Descriptive notes. 25–26 cm, 73–86 g (*leverianus*); 29 cm, one male 75·8 g and two females 67·5–71 g (*major*). Large, long-tailed species with bold black-and-white plumage. Nominate race has entire head to upper back, neck, throat and chest to point on mid-breast glossy blue-black, forming shaggy hood; middle back, scapulars, rump and uppertail-coverts white; tail long and strongly graduated, black, feathers with large white tips (visible mainly from below when bird perched); upperwing-coverts black, greater coverts with variable amounts of white but often with just a few white-tipped feathers (less often a few median coverts also with small white tips), lesser coverts usually concealed by long white scapular feathers; flight-feathers black, tertials with broad white edges and rounded tips; underparts below central breast white; iris yellow; bill short and thick, black; legs strong, blackish, tarsus short. Sexes similar. Immature resembles adult. Race *major* differs from nominate in larger size, longer tail, more extensive black on back (only rump white), and tertials more narrowly edged and tipped white or only outer half tipped white. Voice. Not especially vocal. Most often heard are loud, metallic "chink" notes, given as pair flies across clearing; occasionally a thin squealing "sweeeee" and "eechúk". Variable and infrequently heard song a short series of low, raspy notes and rattles followed by a few squeaky notes, e.g. "t-t-t-t-t-ttreeek-treek-treeek, titl-titl-tleechuk-chuk", jerky or irregular. Race *major* often gives rapid 3-syllable phrases; a common phrase in one recording was "swikit swee swee".

Habitat. Shrubby clearings in floodplain-forest or *terra firme* forest, disturbed areas and openings along river edges, on river islands, in plantations and gardens, and in bushy areas along forest borders; also in canopy of rather open second-growth woodland. Lowlands and foothills to c. 1200 m, less frequently to 2000 m in Andes of Venezuela; rarely, to 2000 m in Peru (Urubamba Valley).

Food and Feeding. Arthropods and fruit. Has been noted as taking berries of *Hamelia patens* and *Phytolacca*, and small, hard green buds, and regularly feeds on *Cecropia* catkins. Of 26 stomachs examined, nine contained only vegetable matter and two only animal matter; 15 contained both, including fruit pulp, seeds, spiders (Araneae), caterpillars, and hymenopterans. Usually in pairs or in families of three or four in breeding season; less frequently in groups of five or more when not breeding. May briefly associate with other birds in small fruiting trees, but as a rule not with mixed-species flocks; reported as sometimes associating with Black-throated Grosbeak (*Saltator fuliginosus*) in E Brazil (Espírito Santo). Forages from eye level or lower to well up in tall second growth, and regularly perches on tops of shrubs and or even fairly tall trees. Foraging movements appear to be limited mainly to hopping and peering, sometimes almost in manner of a jay (Corvidae), in fairly open shrubbery and shady second growth.

Breeding. Breeding recorded in Oct in SE Brazil (Rio de Janeiro). Cup-nest of twigs, plant material and grass, occasionally leaves, placed in branch fork and concealed by foliage in shrub or small tree, once 3·5 m above ground; one nest reported 1·4 m up in tree cavity. Clutch 2 eggs, ashy brown to reddish-brown, densely spotted brown; incubation period 12–13 days; nestling period 15 days.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common and widespread. Deforestation has greatly reduced populations in SE & E Brazil. On the other hand, benefits from creation of small clearings and subsequent regrowth of bushy vegetation; has profited from regrowth following extensive forest clearing in Andean foothills. Found in many protected areas across broad range, including Canaima National Park (Venezuela), Iwokrama Forest Reserve (Guyana), Brownsberg Nature Park (Suriname), Amacayacú National Park (Colombia), Yasuní National Park and Cuyabeno Reserve (Ecuador), Manu National Park (Peru), and Serra do Divisor, Pacaás Novos, Iguaçu and Itatiaia National Parks (Brazil).

Bibliography. Belton (1985), Boesman (1998), Burmeister (1856), Burns (1997a, 1997b), Burns & Naoki (2004), Burns *et al.* (2002, 2003), David & Gosselin (2002b), Descourtilz (1852), Goeldi (1894), Goodfellow (1901), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Ihering (1900), Isler & Isler (1999), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Moojen *et al.* (1941), Narosky & Di Giacomo (1993), Naumburg (1930), Nehrkorn (1899), Norgaard-Olesen (1974), O'Neill (1974), Pacheco *et al.* (2007), Parker & Goerck (1997), Pearson (1971), Pelzeln (1869), de la Peña & Rumboll (1998), Penard & Penard (1910), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage & Schreiner (1929), Snyder (1966), Taczanowski (1884), Walker (2001), Weske (1972), Zimmer (1947b).

Genus *NEOTHRAUPIS* Hellmayr, 1936

5. White-banded Tanager

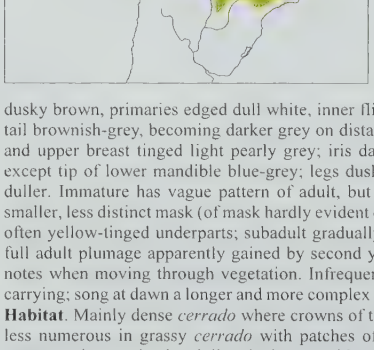
Neothraupis fasciata

French: Tangara unifascié **German**: Flügelbindentangare **Spanish**: Tangara Bandeada
Other common names: Shrike-like Tanager

Taxonomy. *T.*[*anagra*] *fasciata* M. H. C. Lichtenstein, 1823, São Paulo, Brazil.

Recent molecular data indicate that present genus, *Schistochlamys* and *Cissopis* are one another's closest relatives. Monotypic.

Distribution. E & S Brazil (from C Maranhão and C Piauí S to Mato Grosso do Sul, São Paulo and Minas Gerais; also SE Amapá), NE Bolivia and NE Paraguay. Recent record from S Suriname.



Descriptive notes. 16 cm; 26–32 g. Plumage pattern strikingly similar to that of several *Lanius* shrikes of N latitudes. Male has crown, nape and upperparts to uppertail-coverts medium grey, broad black mask extending from forehead through lores and eye to rear cheek and surmounted by narrow white line (usually visible) over and behind eye; bend of wing and lesser and median upperwing-coverts black, median coverts broadly tipped white (forming prominent white wingbar); outer half of greater coverts (bottom half when wing folded) black, inner half dusky with broad grey edges; primary coverts black; flight-feathers dusky brown, primaries edged dull white, inner flight-feathers edged grey, tertials brownish-grey; tail brownish-grey, becoming darker grey on distal third; throat and lower underparts white, chest and upper breast tinged light pearly grey; iris dark reddish-brown; bill thick, mostly dusky, all except tip of lower mandible blue-grey; legs dusky horn. Female is similar to male, but slightly duller. Immature has vague pattern of adult, but is much duller and brownish (less grey), with smaller, less distinct mask (of mask hardly evident on younger birds), smaller white wing patch, and often yellow-tinged underparts; subadult gradually acquires crisp blacks and greys of adult, with full adult plumage apparently gained by second year. Voice. Gives frequent weak high chipping notes when moving through vegetation. Infrequently heard day song short, twittery and not far-carrying; song at dawn a longer and more complex whistled phrase that may be performed as a duet.

Habitat. Mainly dense *cerrado* where crowns of trees shade more than 50% of ground; somewhat less numerous in grassy *cerrado* with patches of semi-deciduous trees 7–15 m high, and least numerous in grassland and disturbed areas with scattered trees. In E Bolivia found in open woodland with thick grass and low bushes. Mostly at c. 500–1100 m, mainly on flat tablelands.

Food and Feeding. Mostly insects and other arthropods; also variety of small fruits, including those of *Annona*, *Miconia*, *Eugenia*, *Palicourea*, *Cascaria* and *Byrsonima*; in Brazil, family groups

observed foraging extensively for nectar in *Pseudobombax*-like blossoms of shrub in Jun in Chapada of Mato Grosso. Of seven stomachs examined, six contained arthropods, including ants (Formicidae), beetles (Coleoptera), spiders (Araneae), and a small land snail (Pulmonata); remaining stomach contained seeds. When not breeding found in groups of 5–12 (average 7), which are often with mixed-species flocks or form core elements of these flocks. Forages extensively by dropping to ground or into grasses and herbaceous vegetation, apparently often to pursue dislodged prey, and regularly spends considerable time foraging by hopping on ground, where it keeps near cover. Also regularly follows fires through *cerrado* to capture insects from ground. When group descends to ground to feed, typically a sentinel remains perched higher. Also forages fairly quickly and steadily through savanna trees and bushes such as *Curatella* and *Byrsonima*, where it peers and picks insects from leaves, branches and trunks, behaviour suggesting that of *Tachyphonus* tanagers.
Breeding. Breeding recorded in Oct–Nov in C Brazil (Goiás). One or more offspring from a previous generation may help with nesting activities. Large, deep cup-nest of twigs and straw, lined with fine grass, usually well hidden among leaves and branches of small tree. Clutch 2–3 eggs (more often 3). No other information.
Movements. Uncertain; reported as possibly migratory in SC Mato Grosso, but no recent mention of seasonal movements.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to fairly common locally. Despite forming small flocks, is seldom very numerous. In Paraguay, recent records from San Pedro and Canindeyú, and historically S to Caaguazú. Much of the *cerrado* habitat across E & S Brazil has been destroyed and converted into farmland for soybeans and cattle pastures. This species' present population (now fragmented) represents only a fraction of the original, and should be monitored. May occur in some or all of the following protected areas: Brasilia, Das Emas, Pantanal Mato-grossense and Ilha Grande National Parks, in Brazil.
Bibliography. Allen (1891), Alves (1990, 1991), Alves & Cavalcanti (1996), Anon. (2010a), Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Butchart & Stattersfield (2004), Cavalcanti & Pimentel (1988), Isler & Isler (1999), Pelzeln (1869), de la Peña & Rumboll (1998), Ragusa-Netto (2002b), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), dos Santos Alves & Cavalcanti (1990), Schubart *et al.* (1965), Sedano & Burns (2010), Sick (1993), Souza (2002), Stattersfield & Capper (2000).

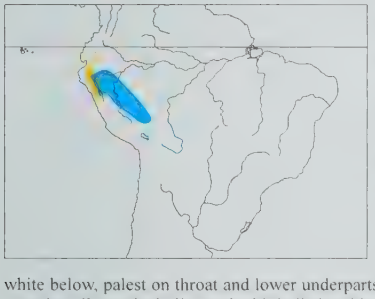
Genus *CONOTHRAUPIS* P. L. Sclater, 1880

6. Black-and-white Tanager

Conothraupis speculigera

French: Tangara à miroir blanc **German**: Spiegeltangare **Spanish**: Tangara Albinegra

Taxonomy. *Schistochlamys speculigera* Gould, 1855, Rio Ucayali, Peru.
Placement of genus in present family has been questioned. Has been suggested that this species could be close to genus *Sporophila*, currently in Emberizidae, or that bill shape is more like that of a fringillid finch. On the other hand, has been suggested that it is conspecific with *C. mesoleuca*, but recent evidence points to the contrary. Monotypic.
Distribution. Breeds W slope of Andes from W Ecuador (Pichincha, Azuay, El Oro and Loja) S to NW Peru (Lambayeque and La Libertad); migrates to E slope and base of Andes (very locally Amazonas, Cajamarca and San Martín) and E lowlands of Ucayali and Madre de Dios, in Peru.



Descriptive notes. 16–16·5 cm; 23–28 g. Male has entire head to throat, upper breast and back black, lower back, rump and uppertail-coverts grey, contrasting black longest uppertail-coverts and tail; upperwing-coverts and flight-feathers glossy black, white band near base of flight-feathers (formed by outer webs of feathers); black of breast sharply demarcated from white centre of lower breast and belly; sides and flanks light grey; underwing-coverts white; iris red-brown; bill fairly thick, mostly pale bluish-grey, tip black; legs dark grey. Female has head and upperparts olive, primary coverts blackish, tail dusky with olive edges; white below, palest on throat and lower underparts, throat very lightly tinged olive-yellow, breast more heavily washed olive and with indistinct blurry olive streaking, lower breast and belly buff-white or tinged yellowish white; weakly indicated broken whitish eyering. Juvenile is like female; immature male like female, but breast more heavily washed yellowish-olive, older male with some black on face and malar area but retains pale eyering. Voice. Song of male a loud, clear "kréé-uung, kréé-uung", repeated several times, with loud, abrupt quality of Scrub Blackbird (*Dives warczewiczi*).
Habitat. Dry deciduous woodland, arid semi-open scrub with grass and borders of humid forest, and second growth or disturbed woodland. Appears to occupy variety of different habitats at different times, not necessarily on regular or seasonal basis; apparently well adapted to dispersing over dry and arid regions in search of localized rainfall for foraging and breeding. Widely scattered non-breeding records from E of Andes in Peru are from forest edges, river borders, second growth and various openings in regions of humid lowland forest. In Ecuador recorded mainly 500–1700 m when breeding (occasionally or locally to 1950 m); in Peru, up to c. 1500 m in dry NW and mostly below 600 m E of Andes.
Food and Feeding. Of 30 stomachs examined, 23 contained only animal matter and seven contained a mixture of plant and animal matter; items included smooth and hairy caterpillars, small spiders (Araneae), a medium-sized orthopteran, moths (Lepidoptera), beetles (Coleoptera), bugs (Hemiptera), a small bee or wasp (Hymenoptera), leaflets, and seeds. Most often seen singly or in pairs or small groups; occasionally reported in flocks of more than 50 individuals. In NW Peru, large flocks foraged mainly in weedy understorey in patches of tall mesquite (*Prosopis*) woodland, where presumed to be searching for insects (but could not be observed or approached in dense vegetation). Forages also in crown or canopy of small trees (3–12 m), where it hops along thin branches and perches upright or reaches out to pick insects from mesquite leaflets. Individuals also may perch quietly for extended periods of time well above ground.
Breeding. Breeds mainly during Feb–May rainy period. Nest in Ecuador a loosely woven untidy cup made from small sticks, twigs and leaf petioles, lined with brown and/or black fungal rhizomorphs, placed up to 1·75 m above ground in shrubbery, hedgerow or small sapling, usually well concealed, sometimes low down (0·5 m) in shrubby weeds; in NW Peru, laying female flushed from thicket of tall grass and weeds on steep slope above ditch may have had nest on or close to ground. Clutch 3–4 eggs, whitish to pale blue with variable amount of reddish-brown and blackish blotches and speckles, markings sometimes concentrated at blunt end; no information on incubation and nestling periods. Parasitism by Shiny Cowbird (*Molothrus bonariensis*) recorded.
Movements. Not well understood; in many areas perhaps only a seasonal or periodic visitor, erratic and unpredictable in occurrence. In general, found in dry to arid regions in W Ecuador and NW Peru during first half of year and then migrates E across Andes into SW Amazonia, but much variation in this pattern. In SW Ecuador and NW Peru seems to be nomadic, appearing and breeding after heavy rains or when rainfall sufficient to produce suitable vegetation; during such times can appear in large single-species flocks. Post-breeders believed to disperse across low Andean passes to E slope or to Amazonia for varying periods of time, but appear not to be resident there; recorded Jun–Sept in Amazonian Peru, but probably present for longer. Evidence to date suggests that the species' presence on E slope or in E lowlands represents periodic dispersal.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Rare to uncommon throughout much of range; locally common in SW Ecuador (especially SW Loja). Status difficult to assess owing to the species' erratic and/or periodic movements; is also generally inconspicuous and hard to see, even when singing. Breeding reported for W slope of Andes in Ecuador and NW Peru, but not for E slope or E lowlands of either country. Heavily dependent on local rainfall; if even marginal scrub and woodland remain intact, threats due to habitat degradation seem unlikely. Fieldwork required in order to clarify its ecological requirements and biology.
Bibliography. Anon. (2010a), Best *et al.* (1993), Burns (1997a), Burns *et al.* (2002, 2003), Butchart & Stattersfield (2004), Carriker (1933, 1934), Coopmans *et al.* (2004), Greeney *et al.* (2006), Ingels (2007), Isler & Isler (1999), Lebbin (2005, 2006a), Meyer de Schauensee (1966, 1970a), O'Neill (1966), O'Neill & Pearson (1974), Remsen *et al.* (2010), Ridgely (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Storer (1960), Taczanowski (1884), Witt (2005), Zimmer (1947b).

7. Cone-billed Tanager

Conothraupis mesoleuca

French: Tangara de Berlioz **German**: Witwentangare **Spanish**: Tangara Picuda

Taxonomy. *Rhynchothraupis mesoleuca* Berlioz, 1939, Juruena, c. 490 km NW of Cuiabá, Mato Grosso, Brazil.
Placement in present family has been questioned. Sometimes placed in a monotypic genus, *Rhynchothraupis*. On the other hand, has been suggested as being conspecific with *C. speculigera*, but new vocal information and knowledge of female plumage (female formerly unknown) indicate that it could be most closely related to White-naped Seedeater (*Dolospingus fringilloides*), currently placed in family Emberizidae. Further research required. Monotypic.
Distribution. W Mato Grosso (upper R Juruena basin) and SW Goiás (Das Emas National Park), in SC Brazil.



Descriptive notes. c. 12–14 cm; one male 15 g, one female 15·5 g. Male is mainly black with greenish gloss; centre of breast and belly white; small white patch at base of primaries, white underwing; iris dark brown; bill thick, pale blue-grey to whitish; legs greyish-brown to black. Differs from *C. speculigera* mainly in smaller size and lack of grey on rump and flanks. Female is plain grey-brown, slightly paler below, with breast pale olive-brown and centre of lower breast and belly buffy white; bill pale dull olive, legs dark brown. Juvenile not described; immature male has darker bill than adult, dark blue-grey, changing to adult colour from base to tip. Voice. Three-part song of male consists of several musical notes, followed by 2 slightly lower-pitched notes extended into trills, and finally a very high-pitched trill, e.g. "tche, tche, tche, tche, tche, tcherrrrrrrrrrrr, tcherrrrrrrrr, tiiiiiiiiiiiiiiiiiiiiii". Also has loud song on descending scale and ending with short metallic "tzi" (Mato Grosso), or faster and ending with even shorter ascending note (Goiás). Both sexes give loud "chank" call, similar to that of *Ramphocelus carbo* but somewhat more metallic.
Habitat. In Mato Grosso inhabits flooded areas along rivers, e.g. seasonally flooded forest and flooded grassland with scattered shrubs and moriche palms (*Mauritia flexuosa*), below c. 120 m; in Goiás, found also in brushy semi-deciduous to evergreen gallery forest, usually near water, and below 300 m. Type specimen said to have been found in bushy vegetation in dry forest in transition zone between Amazonian rainforest and open *cerrado* at c. 200 m (much of this habitat in the region now cleared).
Food and Feeding. Insects; also seeds. In upper R Juruena region (Mato Grosso), seen to catch small aerial insects during rapid sallies, returning to same perch each time; also, frequently observed to eat seeds, including those of bamboo and grasses (including exotics such as *Brachiaria*). Forages singly and in pairs. Generally below 5 m in shrubs; occasionally perches at tops of trees.
Breeding. No information. Apparently territorial.
Movements. No information. Population in Goiás appears largely confined within the boundaries of Das Emas National Park, as almost all surrounding terrain now converted to agricultural use.
Status and Conservation. CRITICALLY ENDANGERED. Uncommon to rare, and very local. Until 2003 known only from a single male specimen, taken in 1938 in WC Brazil, apparently from or near Juruena telegraph post, in Mato Grosso; in 1993, a female/juvenile tanager in Noel Kempff Mercado National Park, in Bolivia, was thought to be of this species, but identity remains unconfirmed (female of present species was at that time undescribed). In 2003, the species was found in Das Emas National Park, in Goiás, where song was tape-recorded, and between then and 2007 there were six sightings, including the first of the female, from four different locations within the park; a few recent sightings of up to three individuals have been made; estimated that the park could contain as many as 250 individuals, although true number likely to be far lower. In 2006, another small population was located 900 km to the NW, along the upper R Juruena and surrounding area, in Mato Grosso; subsequently, a minimum of 40 individuals was recorded at a total of 18 sites there, and the population in this region is thought to number perhaps fewer than 100 individuals. With more information on this species' voice and habitat requirements now available, it could prove to be somewhat more widespread; intensive fieldwork in the appropriate habitats is urgently needed. Protection appears secure at Das Emas National Park, where it has been estimated, perhaps generously, that up to 1500 km² of suitable habitat exist. In W Mato Grosso, the Chapada dos Parecis region (which extends widely across and beyond the upper Juruena basin) contains several areas of potentially suitable habitat not yet visited by ornithologists, and these areas, a mosaic of private and indigenous lands, certainly merit special surveys. A major threat is presented by planned hydro-electric developments on the upper Juruena, which could threaten this species' survival there.

Bibliography. Anon. (2010a), Berlioz (1939), Bond (1951b), Butchart & Stattersfield (2004), Buzzetti & Carlos (2005), Candia-Gallardo *et al.* (2010), Hellmayr (1936), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Souza (2002), Stattersfield & Capper (2000), Storer (1960), Tobias *et al.* (2006), Zimmer (1947b).

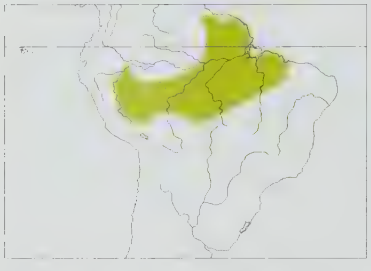
Genus *LAMPROSPIZA* Cabanis, 1847

8. Red-billed Pied Tanager

Lamprospiza melanoleuca

French: Tangara noir et blanc **German**: Rotschnabeltangare **Spanish**: Tangara Piquirroja
Other common names: Red-billed/Pied Tanager

Taxonomy. *Saltator melanoleucus* Vieillot, 1817, French Guiana.
Recent genetic data indicate that this genus is probably not closely related to other thraupids, but no closely related family or sister-taxon has yet been identified; retained in present family pending further information. Monotypic.
Distribution. Lowlands of SE Peru (S Loreto S to Madre de Dios and N Puno) and N Bolivia (Beni) E across C & E Brazil (NW Mato Grosso, E Amazonas and Pará) to Guyana, Suriname and French Guiana.



Descriptive notes. 17–18 cm; 24–42 g, mean 31–32 g. Male has head and entire upperparts including upperwing-coverts, flight-feathers and fairly long tail, glossy blue-black; throat and centre of chest black, white patch on side of chest bordered below by oblique black band from centre of chest to side of body; rest of underparts white, thighs black; iris dark brown; bill thick, bright red; legs brownish-grey to black. Female is similar to male but hindneck, back, rump and uppertail-coverts grey; oblique band on each side of breast often less distinct or mottled with white, and lower underparts often cream-coloured or tinged creamy cinnamon. Juvenile is distinctive, has bill black, head black (not glossy), upper back white, lower back black with white scaling and mottling, rump greyish-white, upperwing-coverts bluish-black with white tips, chin and underparts white, throat and chest white mixed with black, and thigh mixed black and white. Voice. Flocks sometimes quite vocal, giving fairly high-pitched, hard piercing calls, in fairly rapid succession, e.g. "éée-éèh...éée-éée-éèh...éée-éèh-yuu...", sometimes for extended periods of time. Song has similar penetrating nasal quality, a semi-musical but jumbled series of complex phrases and notes, reminiscent of song of an *Oryzoborus* seed-finch, or of a *Sporophila* seedeater delivered at brisk pace.
Habitat. Mainly high canopy and emergent trees of tall to very tall, humid *terra firme* forest, less often at forest borders; to c. 900 m.
Food and Feeding. Observed to feed on *Cecropia* catkins. Stomach contents included berries and seeds, also beetles (Coleoptera). Wide-ranging, and usually seen in groups of 3–8 individuals that forage high in canopy and in crown of emergent trees; pairs and groups occasionally descend to middle levels or lower at forest borders. Groups may associate with mixed-species flocks, mainly those containing other tanagers, honeycreepers and other species of canopy and emergent trees, but seem not to forage for extended periods of time with them; also encountered independently of mixed flocks. Will forage with other species at fruiting trees. Groups often leave a fruiting tree or high foraging site and fly long distance over top of canopy, calling, only to return a short time later. Foraging territories of groups seem quite large, perhaps 2–3 times as big as that of the mixed flock with which associated. In Suriname and elsewhere, perches horizontally, often on fairly large open branches (8–10 cm in diameter). Forages by hopping mostly along open branches and peering downwards to inspect sides of branch; reported also as leaping back and forth among larger open limbs in crown of tall tree, opening wings only once or twice to cover distance of c. 3–6 m, possibly capturing insects in air.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon. Occurs at low density, in part because of large foraging territories. Requires mature *terra firme* forest. Has reasonably large range, and no obvious threats.
Bibliography. Burns (1997a), Burns *et al.* (2002, 2003), Haverschmidt (1948, 1968), Haverschmidt & Mees (1994), Hilty (2009b), Marantz & Zimmer (2006), Munn (1985), Naumburg (1930), Oren & Parker (1997), Pacheco *et al.* (2007), Pearson (1975a), Pelzeln (1869), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Willis (1977), Yuri & Mindell (2002), Zimmer (1947b).

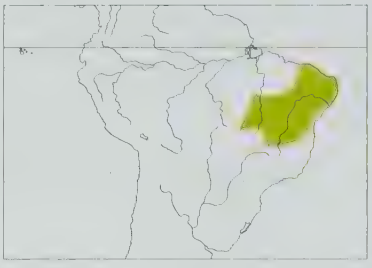
Genus *COMPSOTHRAUPIS* Richmond, 1915

9. Scarlet-throated Tanager

Compsothraupis loricata

French: Tangara à gorge écarlate **German**: Rotbrusttangare **Spanish**: Tangara Gorjirroja

Taxonomy. *Tanagra loricata* M. H. C. Lichtenstein, 1819, NE Brazil (possibly Ceará).
Sometimes placed in genus *Sericossypha*, which it closely resembles in size, plumage and certain external morphological characters (e.g. tarsal scutellation, rounded non-operculate nostrils, weak rictal bristles, and bill shape); differs, however, primarily in having nostrils exposed (not covered). Retained in its own monotypic genus pending molecular data, but argument for maintaining this seems weak; behaviour suggests a sluggish *Thraupis* tanager, and many observers have remarked that it appears remarkably icterid-like in field. Monotypic.
Distribution. E Brazil from E Maranhão, Piauí, Ceará, Pernambuco and Alagoas S to WC Goiás and N Minas Gerais.



Descriptive notes. 21 cm; one male 72·5 g. Large, long-tailed and icterid-like in appearance. Male is glossy blue-black, except for scarlet throat and centre of chest; base of feathers of back and flanks white (not visible in field); bare black circumorbital area extends somewhat behind eye; iris dark brown; bill fairly stout, black; legs strong, dusky grey. Female is similar to male, but entire plumage, including throat and chest, black. Subadult male is like female, but duller. Voice. Call a loud icterid-like "chirt" or "kyuh", often repeated over and over (especially when in flight). Dawn song essentially a more ringing version of this same note, a single penetrating "kyeh" or "kyuh" repeated at intervals of c. 1 second, with only infrequent short pauses, sometimes for up to 45 minutes at dawn, rarely during day.
Habitat. *Caatinga*, gallery woodland and other semi-open areas near marshes, lagoons and rivers, generally not far from water; at 200–1000 m.
Food and Feeding. Stomach contents insects. Found in pairs, trios or, more often, small groups of up to c. 6–8 individuals, even when nesting; red-throated males usually greatly outnumbered by females, although flocks usually have at least one adult male. Sometimes seen in company of various icterids. Conspicuous, rather slow-moving and sometimes unwary. May perch on high exposed branch for extended periods.
Breeding. In display, male reveals white feather bases on back. Nest hidden in dense palm crown, in woodpecker (Picidae) hole in *Mauritia* palm snag, or in (or perhaps on top of) old stick nest of Caatinga Cacholote (*Pseudoseisura cristata*), carrying long sticks to add to nest. Seen to attack hawk (Accipitridae) near nest. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon. Extensive deforestation continues within the rather small range of this species, and its remaining suitable habitat is fragmented. In need of monitoring.
Bibliography. Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Pinto (1954), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Souza (2002), Zimmer (1947b).

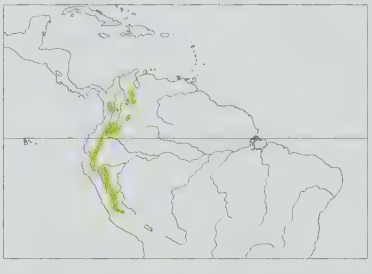
Genus *SERICOSSYPHA* Lesson, 1844

10. White-capped Tanager

Sericossypha albocristata

French: Tangara à coiffe blanche **German**: Weißkappentangare **Spanish**: Tangara Coroniblanca

Taxonomy. *Tanagra* (*Lamprotes*) *albo-cristatus* Lafresnaye, 1843, Colombia.
Despite numerous earlier suggestions to the contrary, morphological and genetic data support placement of this species within present family. Molecular-genetic data indicate that present genus and *Nemosia* are probably sister-taxa. Monotypic.
Distribution. SW Venezuela (Andes of S Táchira); and Colombia locally in E Andes (Norte de Santander), locally on both slopes of C Andes (Caldas–Tolima border), W Andes in Antioquia (La Linda, near city of Jardín) and head of Magdalena Valley in Huila S through Cauca and Nariño to Ecuador and C Peru (Junín).



Descriptive notes. 23–24 cm; 95–125 g. Large, with fairly stout bill small for size of bird; icterid-like in appearance. Male is mainly glossy blue-black with conspicuous plush-like white feathering on lores and forecrown extending to mid-crown; throat and chest rich crimson; iris dark brown; bill blackish; legs strong, dusky grey. Female is similar to male, but throat and chest dark dusky crimson, considerably darker and less conspicuous than that of male. Immature has white crown, but rest of plumage entirely matt black. Voice. Typically noisy, and heard well before seen. Gives loud, piercing "péééèaap!", sometimes followed by 1 or 2 shrieking "kéép" notes; also "kip" and "peeer", and "peeeur", irregularly or up to 40 notes per minute, at least some of which are doubtless contact notes to keep wide-ranging and rapid-moving flock-members together. Also gives same note or notes from perch, sometimes for lengthy period (up to 9 minutes recorded), turning from side to side or leaning forward with each note, but not changing perch.
Habitat. Humid and wet montane forest, especially mossy higher-elevation forest; less often along forest borders or tall second growth. Recorded at 1600–3200 m in Colombia, c. 1750–3000 in Ecuador (sight records to 1400 m), and c. 1700–2800 m in Peru; everywhere most numerous c. 1900–2700 m.
Food and Feeding. Of seven stomachs examined, two contained only vegetable matter, four only animal matter, and one both; contents included fruit pulp, seeds, ants, wasps and bees (Hymenoptera), beetles (Coleoptera), dipteran larvae, and a snail (Pulmonata) shell. Surprisingly few field observations of prey captures or food items taken; has been seen to eat *Cecropia* catkins, and some evidence in E Ecuador suggests that larvae of paper wasps (Vespidae) may be an important dietary item. Forages and travels in wide-ranging, wandering groups of 4–8 and occasionally up to 20 individuals; in Peru groups typically contain only one adult male, suggesting that some are family groups. Usually not with mixed-species flocks, although occasionally loosely associated with jays (Corvidae) or mountain caciques (*Cacicus*). Forages mostly in upper levels or canopy of trees, occasionally in tops of bushes and smaller trees at forest borders. Flock-members usually remain fairly close together, peer, posture and cock tail in jay-like fashion, and hop and leap boldly up through trees. Members of group often forage in two or three trees within a small area and then all fly off, some straggling along, to a new site, either nearby or up to hundreds of metres away, suggesting that foraging or home ranges are very large. Has been noted as sailing down slopes with wings open.
Breeding. One nest found, on E slope of Andes in Ecuador (between Baeza and Cosanga, at 2000 m): rather large, weakly constructed cup of rootlets and pale fibres, hidden by fronds; up to four

adults (three males, one female) brought food, possibly wasp larvae, up to three adults arriving simultaneously in nearby tree, but visiting nest singly; one nestling fledged on c. 22nd Jan. No other information.
Movements. May wander seasonally; in S Colombia, noted only Jan to late Apr and in Jun in Cueva de los Guácharos National Park.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common; declining. Deforestation and fragmentation of forest within its high-Andean range represent a significant threat, because groups require fairly large tracts of montane forest for foraging. Occurs in several larger protected areas, among them Tamá, Cueva de los Guácharos and Puracé National Parks (Colombia), Podocarpus National Park (Ecuador) and Tingo María National Park (Peru).
Bibliography. Burns (1997a), Burns *et al.* (2002, 2003), Fjeldså & Krabbe (1990), Goodfellow (1901), Greeney *et al.* (2007), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Morony (1985), Phelps & Phelps (1963), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Zimmer (1947b).

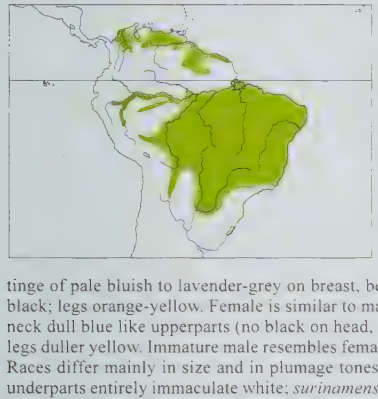
Genus *NEMOSIA* Vieillot, 1816

11. Hooded Tanager

Nemosia pileata

French: Tangara coiffe-noire **German**: Schwarzkappentangare **Spanish**: Tangara Encapuchada

Taxonomy. *Tanagra pileata* Boddaert, 1783, Cayenne, French Guiana.
Molecular-genetic data indicate that present genus and *Sericossypha* are probably sister-taxa. Six subspecies recognized.
Subspecies and Distribution.
N. p. hypoleuca Todd, 1916 – NW Colombia (Córdoba E in coastal region to Magdalena and S in Magdalena Valley to S Cesar) and N Venezuela (Zulia and Lara E to Distrito Federal, Delta Amacuro and N Bolívar).
N. p. surinamensis J. T. Zimmer, 1947 – Guyana and Suriname.
N. p. pileata (Boddaert, 1783) – French Guiana and WC Brazil (S of R Amazon between R Madeira and R Tapajós) S to extreme N Bolivia.
N. p. interna J. T. Zimmer, 1947 – CN Brazil in lower R Negro and upper R Branco regions.
N. p. nana Berlepsch, 1912 – NE Peru and W Brazil (E to lower R Madeira).
N. p. caerulea (Wied, 1831) – E & S Brazil (S of R Amazon and E of R Tapajós), and extreme SE Peru E to E Bolivia, Paraguay and NW & NE Argentina.



Descriptive notes. 12 cm; 12–22 g. Male nominate race has crown and side of head black, this extending down onto side of neck and narrowly to side of chest; upper lores (from top of bill to top of eye) pure white; nape and entire upperparts light porcelain-blue, tail dull porcelain-blue; lesser and median upperwing-coverts pale porcelain-blue (like back), greater coverts pale porcelain-blue and rather broadly edged dull white, primary coverts blackish; flight-feathers blackish, edged light grey-blue, tips of primaries blackish, tertials light grey-blue, inner webs fading to dusky; throat and underparts white, tinge of pale bluish to lavender-grey on breast, belly and sides; iris yellow; bill fairly heavy, all black; legs orange-yellow. Female is similar to male but duller blue, has crown, side of head and neck dull blue like upperparts (no black on head, neck or chest), lower mandible pale yellowish, legs duller yellow. Immature male resembles female, and may be sexually mature in this plumage. Races differ mainly in size and in plumage tones: *hypoleuca* is similar in size to nominate, but underparts entirely immaculate white; *surinamensis* is larger than nominate, and relatively darker above; *nana* differs from nominate in smaller size and overall darker coloration; *interna* is similar in coloration to nominate but smaller (thus similar in size to previous, but with paler upperparts); *caerulea* is largest and has palest upperparts of all races. Voice. Dawn song a high, insistent "tsip-tsip ti-chéw ti-chéw" or variant. Calls high-pitched, lisping "tic" and "sip" notes; when excited "tic, tic-ttttttttttttttttt", and other chips and trills.
Habitat. Moist deciduous and humid evergreen woodland, mostly in semi-open situations, pastures with scattered open trees, along woodland borders, and in irregular second growth, often in vicinity of water; may occur also at edge of mangroves. In vast Amazonian range mainly restricted to lighter *várzea* woodland and borders and in early to middle successional vegetation, especially on river islands and along riverbanks, where often seen in *Cecropia* trees. Lowlands to c. 600 m, locally to 1300 m.
Food and Feeding. Insects, infrequently fruit; reported to eat *Miconia* berries. Four stomachs contained only animal matter, including beetles (Coleoptera), hymenopterans (including ants and bees), bugs (Hemiptera, including homopterans), caterpillars, and spiders (Araneae). Found in pairs, families, or groups of up to half a dozen, which forage in single-species groups or, occasionally, in loose association with other species. Stays mostly on rather substantial open, upper branches (much less on twigs) within open trees, where it hops along rather deliberately, almost like a vireo (Vireonidae), peering at bark surfaces or leaf petioles and gleaning and picking insects. Often attracted to flowering trees, whether for nectar or for insects not determined; occasionally gleans or hovers around leaves. Most often seen in *Cecropia* and Leguminosae trees, where group attracts attention with occasional outbursts of chipping and twittering.
Breeding. In the Guianan region breeding may occur during short dry season (Feb/Mar–Apr) and again during longer Aug–Dec dry season, indicating either a bimodal pattern or a protracted season, occurring in most of year except during wettest months: in Suriname, nest-building observed Jul and Aug, occupied nest found in Dec, and fledglings recorded Oct and Feb; in French Guiana, two nests being built in Feb and pair feeding a juvenile in Mar; fledgling observed in Oct in E Venezuela. Nest built by both sexes, in French Guiana and Suriname a thin open cup constructed from dry weeds, tendrils, dead leaves, grass and spider webs, appears fragile; placed c. 8–12 m up in relatively open branch fork, usually exposed to partial or full sun, sometimes in isolated tree in clearing and somewhat away from forest. Clutch 2 eggs, bluish, spotted with brown or lilac-grey; no information on incubation and nestling periods.
Movements. Resident over most of range. Some seasonal movements may occur in *llanos* region of Colombia and Venezuela; seasonal movements possible in extreme S of range in S Brazil, Paraguay and N Argentina.
Status and Conservation. Not globally threatened. Fairly common throughout its large range; often locally distributed and seldom numerous. Found in a few protected areas, but much more widely in unprotected and partly disturbed areas. Because this species favours forest edge and semi-open situations, it may benefit locally from partial deforestation and opening of formerly forested areas; examples of partially cleared areas where this species occurs include ranchland at S end of L Maracaibo, in W Venezuela, and ranchland S of Tumeremo, in E Venezuela, and abandoned citrus plantations near Meerzog (Paramaribo), in Suriname; also regular in young second growth (i.e. *Cecropia*) on Amazonian river islands in NE Peru. Overall, seems to be at little risk in the short term, although populations of extreme E Brazil are almost certainly declining because of deforestation.
Bibliography. Belton (1985), Burns (1997a), Burns *et al.* (2002, 2003), Dugand (1947), Estela *et al.* (2000), Friedmann & Smith (1950), Haverschmidt (1948, 1952, 1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Narosky & Di Giacomo (1993), Naumburg (1930), Pacheco *et al.* (2007), Parker & Goerck (1997), de la Peña & Rumboll (1998), Penard & Penard (1910), Phelps & Phelps (1963), Renaudier *et al.* (2008), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage, E. (1914), Snethlage, H. (1927, 1928a, 1928b), Snyder (1966), Souza (2002), Thomas (1982), Todd & Carriker (1922), Tostain *et al.* (1992), Zimmer (1947a).

12. Cherry-throated Tanager

Nemosia rourei

French: Tangara rougegorge **German**: Rubinkehltangare **Spanish**: Tangara Golirroja

Taxonomy. *Nemosia Rourei* Cabanis, 1870, locality uncertain, probably Rio de Janeiro, Brazil.
Type locality was for long regarded as Muriaé, in SE Minas Gerais, but this now questioned, and hypothesized that type specimen is, in fact, from Macaé, in S Rio de Janeiro. Molecular-genetic data indicate that present genus and *Sericossypha* are probably sister-taxa. Although this species has for long been placed in present genus, it is vocally closer to *Lamprospiza*. Monotypic.
Distribution. Espírito Santo and probably also adjacent Minas Gerais, in E Brazil.



Descriptive notes. 12·5–14 cm; 22 g. Has crown pale pearl-grey with some white at margins, contrasting strongly with broad black mask across forehead and extending back through eye to nape; rest of upperparts bluish pearl-grey becoming paler again on rump and uppertail-coverts; wings black with outer edges of tertials mostly whitish-grey, tail black; throat and chest scarlet, this colour extending down to a point on upper breast (size and position of patch apparently somewhat variable), rest of underparts white except for a little black on rear of thigh; iris amber-yellow to deep amber; bill blackish; legs pinkish-grey to pinkish-flesh. Sexes apparently similar. Presumed immature has throat patch tinged brownish. Voice. Almost always noted first by voice. Call a loud, sharp, penetrating and somewhat nasal "péuuu, péuuu-see'ee", last 2 notes very high-pitched and uttered quickly; or almost any of above notes singly, doubled or in various combinations, e.g. "péuuu", or "péuuu, péuuu-see'se-péuuu", and so on. Also weaker, high-pitched "ti" notes, singly or in longer series, sometimes in rapid series. Song not certainly known, but has been suggested that loud penetrating vocalizations described above represent a song.
Habitat. Dense humid hill forest and forest borders ("Atlantic Dense *Ombrophyllous* Montane Forest"), especially with tall trees, extensive epiphytic growth, and palms (of genus *Euterpe*). Sporadic observations in coffee plantations, eucalypts (*Eucalyptus*) and pines (*Pinus*) seem to be related to movements between more suitable forest patches. Recorded at c. 850–1250 m.
Food and Feeding. Recorded food items include caterpillars, a butterfly (Lepidoptera), an ant (Formicidae) and other small arthropods; has been seen to forage in eucalypt flowers. Most recent observations have been of birds travelling in wide-ranging, monospecific groups of 2–8 individuals; occasionally singles seen, with groups of 2–3 the norm. Less often (c. 35% of time) found with or near mixed-species flocks in canopy and upper levels of humid forest. Sirystes (*Sirystes sibilator*) being a frequent flock associate, as is Chestnut-crowned Becard (*Pachyramphus castaneus*) and *Hemithraupis ruficapilla*; larger flocks in which present species seen appear always to contain other tanagers, as well as woodpeckers (Picidae), woodcreepers (Dendrocolaptidae), ovenbirds (Furnariidae), tyrant-flycatchers (Tyrannidae) and cotingas (Cotingidae). Extremely low rate at which groups are encountered suggests that these birds have large home ranges. Forages by hopping along branches and peering first on one side and then on the other, and by gleaning from leaves. One individual which captured a large lepidopteran was pursued by *Thraupis ornata*; another was attacked unsuccessfully by a Black-necked Araçari (*Pteroglossus aracari*).
Breeding. Nest-building observed once, on 25th Nov: two birds bringing moss to a shallow natural depression at base of medium-height branch adjacent to a main trunk, third individual present but did not bring material, and fourth individual nearby seen to carry small twig; not observed to bring any other nest material. In possible courtship display in Oct, one individual (probably male) faced another on a high branch, held wings half-open, perpendicular to body, and weakly fluttered them while slightly raising head and calling quietly. No other information. Recorded longevity more than 6 years.
Movements. No information.
Status and Conservation. CRITICALLY ENDANGERED. Restricted-range species: present in Atlantic Forest Lowlands EBA. Rare, declining and poorly known. Global population assessed at fewer than 250 individuals within total estimated range of c. 31 km². Until a 1998 sighting, and a scattering of more recent sightings, the species had not been positively seen in more than fifty years and was feared extinct. Rediscovered in 1998 in mountains of Conceição do Castelo (20°19' S, 41°17' W) at privately owned Fazenda Pindobas IV, in S Espírito Santo, and subsequently seen there by a number of observers; in 2003–2004 reported in Espírito Santo from Mata do Caetés, at c. 1100–1250 m in Vargem Alta municipality, where up to eight individuals have been seen; probable sighting also at Fazenda Pedra Bonita, in Minas Gerais, but recent surveys failed to confirm this report. Other sites with "probable" records are being investigated. Rio de Janeiro National Museum reportedly once held two additional specimens, both subsequently lost. Still threatened with extinction, this enigmatic bird is known from only a handful of sites and is not reliably found at any of them. At present only two groups definitely known, a group of about six at Pindobas IV

and the other of at least eight at Caetés, both sites in Espírito Santo montane forest. Recent observations suggest that a small population exists also at Augusto Ruschi Biological Reserve. Small number of records, despite intensive searches, doubtless reflects the species' extreme rarity, and now, as a result of massive deforestation, it is very patchily distributed, being confined to only a few small, isolated reserves. During a recent year of fieldwork devoted to assessing its status and ecology, only eleven records were obtained. Intensive biological surveys in Espírito Santo and Minas Gerais continue. Present population estimates range from minimum of 14 known individuals to estimated maximum of c. 250. The major threat to this species is forest destruction, which continues, and consequent fragmentation of habitat. Associated threats include quarrying for limestone, granite and marble (including use of explosives), illegal palm extraction, expansion of coffee plantations, small-scale firewood-cutting, and larger-scale timber-cutting, including for charcoal production. In 2010, the government of the state of Espírito Santo signed a decree that will help to save this species, one of the rarest birds in Brazil. This decree recognizes ten "Ecological Corridors" as priority areas for conservation of Espírito Santo's biodiversity: these are Saíra-apunhalada, Córrego do Veado, Pedra do Elefante, Sooretama–Comboios–Goytacazes, Alto Misterioso, Centro Norte Serrano, Duas Bocas–Mestre Álvaro, Guanandy, Bururama–Pacotuba–Cafundó, and Caparaó. The objective is to reconnect Atlantic Forest remnants by developing forest conservation and restoration actions, and promoting sustainable activities and proper soil management. This species has been adopted as the symbol of the region, thereby raising its profile and contributing to campaigns for the conservation of its forests.

Bibliography. Anon. (2010a), Bauer, Pacheco, Venturini, Paz *et al.* (1998), Bauer, Pacheco, Venturini & Whitney (2000), Butchart & Stattersfield (2004), Isler & Isler (1999), Jacomelli (2008), Pacheco (1998, 1999), Ridgely & Tudor (1989, 2009), Scott (1997), Scott & Brooke (1985), Sick (1979, 1985, 1993, 1997), Sick & Teixeira (1979), Souza (2002), Stattersfield & Capper (2000), Venturini & Rehen (2000), Venturini, Rehen *et al.* (2000, 2001), Venturini, Rogerio de Paz & Kirwan (2002, 2005).

Genus *CREURGOPS* P. L. Sclater, 1858

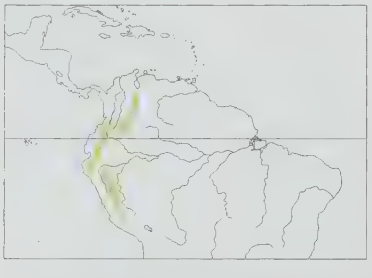
13. Rufous-crested Tanager

Creurgops verticalis

French: Tangara à cimier roux **German**: Ockerschopftangare **Spanish**: Tangara Crestirrufa

Taxonomy. *Creurgops verticalis* P. L. Sclater, 1858, Rio Napo, eastern Ecuador.
Forms a superspecies with *C. dentatus*. Monotypic.

Distribution. W Venezuela (Táchira), and Andes from Colombia (patchily W & C Andes, including both slopes in Nariño, head of Magdalena Valley in Huila; spottily on entire E slope of E Andes) S on W slope to extreme NW Ecuador (Carchi), and throughout E slope of Ecuador S to C Peru (Junín and N Ayacucho).



Descriptive notes. 15 cm; 21–27 g. Notably heavy bill has small "tooth" near tip of cutting edge of upper mandible, visible in the hand. Male has crown and side of head to below eye leaden grey, with broad cinnamon-rufous crest narrowly bordered black (crest usually held flat); nape and upperparts, including upperwing-coverts, uppertail-coverts and tail, leaden grey; flight-feathers dusky, edged leaden grey, tertials mostly leaden with dusky inner webs; chin, throat and entire underparts to undertail-coverts cinnamon-rufous; iris dark red to reddish-brown; bill stout, blackish; legs brownish-grey. Female is similar to male, but lacks rufous crest and has underparts slightly paler. Immature male is like female, but grey of upperparts mixed with buff, crown patch usually undeveloped. Voice. Often rather quiet. Song (or possibly calls) a rather high series of short phrases, "pit-sa, pit-sa...sa-pit, sa-pit, sa-pit...sa-pit...pit-za", without much clear pattern. Calls include lower-pitched "chup" notes and various undistinctive "sit" and "seet" notes.

Habitat. Humid and wet mossy montane forest, and occasionally along forest borders; primarily a cloudforest species. At 1600–2700 m in Colombia, 1500–2800 m in Ecuador, and 1100–2400 m in Peru; recorded at c. 1800 m in Venezuela.

Food and Feeding. Primarily an insectivorous species; eats some fruit. One stomach contained only animal matter, another both vegetable and animal matter, including fruit pulp and insects. Usually in pairs, associated with mixed-species flocks containing New World warblers (Parulidae), and *Conirostrum* and other tanagers. Hops along bare or mossy limbs in canopy or subcanopy, and works out into terminal foliage, where it probes, pecks and reaches out or up, or hangs downward to glean insects from leaves. May opportunistically sally or flutter short distances to air. Fairly active and energetic, but not so restless as smaller *Hemispingus* and *Tangara*.

Breeding. In Colombia, two males in breeding condition in Jun at N end of W Andes and, in C Andes, one in Jun in Antioquia and one in Mar in S Huila; juvenile in Aug in Huila, another in Dec in E Nariño. No other information.

Movements. None recorded.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common. In Venezuela, known only from a few records near Colombian border. Deforestation within this species' range is widespread, especially in Colombia and Ecuador, but it occurs in numerous protected areas, including Tamá National Park (Venezuela), and Las Orquídeas, Tatamá, Farallones de Cali and probably Cueva de los Guácharos National Parks (Colombia), as well as the Río Blanco Reserve, in Caldas (Colombia), also Cayambe-Coca Ecological Reserve and Sangay, Podocarpus and Sumaco-Galeras (and other) National Parks, on Ecuador's E slope, and Cordillera de Colán and Tingo María National Parks, in Peru. Despite fragmentation of its range through deforestation, it should survive also in intact habitat in many unprotected areas.

Bibliography. Burns & Racicot (2009), Burns *et al.* (2003), Echeverry-Galvis & Córdoba-Córdoba (2007), Fjeldså & Krabbe (1990), Graves (1983), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Remsen *et al.* (2010), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg *et al.* (2007), Zimmer (1947a).

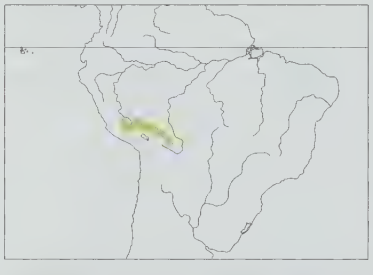
14. Slaty Tanager

Creurgops dentatus

French: Tangara ardoisé **German**: Schiefertangare **Spanish**: Tangara Pizarrosa

Taxonomy. *Malacothraupis dentata* P. L. Sclater and Salvin, 1876, Tilotilo, La Paz, Bolivia.
Was earlier placed in a separate genus, *Malacothraupis*. Forms a superspecies with *C. verticalis*. Monotypic.

Distribution. E slope of Andes from SE Peru (Cordillera Vilcabamba, in Cuzco) S to Bolivia (Cochabamba, possibly also Santa Cruz).



Descriptive notes. 14 cm; 16–20 g. Male has conspicuous chestnut cap extending from bill to nape, bordered narrowly with black at side; otherwise, plumage almost entirely slate-grey above and below, including wing-coverts, flight-feathers and tail; iris reddish-brown; bill strong, blackish; legs greyish-horn. Female is rather different, with dark grey crown bordered by long, narrow white supercilium, and dark grey lores and area back through eye; chin and upper throat white, merging into bright rufous on side of neck, chest, breast and sides and flanks, with centre of lower breast, belly and undertail-coverts white. Immature and subadult resemble female, but much duller, underparts mottled dingy greyish-white, with rufous tinge on breast. Voice. Calls during foraging a rather rough, burry "zurrk" and various high-pitched "sik" and "seet" notes, much like those of many other tanagers. No song yet recorded.

Habitat. Humid and wet montane forest and tall, humid second growth; primarily a cloudforest bird. Recorded at 1200–2500 m.

Food and Feeding. Arthropods, relatively little fruit. Contents of five stomachs were insects, including beetles (Coleoptera). Normally found singly or in pairs, foraging with mixed-species flocks containing other tanagers, especially *Tangara*. Forages mainly in upper part of trees; on steep, broken forest hillsides also regularly found in shrubs or lower woody vegetation, as well as in canopy or subcanopy of higher mossy trees. Fairly active and restless, working along smaller bare and mossy limbs; often spends considerable time in peering and moving in outer foliage, where it pops in and out of view.

Breeding. No information.

Movements. Some local or seasonal movement possible; only occasionally recorded in disturbed forest along R Urubamba below Machu Picchu, in Peru.

Status and Conservation. Not globally threatened. Restricted-range species: present in Peruvian East Andean Foothills EBA and Bolivian and Peruvian Lower Yungas EBA. Fairly common in S Peru (Cuzco and Puno); status in Bolivia less clear. Deforestation of middle-elevation montane forest will affect this species locally. On the other hand, it occurs in several large protected areas, including Manu National Park, in Peru, and Madidi National Park, in Bolivia. The species' range includes considerable intact forest which is unprotected, but appears not to be at any risk in the short term.

Bibliography. Bond & Meyer de Schauensee (1942), Burns (1997a), Burns *et al.* (2002, 2003), David & Gosselin (2002b), Fjeldså & Krabbe (1990), Hellmayr (1936), Isler & Isler (1999), Parker & O'Neill (1980), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Weske (1972), Zimmer (1947a).

PLATE 2 ➤


15
16
17
18
ssp chrysophrys
ssp superciliaris
ssp urubambae
19
ssp nigrifrons
20
ssp insignis
ssp iteratus
21
ssp frontalis
ssp hanieli
22
23
ssp berlepschi
ssp flavidorsalis
ssp melanotis
ssp castaneicollis
24
25
26
27
28
29
30
southern
northern
inches 2
cm 5

PLATE 2

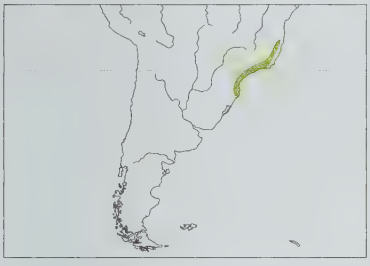
Genus *ORTHOGONYS* Strickland, 1844

15. Olive-green Tanager

Orthogonys chloricterus

French: Tangara viréon **German**: Olivtangare **Spanish**: Tangara Verdioliva

Taxonomy. *Tachyphonus chloricterus* Vieillot, 1819, near Rio de Janeiro, Brazil.
Monotypic.
Distribution. Espírito Santo S to E Santa Catarina, in SE Brazil.



Descriptive notes. 18–19 cm. Olive and yellow tanager lacking distinctive markings, with bill relatively slender. Plumage is uniformly olive above, including wing and tail, slightly darker on crown; below, entirely dull yellow (contrasting with olive upperparts), with tinge of olive on sides and flanks; iris dark brown; bill blackish; legs pale yellowish-brown, sometimes with pinkish tinge. Sexes similar. Juvenile undescribed. Voice. Loud "wheek!" and other notes during foraging, often heard well before groups appear in view; call a high, buzzy "tseee". Song a chattery, bubbly mix of "tseee" and "pit" or "si" notes, often 3–5 in a series, followed by short pause, e.g. "tséé-si, si, si, tséé-si, si, si", sometimes several individuals joining in and singing simultaneously.
Habitat. Tall humid montane forest and forest borders in coastal mountains, at 900–1800 m.
Food and Feeding. Insects; some fruit, including *Cecropia* catkins. Occurs in flocks of about eight individuals, occasionally up to 20, most often in single-species flocks. When foraging, individuals within group often spread over fairly large area. Forages mainly in middle and upper levels, but may come lower, especially for fruit. Hops along branch, then pauses to peer at foliage and bromeliads, often stretching upwards. In sample of c. 60 observations, most were of birds taking insects from leaves, including large leaves, and from bromeliads; smaller number were of sallies for flying insect prey. Sometimes comes to fruit feeders. Flicks tail up when excited.
Breeding. Bird carrying nest material to bromeliad on large tree in Nov. No other information.
Movements. None reported.
Status and Conservation. Not globally threatened. Restricted-range species: present in Atlantic Forest Mountains EBA. Locally common to uncommon. Despite some published statements, no definite records from Rio Grande do Sul. Occurs in numerous parks and reserves in SE Brazil. Numerous at Boraceia Forest Reserve, in Serra do Mar (NE São Paulo); smaller numbers at Itatiaia and Tijuca National Parks (Rio de Janeiro). Outside protected areas and parks, almost all habitat formerly occupied by this species has disappeared, resulting in range contractions and highly fragmented distribution. Despite local population declines and fragmentation, its long-term viability should be assured if protection continues for the parks and reserves where it remains.
Bibliography. Davis (1945b, 1946), Diamond & Lovejoy (1985), Goeldi (1894), Holt (1928), Isler & Isler (1999), Machado (2002), Parker & Goerck (1997), Ridgely & Tudor (1989, 2009), Santos (1948), Sick (1985, 1993), Souza (2002).

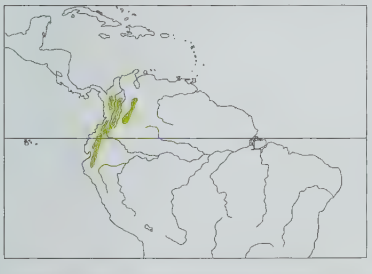
Genus *HEMISPINGUS* Cabanis, 1851

16. Black-capped Hemispingus

Hemispingus atropileus

French: Tangara à calotte noire **Spanish**: Hemispingo Capirotado
German: Schwarzkappenhemispingus
Other common names: Black-capped Tanager(!)

Taxonomy. *Arremon atro-pileus* Lafresnaye, 1842, Bolivia; error = Bogotá, Colombia.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species may form a superspecies with *H. auricularis* and *H. calophrys*, and has been treated as conspecific with one or both of those; currently treated as separate species to emphasize plumage differences, pending additional study. Monotypic.
Distribution. W Venezuela (Andes in S Táchira) and generally in Andes of Colombia and on both slopes in Ecuador S to extreme NW Peru (N Piura N of R Marañón).



Descriptive notes. 16 cm; 18–26 g. Bill moderately stout, but thinner than that of most other tanagers. Has crown and side of head sooty black, long, narrow buff-white supercilium from nostril to nape; upperparts, including tail-coverts, brownish-olive; lesser and median upperwing-coverts olive, greater coverts dusky, tinged olive; flight-feathers dusky, edged olive-yellow, tertials dusky, broadly edged olive-yellow; tail mostly dull greyish-olive; throat and foreneck rather bright ochre-yellow, this becoming duller on mid-breast, more olive-yellow on central lower underparts; sides, flanks and undertail-coverts mostly olive; iris reddish-brown; bill variable, all dusky or upper mandible dusky, lower mandible bluish-grey; legs horn-grey, tinged olive. Sexes similar. Immature resembles adult, but duller. Voice. Infrequently heard song a fast series of high sputtering and chipping notes, rather indistinctive and not so explosive as that of some congeners. Contact calls include "tsit" and other high-pitched notes and chatters.
Habitat. Humid and wet montane forest, especially (or mainly) where *Chusquea* bamboo and other dense vegetation dominant; also elfin forest near tree-line. Recorded at 1800–3600 m: mostly above c. 2400 m in Colombia; mostly at 2250–3200 m in Ecuador and adjacent N Peru.
Food and Feeding. Small arthropods. Forages in pairs or in groups of 3–7, occasionally up to 12 individuals, and in single-species groups or, far more frequently, in mixed flocks with *Basileuterus* warblers and other small tanagers. May behave as leader in small mixed flocks. Group fast-moving, active and warbler-like; primarily gleans or picks small arthropods from foliage, bamboo stems and leaves, mainly from near ground to c. 6 m up. Not shy, but can be difficult to see well because of dense lower vegetation in which usually found.
Breeding. No information.
Movements. None reported.
Status and Conservation. Not globally threatened. Locally common. In Colombia, commonest at higher elevations within its range. Extensive deforestation, especially at higher elevations, may be a local threat to this species.
Bibliography. Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Clements & Shany (2001), Dunning (1982), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Klicka *et al.* (2007), Krabbe *et al.* (2001), Lovette & Bermingham (2002), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Zimmer (1947b).

17. White-browed Hemispingus

Hemispingus auricularis

French: Tangara oreillard **German**: Weißbrauenhemispingus **Spanish**: Hemispingo Cejiblanco
Other common names: Puno Hemispingus, White-browed Tanager

Taxonomy. *Chlorospingus* (*Hemispingus*) *auricularis* Cabanis, 1873, Marayniоc, Junín, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species may form a superspecies with *H. atropileus* and *H. calophrys*, and has been treated as conspecific with one or both of those; replaces former on S side of R Marañón, and currently treated as separate species on grounds of some plumage differences and molecular-genetic analyses. Monotypic.
Distribution. Peru on E slope of Andes (from Marañón Valley S to Cuzco).



Descriptive notes. 15–16 cm. Bill moderately stout, but thinner than that of most other tanagers. Has crown, side of head and broad band down side of neck black, long white supercilium from base of bill to nape; entire upperparts, including upperwing-coverts, bright olive; flight-feathers dusky, edged olive, tertials olive, inner web dusky; tail olive-green; throat and chest rich ochre-yellow (some individuals slightly paler), flanks yellowish-olive, central lower underparts pale yellow; iris dark reddish-brown; upper mandible dusky, lower mandible often paler horn-grey; legs horn-grey, tinged olive. Differs from *H. atropileus* in slightly smaller size, blacker face, whitish (not buff-white) supercilium, and usually deeper, richer ochraceous-yellow (not olive-yellow) underparts. Sexes similar. Juvenile undescribed. Voice. Dawn song, from exposed perch at top of tree 5–10 m tall, a slow, even series of 3–5 single thin "chew" notes alternated with 6–9 high "zeet" notes, e.g. repetitive "chew zeet, chew zeet, chew zeet...", reminiscent of hummingbird (Trochilidae) song; often continuously for 15–20 minutes. Perches upright, flicks tail continuously from side to side, looks back and forth, or flips around 180 degrees while singing.
Habitat. Humid and wet forest and forest borders, especially where *Chusquea* bamboo and dense undergrowth present; at c. 2600–3700 m.
Food and Feeding. Of 13 stomachs examined, one contained only vegetable matter, eleven only animal matter, and one both; contents included caterpillars and other insects, and seeds. Forages in pairs or in varying-sized groups, much as *H. atropileus*; often with mixed flocks containing other tanagers and, especially, *Basileuterus* warblers. Forages actively near ground, or in understorey. Often creeps and hops up bamboo stalks and branches, or jumps from one to the next, reaching and gleaning from beneath leaves or probing and pecking at bamboo internodes; less often, leans down to pick insect prey from upper surface of leaves.
Breeding. In Peru, cup-nest of leaves and stems; eggs pale rose with numerous reddish-grey spots and streaks, markings random or nearer large end. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common at higher elevations throughout range. Occurs in some protected areas, such as Manu National Park. Some portions of its range are subject to colonization pressure, which could place the species at risk locally in the future.
Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), García-Moreno *et al.* (2001), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (2009), Schulenberg *et al.* (2007), Taczanowski (1884), Walker (2001).

18. Orange-browed Hemispingus

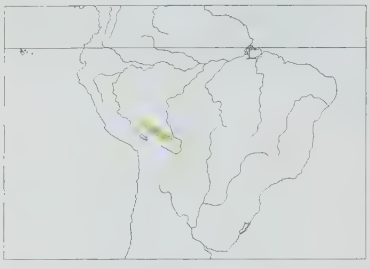
Hemispingus calophrys

French: Tangara des bambous **Spanish**: Hemispingo de los Bambúes
German: Ockerbrauenhemispingus
Other common names: Bolivian/Yungas Hemispingus, Orange-browed Tanager

Taxonomy. *Chlorospingus calophrys* P. L. Sclater and Salvin, 1876, Tilotilo, La Paz, Bolivia.

On following pages: 19. Parodi's Hemispingus (*Hemispingus parodii*); 20. Superciliaried Hemispingus (*Hemispingus superciliaris*); 21. Grey-capped Hemispingus (*Hemispingus reyi*); 22. Oleaginous Hemispingus (*Hemispingus frontalis*); 23. Black-eared Hemispingus (*Hemispingus melanotis*); 24. Piura Hemispingus (*Hemispingus piurae*); 25. Western Hemispingus (*Hemispingus ochraceus*); 26. Slaty-backed Hemispingus (*Hemispingus goeringi*); 27. Rufous-browed Hemispingus (*Hemispingus rufosuperciliaris*); 28. Black-headed Hemispingus (*Hemispingus verticalis*); 29. Drab Hemispingus (*Hemispingus xanthophthalmus*); 30. Three-striped Hemispingus (*Hemispingus trifasciatus*).

Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species may form a superspecies with *H. atropileus* and *H. auricularis*, and has been treated as conspecific with former or both. Possibly closest to *H. parodii*, which appears to be its sister-taxon. Monotypic.
Distribution. E slope of Andes in S Peru (S Puno) S to W & C Bolivia (La Paz and Cochabamba).



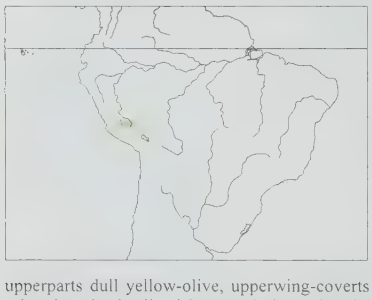
Descriptive notes. 14–16 cm; 14·5–20·5 g. Has central crownstripe and broad stripe through eye back to nape jet-black, small orange-ochre spot embedded in black on rear ear-coverts; long, broad supercilium bright orange-ochre; entire upperparts, including tail and upperwing-coverts, bright olive, tinged yellowish; primary coverts blackish, edged olive; flight-feathers dusky, outer feathers edged yellow, inner ones olive; side of head (below eye), throat and chest rich orange-ochre, fading to ochre-yellow on lower underparts; sides, flanks and undertail-coverts pale olive, faintly tinged yellowish; iris dark brown; bill dark grey, paler below; legs dark grey. Differs from *H. atropileus* and *H. auricularis* mainly in much broader and orange-ochre (not whitish) supercilium. Sexes similar. Immature is duller than adult, head mostly olive. Voice. During foraging, high chittery trills that descend somewhat (distinctive, but variable in length), sometimes given repeatedly by group-members; also a variety of high, soft "tic" and "ti" notes. No song yet recorded.
Habitat. Humid and wet montane forest and elfin forest, mainly where extensive *Chusquea* bamboo present; found also in dense regrowth vegetation around landslides. At 2300–3350 m.
Food and Feeding. Of 26 stomachs examined, 24 contained only animal matter and two both animal and vegetable matter; contents included caterpillars and other unidentified insects. Occurs in pairs or in small groups of about 4–8 individuals, foraging with mixed-species flocks or independently of them. In Bolivia found mainly in bamboo and fairly close to ground; median foraging height c. 3 m, no records above 6 m. Gleans prey from both surfaces of leaves equally (24 of 28 observations), also from slender branches 1 cm in diameter. Picked prey from substrates mostly without acrobatics (19 of 24 observations) or reached, hung or sallied. Occasionally probes hanging dead-leaf clusters. Behaviour much as that of *H. auricularis* and *H. atropileus*.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Bolivian and Peruvian Upper Yungas EBA. Fairly common to locally common. Has comparatively small range, within which it is likely vulnerable to ongoing colonization and deforestation.
Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), Hellmayr (1936), Isler & Isler (1999), Lambert (2006), Meyer de Schauensee (1970a), Remsen & Parker (1984), Ridgely & Tudor (2009), Schulenberg *et al.* (2007), Weske & Terborgh (1974).

19. Parodi's Hemispingus

Hemispingus parodii

French: Tangara de Parodi **German**: Gelbbrauenhemispingus **Spanish**: Hemispingo de Parodi
Other common names: Parodi's Tanager

Taxonomy. *Hemispingus parodii* Weske and Terborgh, 1974, River Mapitunari, 3480 m, Cordillera Vilcabamba, Cuzco, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Present species may be closest to and sister-taxon of *H. calophrys*. Appears to be upper-elevational replacement of *H. atropileus*. Monotypic.
Distribution. Vilcabamba and Vilcanota Cordilleras (E slope of Andes), in Cuzco, S Peru.



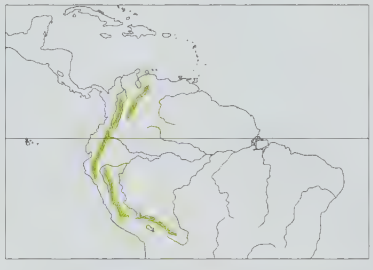
Descriptive notes. 14 cm; one male 21·8 g. A fairly large hemispingus very similar in appearance to Citrine Warbler (*Basileuterus luteoviridis*). Has top of head dusky olive, darker on forehead, lighter on rear crown, the feathers dull blackish with dark yellow edges; long narrow supercilium from base of upper mandible to nape yellowish, brightest over eye; lores and postocular region olive, ear-coverts and subocular area dull yellowish with paler shaft streaks; postauricular area dark citrine, bordered behind by dull yellowish band that extends upwards from side of throat and, along with supercilium, largely encloses side of head; upperparts dull yellow-olive, upperwing-coverts dark citrine (like back), flight-feathers dusky, primaries edged yellowish, secondaries and tertials dark citrine (like back); tail slightly graduated, outer webs of feathers dark citrine, inner webs dusky; chin and throat bright yellow (no ochre tinge), flanks and side of breast dull yellow, central breast and belly brighter, undertail-coverts paler yellow; iris dark brown; bill grey, upper mandible often duskier, cutting edges usually pale; legs pale grey. Differs from Citrine Warbler chiefly in having crown dusky olive (not yellowish), legs grey (not pinkish-flesh), and bill two-toned (not all black). Sexes similar. Immature undescribed. Voice. Dawn song a repetition of "pit zzre", first note high-pitched, second slightly lower. Day song a series of rapid, chittering and buzzy phrases, "p-p-p-psit-sit-sit, z-z-z-zit-dit-dit", and "zh-zh-zh-zhit-zhit-zhit", high-pitched. Abrupt shifts from one phrase to another at different pitch and tone are typical, occurring in a fraction of a second or sometimes with pause between song shifts.
Habitat. *Chusquea* bamboo in humid upper montane forest and elfin forest, and areas of mixed elfin forest and tall grass with irregular tree-line of short, gnarled trees heavily coated with epiphytes. At or near tree-line from 2750 m to c. 3500 m.
Food and Feeding. Arthropods. In groups of 3–9 individuals, usually in mixed flocks with Citrine Warbler and other small passerines. Forages low in bamboo and in mixed bamboo and leafy understorey. Gleans items from both surfaces of leaves and from bamboo leaves and internodes; may lean down or stretch to pluck prey off substrate.
Breeding. Birds in partial/full breeding condition suggest breeding from Jul. No other information.
Movements. No information; probably resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Bolivian and Peruvian Upper Yungas EBA. Fairly common locally. May occur at scattered locations in Manu National Park, but much of tree-line habitat within its range is unprotected and currently subject to disturbance from firewood-cutting and deforestation for subsistence agriculture and settlement. Populations should be monitored; may require listing as, at least, Near-threatened.
Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), Isler & Isler (1999), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Weske & Terborgh (1974).

20. Superciliaried Hemispingus

Hemispingus superciliaris

French: Tangara bridé **German**: Augenbrauenhemispingus **Spanish**: Hemispingo Cejudo
Other common names: Superciliated Hemispingus, Superciliaried Tanager; Yellow-browed/Tachira Hemispingus (*chrysophrys*); White-browed Hemispingus ("*superciliaris* group"); White-bellied Hemispingus ("*leucogastrus* group")

Taxonomy. *Arremon superciliaris* Lafresnaye, 1840, Santa Fé de Bogotá, Colombia.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Races form three groups, "*superciliaris* group" (including *chrysophrys*, *nigrifrons* and *maculifrons*), with yellow underparts, "*leucogastrus* group" (including *insignis*), with white underparts, and single-species "*urubambae* group", with yellow underparts, and no intergrades between groups found; alternatively, *chrysophrys* treated as separate, single-species group and *urubambae* as part of "*superciliaris* group". "Leap-frog" plumage pattern (yellow underparts in populations on each side of grey population), and supercilium yellow in far N and white elsewhere, are curious morphological differences, suggesting that more than one species involved; genetic analysis needed. Seven subspecies currently recognized.
Subspecies and Distribution.
H. s. chrysophrys (P. L. Sclater & Salvin, 1875) – Andes of Trujillo, Mérida and N Táchira, in W Venezuela.
H. s. superciliaris (Lafresnaye, 1840) – E Andes of Colombia (W slope in Santander, E slope in Boyacá, and both slopes in Cundinamarca).
H. s. nigrifrons (Lawrence, 1875) – C Andes in Colombia (from Antioquia S on both slopes through Cauca and Nariño) and Ecuador (S on W slope to Azuay and on E slope to Morona-Santiago).
H. s. maculifrons J. T. Zimmer, 1947 – W slope in S Ecuador (El Oro) S to N Peru (Cajamarca).
H. s. insignis J. T. Zimmer, 1947 – E slope of Andes in Peru (from Amazonas S to Junín).
H. s. leucogastrus (Taczanowski, 1874) – E slope of Andes in Junín (Peru).
H. s. urubambae J. T. Zimmer, 1947 – E slope of Andes in Peru (S from Cuzco) S to C Bolivia (Cochabamba).



Descriptive notes. 13–14 cm; 11–17 g. Overall, rather variable. Nominate race has forecrown and cheek dusky, long narrow white supercilium; rest of crown, nape and upperparts, including tail and upperwing-coverts, olive-green, primary coverts blackish; flight-feathers blackish, outer primaries edged olive-yellow, inner ones olive-green; throat and underparts bright yellow, flanks tinged olive; iris reddish-brown; bill fairly small and slender, grey, sometimes duskier above and paler below; legs dark grey. Sexes similar. Immature (or subadult) is duller, with less contrasting head pattern, more olive on breast and sides. Race *chrysophrys* differs from nominate in having yellow (not white) supercilium, olive forecrown and duller cheek; *nigrifrons* is like nominate, but more dusky on forecrown and cheek; *maculifrons* differs in pale greyish-olive forecrown and cheek; *leucogastrus* is distinctive, crown, cheek and upperparts all grey, supercilium white, whitish below, some dusky mottling on side of throat, heavy grey tinge on breast, buff tinge on undertail-coverts; *insignis* is like last, but generally paler, with faint yellow tinge on undertail-coverts; *urubambae* is much like nominate but slightly paler below, forecrown blackish, eyestripe typically with traces of yellow towards rear. Voice. Song (races *maculifrons* and *leucogastrus*) primarily just after dawn, often as duet, trio or quartet, bursts 3–4 seconds long of rapid high notes, rather dry and harsh, that accelerate and become louder (cadence reminiscent of ocean waves rolling onshore), may be repeated at short intervals. Songs presumably similar throughout range (more information needed). Calls rather undistinctive high, sharp "tsit" or "tsick" notes.
Habitat. Humid forest and forest edges, also second growth of various ages, alder (*Alnus*) in landslides, and locally tall *Polylepis* woodland in Ecuador, Peru and Bolivia. Recorded at c. 1900–3350 m in all areas, mostly above c. 2100 m; in Ecuador, up to 3500 m at Yanacocha and to 3700 m at Loma Yanayacu; in Peru, mainly 2200–3450 m on E Andean slope and 2200–2900 m on W slope S to S Cajamarca.
Food and Feeding. Arthropods; may take some small berries and seeds. Twelve stomachs contained insects, including caterpillars and small beetles (Coleoptera). Forages in pairs and in noisy, chittering groups of 3–10 individuals, usually with mixed flocks; locally or seasonally groups of up to 20, sometimes more, in Cuzco (SE Peru), where joins with many other small passerines, including furnariids, tyrant-flycatchers (Tyrannidae), tanagers and emberizids, forming super-sized mixed flocks around dawn. Active and restless, peers and hops in foliage, mostly without acrobatics, but may reach up or out, lean over, or occasionally hang downwards to glean insects from top and bottom of live leaves. Sometimes forages out into rather open trees (alders), generally fairly easy to see. In Peru and Bolivia primarily in tops of trees 8–20 m tall, but descends to small trees, shrubs and bamboo along forest borders; forages higher than *H. atropileus*, but also down to human eye level or lower, especially along forest borders and roadsides, and mainly gleans from leaves in dense foliage near branch tips, often where leaf clusters join branches. From 34 observations in Bolivia, median foraging height 11 m, median distance to top of canopy c. 2 m, and prey gleaned in about equal proportions from top, bottom and base of leaves.
Breeding. Three breeding specimens between Feb and Jul in C Andes of Colombia. No other information.
Movements. Resident throughout range.
Status and Conservation. Not globally threatened. Fairly common to locally common. Increasing human colonization and wood-cutting at high elevations an ongoing concern, but this species should be able to survive in various older-age stages of second growth and forested borders.
Bibliography. Anon. (2000), David & Gosselin (2002a), Dunning (1982), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Hellmayr (1936), Hilty (2003, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Phelps & Phelps (1963), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Walker (2001), Weske (1972), Zimmer (1947b).

21. Grey-capped Hemispingus

Hemispingus reyi

French: Tangara à calotte grise **Spanish**: Hemispingo Coronigrís
German: Graukappenhemispingus
Other common names: Grey-capped Tanager

Taxonomy. *Chlorospingus reyi* Berlepsch, 1885, Mérida, Venezuela.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Monotypic.
Distribution. Andes of Trujillo, Mérida and N Táchira, in W Venezuela.



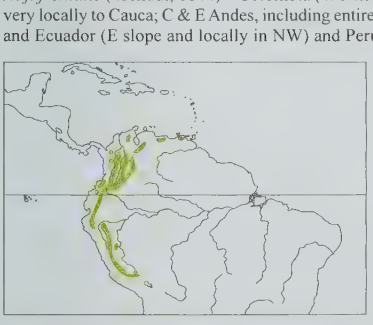
Descriptive notes. 14 cm. Rather plain hemispingus with small, relatively thin bill. Has crown down to bottom of eye and to nape grey (hooded appearance), upperparts, including tail and and upperwing-coverts, bright yellowish-olive (contrasting somewhat with cap); flight-feathers dusky, edged yellowish-olive; side of head olive-yellow, becoming plain yellow on throat and underparts, with tinge of olive on sides and flanks; iris dark brown; bill dark grey; legs greyish-horn. Sexes similar. Immature is similar to adult, but duller. Voice. Possible song a sharp insistent "tee chew chew", often followed by several single "chew" notes, or "stit-sit, seet!". Calls include buzzy "bzit" notes during foraging; also a high, thin "seep", longer "seeeep", and thin chittering notes.
Habitat. Humid and wet, mossy montane forest and forest borders with *Chusquea* bamboo; almost always in or near bamboo. Recorded at 1900–3200 m; most numerous at 2150–3000 m.
Food and Feeding. Little information on diet; appears to be mainly small arthropods. Occurs in pairs and in groups of up to 20 individuals (sometimes more) which forage with mixed flocks, in which often the dominant or nuclear species. Active but methodical; hops along branches and bamboo stems, examines leaf surfaces, especially of bamboo, by peering, reaching and occasionally hanging downward as it works over foliage; takes prey most often from upper surface of foliage. Stays mainly in lower levels (2–8 m up) of forest; usually fairly easy to see, often coming to forest edge along roadsides. General behaviour seems much like that of *H. atropileus*.
Breeding. No information.
Movements. Resident. No local or seasonal movements reported.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Cordillera de Mérida EBA. Fairly common locally. Has small range. The most important protected area within this species' range is La Sierra Nevada National Park (in Mérida), which includes a large intact tract of montane forest. Although it has a small global range and is doubtless vulnerable, a sizeable portion of its total range is well protected at present. Highland areas outside the park are subject to intensive pressure from human colonization and cultivation, which could increase the risk to this species.
Bibliography. Anon. (2010a), Athanas (2006), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Hilty (2003), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950, 1963), Ridgely & Tudor (1989, 2009), Stattersfield & Capper (2000).

22. Oleaginous Hemispingus

Hemispingus frontalis

French: Tangara ocré **German**: Olivrückenhemispingus **Spanish**: Hemispingo Oleaginoso
Other common names: Oleaginous Tanager; Ochraceous/Merida Hemispingus (*ignobilis*)

Taxonomy. *H.*[*ylophilus*] *frontalis* Tschudi, 1844, east slope of Andes, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Has been suggested that race *ignobilis* might merit elevation to species rank, although vocal and behavioural data as yet incomplete. In addition, all four Venezuelan races differ considerably from nominate, but variation appears to be clinal, those farthest E (in NE Venezuela, hence farthest from Andes) differing the most. Review of geographical variation warranted. Five subspecies currently recognized.
Subspecies and Distribution.
H. f. flavidorsalis Phelps, Sr & Phelps, Jr, 1953 – Perijá Mts, in NW Venezuela (probably also on Colombian side).
H. f. hanieli Hellmayr & Seilern, 1914 – coastal range in N Venezuela (Aragua, Vargas, Distrito Federal and Miranda).
H. f. iteratus Chapman, 1925 – mountains of NE Venezuela (Sucre and Monagas).
H. f. ignobilis (P. L. Sclater, 1862) – Andes of W Venezuela from Lara S to N Táchira.
H. f. frontalis (Tschudi, 1844) – Colombia (W Andes of Antioquia, including E slope near Jardín, S very locally to Cauca; C & E Andes, including entire E slope of E range, patchily S of Cundinamarca), and Ecuador (E slope and locally in NW) and Peru S to C Cuzco.



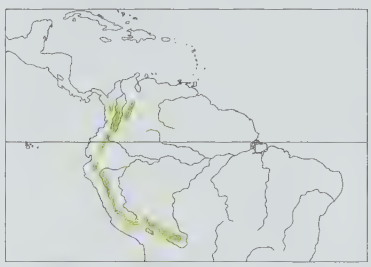
Descriptive notes. 14 cm; 14–20 g. Dingy, dull hemispingus with relatively slender bill. Nominate race has long, narrow, weakly indicated yellowish supercilium (most obvious in front of eye); crown and entire upperparts, including upperwing-coverts and tail, dull dirty olive, flight-feathers narrowly edged cinnamon; dingy olive-yellow below, more olive on sides, tinged cinnamon on undertail-coverts; iris dark brown; bill dusky grey; legs pale brownish to brownish-grey. Sexes similar. Juvenile lacks supercilium, is even duller and dingier than adult; immature like adult but duller. N races differ from nominate in generally brighter coloration: *hanieli* has brighter and more pronounced yellow supercilium, and is more yellow-ochre below; *iteratus* differs from previous in having supercilium and throat tinged rich buff to orange-buff; *ignobilis* has greenish-yellow supercilium, with pale buffy throat better demarcated from breast than in other races; *flavidorsalis* has more olive upperparts, flight-feathers edged olive-green, and supercilium and throat with buff-yellow tinge. Voice. Song, by pair, trio or quartet (occasionally quintet) of foraging birds in early morning, more or less simultaneously by group-members at intervals of c. 15 seconds: one individual (same one each time?) starts, others immediately join in with identical songs sounding slightly out of sync, producing vibrating chorus lasting c. 5 seconds, each bird singing chattery stream of high-pitched "chipa'chipa' chip-chit'chit'chit'chit'it'it'it...", accelerating, then slowing. Rather quiet during day. Soft "chit" notes during foraging.
Habitat. Mostly interior of humid montane forest, especially in thicker vegetation, vine tangles and dense shrubbery; less frequently at forest borders. At 1400–2900 m in Venezuela; 1500–2700 m in Colombia; mostly 1500–2600 m in Ecuador and Peru.
Food and Feeding. Arthropods. Forages in pairs, in family parties and in compact groups of c. 4–8 individuals, accompanying (sometimes as dominant species) understorey mixed flocks. Industrious dead-leaf specialist; groups work through undergrowth or slightly higher, especially in vines and cluttered areas, flying a few metres at a time, hopping up branches in rather jerky manner while constantly flicking tail and peering at foliage, or, more often, fly or hop directly to clumps of curled, hanging dead leaves and inspect these by clinging, hanging upside-down or stretching down to peer into clump. Forages also on live green leaves, sometimes alternating between dead and live surfaces.
Breeding. Seven breeding-condition birds Jun–Nov in NW Venezuela (Perijá Mts) and N part of E Andes in Colombia; juvenile in Apr in C Peru (Junín). Eggs reportedly white. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common throughout range. Found in numerous protected sites in much of range, although increasing human settlement and deforestation may place this species at risk elsewhere.
Bibliography. Clements & Shany (2001), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hilty (1999, 2003), Hilty & Brown (1986), Lovette & Bermingham (2002), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Nehrkorn (1899), Parker *et al.* (1985), Phelps & Phelps (1950, 1963), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schäfer & Phelps (1954), Schulenberg (2000b), Schulenberg *et al.* (2007), Walker (2001), Yuri & Mindell (2002), Zimmer (1947b).

23. Black-eared Hemispingus

Hemispingus melanotis

French: Tangara barbouillé **Spanish**: Hemispingo Orejinegro
German: Schwarzwangenhemispingus
Other common names: Black-eared Tanager

Taxonomy. *Chlorospingus melanotis* P. L. Sclater, 1855, "Bogotá".
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species, *H. piurae* and *H. ochraceus* usually treated as conspecific, but differ from one another markedly in plumage and habitat and all tentatively given full species rank; review warranted. Three subspecies recognized.
Subspecies and Distribution.
H. m. melanotis (P. L. Sclater, 1855) – Andes of W Venezuela (S Táchira) S on W slope of E Andes of Colombia (Santander and SE Boyacá S to head of Magdalena Valley, in Huila), also W Andes (E slope near Jardín, in Antioquia) and C Andes (Antioquia S to E slope in Nariño) of Colombia (probably also E slope of E Andes); also, E slope in Ecuador S to Tungurahua (Baños and Ambato) and in SE (Podocarpus National Park).
H. m. berlepschi (Taczanowski, 1880) – E slope of Andes in Peru from Amazonas S to N Cuzco.
H. m. castaneicollis (P. L. Sclater, 1858) – E slope in SE Peru (from Puno) S to C Bolivia (W Santa Cruz).



Descriptive notes. 13–14 cm; 13–22 g. Bill relatively small and slender. Nominate race has crown and nape grey, side of head blackish, narrow greyish-white supraloral line (often obscure or lacking), inconspicuous white arc below eye; upperparts, including tail and upperwing-coverts, olive-grey, tinged brownish; primary coverts black, flight-feathers dusky, edged and tinged olive-grey; throat and underparts cinnamon to pale orangish-cinnamon, becoming whitish on centre of belly; sides and flanks tinged brownish, undertail-coverts buffy cinnamon; iris dark brown; bill blackish; legs brownish. Sexes similar. Juvenile is very dull and nondescript; immature like adult but much duller. Race *berlepschi* resembles nominate, but has black chin and richer, more rufous throat and chest; *castaneicollis* has fairly long, narrow and weak white supercilium (sometimes lacking or nearly so), more black on side of head and black upper throat. Voice. In SE Peru (Cuzco, 1500 m) at dawn, individuals (race *berlepschi*) sing duets, trios or quartets of high, fast, tinkling "tsink'a'lee, tsink'a'lee, tsink'a'lee... ti, ti..ti", typically 5–6 "tsink'a'lee" phrases in almost explosive burst, then dying away and ending with irregular "ti" notes for few seconds, before song abruptly restarted by pair or group, song bout often continuing for several minutes. Song described also as fast sputtering chatter (2–3 seconds) of "jit" or "ja-jit" notes accelerating into twitter or sometimes slowing to rhythmic "ji-ja-jit ji-ja-jit ji-ja-jit", with intervals of 3–12 seconds between songs; also as rhythmic, accentuated "dididadidadid...", 2–3 seconds. In Bolivia (*castaneicollis*) fairly high, squeaky or wheezy "jit" or "ja-jit"; in alarm, same calls in series while flicking wings.
Habitat. Mainly in undergrowth of humid montane forest, especially in *Chusquea* bamboo or along thick shrubby or vine-covered forest borders. Recorded at 1800–2800 m in Venezuela; 1700–2900 m in Colombia; mostly 1800–2700 m in Ecuador; 1100–2200 m on E slope in Peru.
Food and Feeding. Of 13 stomachs examined, eleven held only animal matter and two both animal and vegetable matter; contents included beetles (Coleoptera) and other insect parts, also seeds. Pairs or groups of 3–4 individuals regularly follow mixed-species flocks and forage from understorey to middle levels (mostly 1–6 m up), occasionally into subcanopy, but more often low, especially along forest borders. Hops actively and alertly through foliage, gleans or picks insects from leaves, and often checks whorls of dead bamboo leaves; may occasionally hang from leaves.
Breeding. One bird in breeding condition in Sept in Colombia (Cundinamarca) and fledglings seen in Nov in Bolivia (Cochabamba). No other information.
Movements. Resident.
Status and Conservation. Not assessed. Probably not globally threatened. Uncommon to locally fairly common over most of range. Found in numerous middle-elevation protected areas scattered

throughout range. Outside these areas may be assumed to be in decline owing to ongoing human colonization, forest destruction and consequent fragmentation of habitat.
Bibliography. Anon. (2000), Clements & Shany (2001), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1963), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg (2000b), Schulenberg *et al.* (2007), Walker (2001), Weske (1972), Zimmer (1947b).

24. Piura Hemispingus

Hemispingus piurae

French: Tangara de Piura **German**: Schwarzscheitelhemispingus **Spanish**: Hemispingo de Piura
Other common names: Piura Tanager

Taxonomy. *Hemispingus piurae* Chapman, 1923, Palambla, 4000 feet [c. 1220 m], Piura, northwest Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species, *H. melanotis* and *H. ochraceus* usually treated as conspecific, but differ from one another markedly in plumage and habitat and all tentatively accorded full species rank; also, present species exhibits some vocal differences, and limited molecular-genetic data suggest that it is at least as distinct from *H. melanotis* as latter is from *H. frontalis*; review of group warranted. Two subspecies recognized.
Subspecies and Distribution.
H. p. piurae Chapman, 1923 – extreme S Ecuador (S Loja) and immediately adjacent Peru (N end of both slopes of W Andes in Piura and Cajamarca).
H. p. macrophrys Koepcke, 1961 – La Libertad (upper R Chicama valley, on W slope of Andes), in NW Peru.



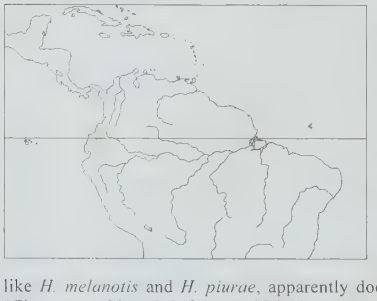
Descriptive notes. 14·5 cm. Small slender bill. Nominate race has head and throat black, sharply contrasting long, narrow white supercilium from bill to nape, small white arc below eye; upperparts uniformly brownish-grey, primary coverts dusky, flight-feathers dusky, edged and tinged brownish-grey; entire underparts rich cinnamon-rufous; iris dark brown; bill black; legs light brown. Sexes similar. Juvenile undescribed. Race *macrophrys* is slightly darker than nominate. Voice. Not well known. Song similar to that of *H. melanotis*, but delivery rate somewhat slower.
Habitat. Humid montane forest, primarily where dense understorey of *Chusquea* bamboo present; also second-growth woodland. Reported at c. 2000–2500 m in S Ecuador; generally 1200–3050 m in NW Peru, e.g. 2450–2950 m in Huancabamba region of E Piura.
Food and Feeding. Arthropods, presumably also some vegetable matter. Usually in pairs, most often independently of mixed-species flocks, although in Peru considered regular member of latter. Forages from understorey to middle levels or higher, generally low down and in cover. Hops through foliage, gleans or picks items from leaves, checks whorls of dead bamboo leaves.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not assessed. Rare and local in S Ecuador; somewhat more numerous in NW Peru. In Ecuador, known only from S Loja, in extreme S: a specimen and sight records at Utuana, and several records at El Tundo Natural Reserve, near Sozoranga. In Ecuador, much of this species' habitat has been degraded or destroyed through cutting and burning; although it seems capable of surviving in secondary habitats, its global range is very small. If treatment as a full species found to be justified, listing as Near-threatened would seem appropriate.
Bibliography. Best *et al.* (1993), Collar *et al.* (1992), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Parker *et al.* (1985), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007).

25. Western Hemispingus

Hemispingus ochraceus

French: Tangara de Berlepsch **German**: Ockerbrusthemispingus **Spanish**: Hemispingo Ocráceo
Other common names: Western Tanager(!)

Taxonomy. *Chlorospingus ochraceus* Berlepsch and Taczanowski, 1884, Cayandeled, western Ecuador.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species, *H. melanotis* and *H. piurae* usually treated as conspecific, but differ from one another markedly in plumage and habitat and all tentatively given full species rank; review of group warranted. Monotypic.
Distribution. W slope of Andes in SW Colombia (Nariño) and Ecuador (S to Chimborazo).



Descriptive notes. 14·5 cm. Much duller and more uniform than *H. melanotis* and *H. piurae*, and easily overlooked as an immature bird. Has crown to upperparts, including tail and entire wing, dull faded grey, back tinged olive; lores, area around eye and cheek dusky (not black) to dusky brown, contrasting little with rest of plumage; drab buffy olivaceous below, slightly brighter buff on undertail-coverts; iris dark brown; bill black; legs light brown. Sexes similar. Juvenile undescribed. Voice. Little definite information. Song reported as similar to that of *H. melanotis*.
Habitat. Moist to humid woodland and forest and older second growth in W Ecuador. Unlike *H. melanotis* and *H. piurae*, apparently does not exhibit particular affinity for bamboo (*Chusquea*), although it favours thick shrubby undergrowth. Recorded at 1600–2200 m.
Food and Feeding. Poorly known. No information on diet. Pairs or small groups are inconspicuous associates of mixed-species flocks, foraging in lower growth.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not assessed. Little information on status, and only a small number of specimens and sightings; possibly rare and/or local. Since before end of 20th century, this species has been reported by various observers along the Nono–Mindo road and Chiriboga road, in NW Ecuador (Pichincha). Its occurrence in protected areas, if any, is uncertain.
Bibliography. Fjeldså & Krabbe (1990), García-Moreno *et al.* (2001), Moore *et al.* (1999), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007).

26. Slaty-backed Hemispingus

Hemispingus goeringi

French: Tangara de Goering **German**: Graurückenhemispingus **Spanish**: Hemispingo Dorsigrís
Other common names: Slaty-backed Tanager

Taxonomy. *Chlorospingus goeringi* P. L. Sclater and Salvin, 1871, Páramos de Mérida, Venezuela.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Monotypic.
Distribution. Andes of Mérida and N Táchira, in W Venezuela.



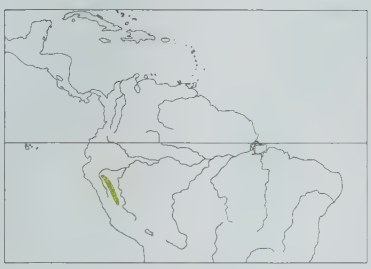
Descriptive notes. 14 cm. Legs unusually long and heavy; small slender bill. Has crown, nape and side of head deep black, long broad white supercilium from near bill to nape; mantle slaty, this becoming dark grey on rest of upperparts, including upperwing; rich tawny-rufous below, flanks tinged olive-brown; iris dark brown; upper mandible black, lower mandible grey; legs dark horn-grey. Differs from very similar *H. piurae* mainly in decidedly richer and brighter colours and much heavier legs. Sexes similar. Juvenile undescribed. Voice. Song, given a few times at dawn, and often as duet by mated pair, an energetic series of rapid staccato notes with "plink" notes throughout, may continue uninterrupted for a minute or more. Dawn song a continuous stream of moderately high-pitched, harsh notes by one bird, "ch-d-d-d-d-d-d-d...", and more pleasant high, musical, almost tinkling series by mate, "chi-ti-tee chi-ti-tee...", the two song types given simultaneously, presumably as duet, for up to 3 minutes.
Habitat. Wet upper montane forest, especially in dense shrubby borders, and stunted elfin forest, where often in or near bamboo (possibly a requirement). Recorded also in dense second-growth shrubbery bordering fields. At 2360–3200 m; sight records down to 2300 m in N Táchira.
Food and Feeding. Arthropods; possibly some vegetable items. Most often in pairs, also singly, and occasionally in groups (possibly families) of up to five individuals; at dawn forages alone or in pairs, during day most often with mixed flocks containing New World warblers, and species of *Diglossa*, *Conirostrum* and other tanagers. Forages from ground to c. 5 m up, mostly within dense cover, appearing momentarily, then disappearing or fluttering across open space and quickly diving into cover; at dawn also hops on ground or in grass at forest edge. Reaches out or up for prey; often makes "springy" upward leaps to pick prey from beneath leaves, or to peck overhead prey.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Cordillera de Mérida EBA. Uncommon and easily overlooked. Small range, estimated at c. 1700 km², now much fragmented by deforestation. Recorded in S half of Mérida (Páramo La Negra, Páramo Escorial, Páramo Aricagua, and Mucuchíes; sight record above La Mucuy) and S into N Táchira (Páramo Zumbador; sight record at Páramo Batallón) N of Táchira Depression. May persist in shrubby secondary and degraded habitats along forest borders, but, because of ongoing deforestation within its range, must be regarded as declining. Seen with some frequency at upper elevations above La Mucuy, in Sierra Nevada National Park (Mérida), the largest protected area within its range, and frequent in Jan–Mar 1993 to 1999 at 2300–2500 m near Páramo Batallón (Mérida–Táchira border).
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Hilty (2003), Isler & Isler (1999), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1963), Stattersfield & Capper (2000).

27. Rufous-browed Hemispingus

Hemispingus rufosuperciliaris

French: Tangara à sourcils fauves **Spanish**: Hemispingo Cejirrufo
German: Zimtbrauenhemispingus
Other common names: Rufous-browed Tanager

Taxonomy. *Hemispingus rufosuperciliaris* Blake and Hocking, 1974, Bosque Huaylaspampa, c. 8400 feet [c. 2560 m], Huánuco, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Monotypic.
Distribution. E slope of Andes in Peru from Amazonas (S of R Marañón in Cordillera de Colán) S to Huánuco (W of R Huallaga in Acomayo–Carpish Ridge region of Carpish Mts).
Descriptive notes. 15 cm; 26–33 g. Distinctive hemispingus with bold rufous eyebrow and underparts; bill relatively small and thin, legs and feet strong, tarsus rather long. Has crown, nape, lores, ear-coverts and side of neck black, long and unusually broad bright cinnamon-rufous supercilium arcing over eye and extending back to nape; upperparts, including entire upperwing and tail, blackish-slate; throat, breast, sides and most of abdomen uniformly cinnamon-rufous, becoming dark grey with slight tinge of brown on lower abdomen, undertail-coverts, flanks and thighs, some white on central belly; underwing dull black, underwing-coverts slightly paler, more greyish; iris brown to dark reddish-brown; bill dusky above, blue-grey below, dusky tip; legs brown to greyish-brown, dark brown or black. Sexes similar. Juvenile and immature undescribed. Voice. Song a mixture of short, nasal and squeaky notes with distinctive long and slurred squeals inserted irregularly in jerky cadence, "nya-tit-tit—tit-squeal! tit-tit-squeal! nya-nya tit-squeal!..." and so on for up to several minutes, with only occasional short pauses. May sing duets. Call a scratchy "chenk", sometimes in rapid succession by members of group.



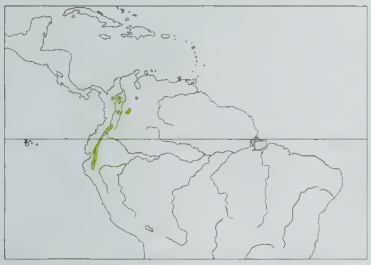
Habitat. Undergrowth of wet, mossy montane and elfin forest, especially in extensive thickets of *Chusquea* bamboo and in dense moss-laden shrubbery along borders of forest; occasionally in adjacent hedgerows and other second growth. Recorded at 2550–3500 m, mostly above 2800 m.
Food and Feeding. Arthropods and berries. Four stomachs contained only animal matter, two vegetable matter, and one both; contents included beetles (Coleoptera), caterpillars, seeds, and tiny stones. Mainly in pairs, occasionally groups of three or four individuals, alone or in mixed flocks, especially those with Citrine Warblers (*Basileuterus luteoviridis*) and/or Peruvian Wrens (*Cinnycerthia peruana*). Inconspicuous, mostly in dense understorey; moves sluggishly, more like a brush-finch (*Atlapetes*) than a hemispingus. Forages within c. 1 m of ground, less often to 2 m, hopping deliberately on large mossy limbs and bamboo canes; regularly on/very near ground, especially in *Chusquea* thickets and in tall grass at base of tree-line bushes (long strong legs suggest that much time spent on ground). Seen to reach down or outwards to pick prey from moss.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in North-east Peruvian Cordilleras EBA. Rare and very local. Estimated global population fewer than 10,000 individuals; believed declining. At type locality in 1973, when first discovered, considered fairly common and seen on most days. Elsewhere, recorded at only very few sites, and these increasingly fragmented because of widespread deforestation and wood-cutting activities for firewood.
Bibliography. Anon. (2010a), Blake & Hocking (1974), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Isler & Isler (1999), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Tallman (1974).

28. **Black-headed Hemispingus**

Hemispingus verticalis

French: Tangara à tête noire **German**: Schwarzkopfhemispingus **Spanish**: Hemispingo Cabecinegro
Other common names: Black-headed Tanager(!)

Taxonomy. *Nemosia verticalis* Lafresnaye, 1840, Santa Fé de Bogotá, Colombia.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Forms a superspecies with *H. xanthophthalmus*, both formerly placed in separate genus, *Pseudospingus*. Monotypic.
Distribution. Andes in W Venezuela (S Táchira), Colombia (W range in Antioquia, C range S to Nariño, and E range in Cundinamarca), Ecuador (E slope in Carchi, Napo and Zamora-Chinchipe) and N Peru (Piura, near Piura–Cajamarca border).



Descriptive notes. 14 cm; 12–15·7 g. A small, rather dark hemispingus with thin bill. Has long clay-coloured median crownstripe, head and throat otherwise black (black rounded off at rear, looking like large black discs on sides of head); upperparts, including tail, dark grey; upperwing-coverts dark grey, faintly edged brown, flight-feathers dusky, outer feathers edged brown, inner remiges edged dark grey; underparts pale grey, becoming whitish on belly and tinged buff on undertail-coverts; iris white; bill and legs blackish. Sexes similar. Immature is rather like adult (including pale eyes), but with irregular whitish mark over eye, whitish throat mixed with black, central underparts whitish, and grey below confined mainly to sides and flanks. VOICE. Song, singly or in duets or trios, a burst 5–15 seconds long of squeaky twittering notes mixed with stream of higher-pitched thin "seet" or "steet" notes; squeaky notes may cease for intervals of 10–12 seconds before another song initiated, but very high "seet" notes may continue at slower rate. Also described (in Peru) as a rapid series of "tchip" notes accelerating into a jumble of squeaky warbles. Calls high "tweet" and "tiip" when foraging.
Habitat. Dense wet montane forest and mossy elfin woodland at tree-line, ranging out into tree-line shrubs and wooded borders; often around small openings in vegetation, occasionally in isolated patches of elfin woodland away from forest. At 2800–3000 m in Venezuela; 3000–3600 m in Colombia; mostly 2700–3400 m in Ecuador; 2700–3600 m in Peru.
Food and Feeding. Insects; also various small berries, including those of melastomes. Contents of two stomachs were insects, including caterpillars and beetles (Coleoptera). In pairs and in groups of 3–5 (rarely 12) individuals, habitually with mixed flocks. Restless, active, fast-moving. Forages primarily in crown layers of shrubs, trees and occasionally bamboo, where it hops out towards tips of branches and stands/walks on tops of leaves and leaf clusters. Perches horizontally, often atop stiff leaves, and gleans items from upper leaf surfaces, petioles and leaf axils.
Breeding. Breeding-condition bird and two immatures in Sept in Colombia. No other information.
Movements. Presumed resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Found in numerous parks and protected sites, but intensive pressure from human colonization could place this species at risk in the future.
Bibliography. Anon. (2000), Clements & Shany (2001), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Parker *et al.* (1985), Phelps & Phelps (1950), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Vuilleumier & Ewert (1978).

29. **Drab Hemispingus**

Hemispingus xanthophthalmus

French: Tangara aux yeux jaunes **German**: Schlichthemispingis **Spanish**: Hemispingo Modesto
Other common names: Dark Hemispingus, Drab Tanager

Taxonomy. *Dacnis xanthophthalma* Taczanowski, 1874, Maraynioc, Junín, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. Forms a superspecies with *H. verticalis*, both formerly placed in separate genus, *Pseudospingus*. Monotypic.
Distribution. E slope of Andes in Peru (S side of Marañón Valley in Amazonas) S to W Bolivia (La Paz).



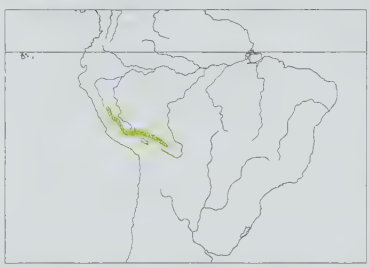
Descriptive notes. 13 cm; 10–15 g. A small, slender, relatively thin-billed, rather dull hemispingus. Has crown to nape, side of head to below eye, and upperparts, including tail and upperwing, plain brownish-grey; dull greyish-white below, whitest on throat and belly, greyish tinge on flanks and buff tinge on undertail-coverts; iris white to pale yellow; bill and legs blackish. Sexes similar. Juvenile undescribed. VOICE. Song, often as duet by pair, a fast sputtering series of variably pitched notes without obvious pattern, up to 8 seconds long, sometimes repeated at short intervals for up to several minutes; most songs short or staccato and squeaky, some longer and with chirping or squealing quality; some may recall those of *H. melanotis*, *Cnemoscopus rubrirostris*, or various New World warblers or *Diglossa* flowerpiercers. Call a high "it-sit" and "tseee".
Habitat. Humid montane forest, elfin forest and forest borders, to tree-line; locally in patches of degraded and scrubby secondary woodland. At 2200–3350 m in Peru and 2900–3050 m in Bolivia.
Food and Feeding. Nine stomachs contained insects. In pairs and in small groups of up to 5–6 individuals, usually with mixed flocks. Forages from eye level to 18 m up, mostly c. 3–12 m up in crown and upper foliage of bushes and small trees. Stands, walks and hops on tops of stiff, dense canopy leaves of *Escallonia*, *Weinmannia*, *Clusia* and other dense, flat-topped trees, where it gleans small prey from upper leaf surfaces; also hops out along small branches to glean or pick prey from leaf tops, twigs and flower stalks. Occasionally pursues prey in short flutter-chases.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Occurs in a few protected areas, most notably Manu National Park, in Peru. Much suitable montane and tree-line habitat exists also in unprotected areas within this species' range, although locally these areas are becoming increasingly degraded or fragmented owing to deforestation and wood-cutting. This species seems able to forage also in various early and scrubby stages of regrowth vegetation.
Bibliography. Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Hellmayr (1936), Hilty (2009b), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Moynihan (1979), Parker & O'Neill (1980), Parker *et al.* (1980), Phelps & Phelps (1950), Ridgely & Tudor (1989, 2009), Schulenberg & Remsen (1982), Schulenberg *et al.* (2007), Walker (2001), Zimmer (1947b).

30. **Three-striped Hemispingus**

Hemispingus trifasciatus

French: Tangara trifascié **German**: Streifenhemispingus **Spanish**: Hemispingo Trilistado
Other common names: Three-striped Tanager

Taxonomy. *Microspingus trifasciatus* Taczanowski, 1874, Maraynioc, Junín, Peru.
Genus has been thought to belong with New World warblers (Parulidae), but recent molecular-genetic data support placement in present family; monophyly of genus questioned, supported by some molecular data, but other molecular data equivocal. This species has been placed in a monotypic genus, *Microspingus*, but recent molecular-genetic data support inclusion in present genus, although relationships with other taxa within this uncertain. Monotypic.
Distribution. E slope of Andes in C Peru (S from Huánuco, W of R Huallaga) S to C Bolivia (Cochabamba).



Descriptive notes. 13 cm; 12–16 g. A small hemispingus with small slender bill, pale wingbars. Has head black, long broad buffy-white supercilium; median crownstripe and upperparts, including tail, brownish-olive; upperwing-coverts pale brownish-olive, median and greater coverts narrowly edged and more broadly tipped buff (forming two prominent wingbars), flight-feathers dusky olive, margined yellowish-buff; chin light buff, throat and underparts ochre-buff, richest on breast, paler and more yellowish on belly; in general, plumage palest in N of range, slightly darker and ochraceous in S; iris dark brown; bill black; legs brownish. Sexes similar. Juvenile undescribed. VOICE. Dawn song, from exposed dead branch above canopy, a series of buzzy "tzit" notes, c. 40 per minute; another song (possibly day song) a buzzy, chattering phrase. Call a high, spitting "swit", sometimes in rapid series or given in chorus, as before crossing an opening.
Habitat. Canopy of humid elfin forest at tree-line, also stunted forest islands at edge of *páramo*, more rarely in thickets of *Chusquea* bamboo. Recorded at c. 3000–3650 m in Peru; 2800–4250 m, occasionally as low as 2375 m, in Bolivia.
Food and Feeding. Insects; contents of ten stomachs insects, including caterpillars. Pairs or groups of 4–6 individuals, rarely up to ten, follow mixed flocks or behave as nuclear species in flocks; infrequently, forage independently. In Bolivia median foraging height was c. 5·5 m, and more than two-thirds of 58 observations within 2 m of tops of vegetation. Gleans from top and undersurface of leaves about equally; 87% of prey taken by simple gleaning movements, remainder by reaching, hanging or sallying. In Peru, gleaned from leaves at or near ends of limbs, also from twigs, picked at moss and lichens, and hung upside-down to pick at stems and small leaves.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. This species' global range is rather small, and limited to narrow band of tree-line vegetation that is subject to pressure from human colonization, deforestation and firewood-cutting; this could place some populations at risk.
Bibliography. Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), García-Moreno *et al.* (2001), Hellmayr (1936), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Parker & O'Neill (1980), Remsen (1984, 1985), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Zimmer (1947b).



Genus *CNEMOSCOPUS*

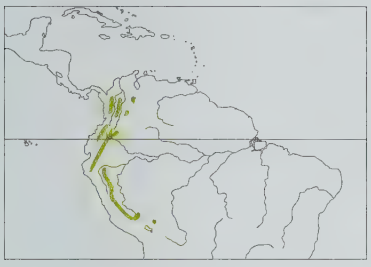
Bangs & T. E. Penard, 1919

31. **Grey-hooded Bush-tanager**

Cnemoscopus rubrirostris

French: Tangara capucin **German**: Graukopf-Buschtangare **Spanish**: Tangara Capuchigrís
Other common names: Grey-hooded Tanager; Red-bellied Bush-tanager (*rubrirostris*); Golden-bellied Bush-tanager (*chrysogaster*)

Taxonomy. *Arremon rubrirostris* Lafresnaye, 1840, Santa Fé de Bogotá, Colombia.
Genus sometimes considered to belong with New World warbler family (Parulidae), but recent molecular-genetic data support placement in present family. This species has in the past been placed variously in *Chlorospingus* and in *Hemispingus*; appears closer to latter in morphology, feeding behaviour and vocalizations, and close relationship supported by molecular-genetic data. S race *chrysogaster*, which differs from nominate in plumage and size, but is similar to it in behaviour, has been considered a separate species. Two subspecies currently recognized.
Subspecies and Distribution.
C. r. rubrirostris (Lafresnaye, 1840) – S end of Andes in W Venezuela (S Táchira) and generally in Andes of Colombia and NW & E Ecuador.
C. r. chrysogaster (Taczanowski, 1875) – Andes of NW & E Peru (Piura; Amazonas S to Junín); W Bolivia (near Tokoaque, in La Paz).
Descriptive notes. 17 cm, 18·5–23 g (*rubrirostris*); 15 cm, 13–22·5 g (*chrysogaster*). Nominate race has entire head, throat and chest medium grey ("hood"), throat and chest slightly paler; upperparts, including uppertail-coverts, tail and upperwing-coverts, yellowish-olive; primary coverts black, flight-feathers dusky, edged olive-green; underparts below chest clear yellow; iris dull red; bill and legs pinkish. Sexes similar. Juvenile undescribed. Race *chrysogaster* differs from nominate in smaller size, paler throat and chest, brighter yellow underparts, pale brown eyes, and dusky bill and legs. Voice. Song of nominate race a 2-second jumble of high, squeaky, sputtering notes that end in downward-inflected whistle, e.g. "twitity, twitity, sweeee", or with last note repeated several times; flows into "chip" notes between groups of phrases. Song of *chrysogaster* similar, but ending may be more varied. Call a high, sharp "seit".
Habitat. Humid and wet montane forest and forest borders; in some areas shows affinity for disturbed areas with alders (*Alnus*). Found at 1250–2150 m in Venezuela, 1900–3350 m in Colombia, 1900–3000 m in Ecuador and 2000–3100 m in Peru; mostly at c. 2100–3000 m.



Food and Feeding. Four stomachs of race *chrysogaster* contained animal matter, and one held vegetable matter; contents included caterpillars 2–4 cm long, also seeds. Overall more insectivorous than *Chlorospingus*. Occurs mostly in pairs or in small groups of up to about eight individuals that follow mixed-species flocks. Forages from eye level to canopy, but usually fairly high and most often at subcanopy levels. Forages out along larger branches with distinctive creeping or crouched gait and teetering movement of rear end, tail pumping downwards (constant tail-wagging behaviour distinctive). Peers at branch surfaces and especially at leaf undersurfaces, and may hang head downwards to inspect curled dead leaves; also sallies short distances to air within outer foliage.
Breeding. Three breeding-condition birds in Jul–Aug in Colombia (at N end of W & C Andes). Egg descriptions differ: one set reportedly pale greenish-white, thickly spotted reddish-lilac at large end; another bluish-white, sparsely marked with black spots. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common along most of E slope of Andes; elsewhere, records somewhat sparse. In NW Ecuador, known only from two sites in Pichincha; in Bolivia, sight records (Nov 2001) near Tokoaque, in La Paz. As with other forest-based Andean species living at middle and upper elevations, this tanager's habitat is subject to considerable pressure from human settlement, which could eventually place it at risk locally. Occurs within a considerable number of protected areas, ranging from Tamá National Park (Venezuela) and Las Orquídeas National Park (Colombia) S to Manu National Park (S Peru) and Madidi National Park (W Bolivia).
Bibliography. Berlepsch (1911), Burns (1997a), Burns *et al.* (2003), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (2003), Hennessey & Gomez (2003), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Nehrkorn (1899), Remsen *et al.* (2010), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Walker (2001), Weske (1972), Zimmer (1947b).

Genus *THLYPOPSIS* Cabanis, 1851

32. Fulvous-headed Tanager

Thlypopsis fulviceps

French: Tangara à tête fauve **German**: Rostkopftangare **Spanish**: Tangara Cabecifulva

Taxonomy. *Th.* [*lypopsis*] *fulviceps* Cabanis, 1851, Caracas, Venezuela.
Four subspecies recognized.
Subspecies and Distribution.
T. f. obscuriceps Phelps, Sr & Phelps, Jr, 1953 – Sierra de Perijá, on Colombia–Venezuela border.
T. f. fulviceps Cabanis, 1851 – mountains of N Venezuela (Carabobo E to Miranda; NE Anzoátegui, W Sucre and N Monagas).
T. f. meridensis Phelps, Sr & Phelps, Jr, 1962 – Andes of Mérida and N Táchira, in W Venezuela.
T. f. intensa Todd, 1917 – E slope of E Andes in N Colombia (Norte de Santander).
Possible sight record, race unknown (presumably *obscuriceps*), from upper R Frio region on W slope of Santa Marta Mts, in N Colombia; requires verification.



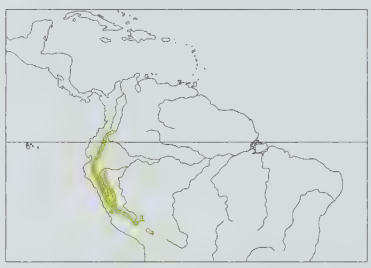
Descriptive notes. 12 cm; 11–13 g. A small grey tanager with conspicuous chestnut head and thin bill. Male nominate race has entire head, nape and throat rufous-chestnut (forming hood), throat slightly paler chestnut; upperparts, including upperwing-coverts, uppertail-coverts and tail grey; primary coverts dusky, flight-feathers dusky, edged grey; breast light grey, becoming whitish on centre of belly and undertail-coverts; iris dark brown; bill greyish above, often paler below at base; legs horn-grey. Female is similar to male, but throat paler, more rufous-buff. Juvenile undescribed. Race *obscuriceps* is very like nominate, but slightly darker grey above; *meridensis* also is very similar to nominate, but paler grey below, and undertail-coverts tinged grey; *intensa* differs in having head chestnut, darker than on other races, and undertail-coverts cinnamon. Voice. Song, infrequently heard during morning hours, a high "chi chi cht-cht-tit-t-t-t-t-t-t", accelerating and trailing off. Calls insignificant, high "tsit" and "chik" notes; rapid "chip" and "tsitt" notes when excited.
Habitat. Canopy vines and shrubby vine-tangled borders of moist to humid forest, second-growth woodland, and shrubby gardens in urban areas, e.g. Caracas (Venezuela). Most numerous in moist to semi-humid forest, e.g. S slope of coastal range below Rancho Grande Biological Station (Venezuela); numbers decrease sharply in more humid zones. At 1500–2300 m in Colombia and 750–2000 m in Venezuela.
Food and Feeding. Insects, including caterpillars; occasionally small berries, especially of Melastomataceae. One or two individuals, occasionally up to about five (possibly family parties), regularly associated with mixed-species flocks in canopy inside forest, and often much lower along forest borders. Notably active and alert, searching for food items mostly on leaves of various sizes, by perch-gleaning, reaching downwards from perch, clinging sideways or upside-down to leaves, pulling or tugging to extract prey, and often probing curled and hanging dead leaves. Occasionally sallies to undersurface of leaves.
Breeding. One bird in breeding condition in Apr in Perijá Mts, and three in Nov in Norte de Santander. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Caripe–Paria Region EBA, Cordillera de la Costa Central EBA, Cordillera de Mérida EBA and Colombian East Andes EBA. Uncommon to locally fairly common. Distribution somewhat spotty, perhaps owing to narrow habitat preferences. Population trends not documented, but likely to show a decline. Deforestation, fires and human colonization have resulted in loss of at least half of the species' habitat within its range, which has consequently contracted. Protected areas within its relatively small range in Venezuela include Henry Pittier National Park and Yacambú National Park.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950, 1963), Salaman *et al.* (2008), Schäfer & Phelps (1954), Sharpe (2003), Strewe & Navarro (2004).

33. Rufous-chested Tanager

Thlypopsis ornata

French: Tangara à flancs roux **German**: Zimtbrusttangare **Spanish**: Tangara Pechicanela
Other common names: Fulvous-chested Tanager

Taxonomy. *Nemosia ornata* P. L. Sclater, 1859, Pallatanga, Ecuador.
May form a superspecies with *T. pectoralis*, and the two have been considered conspecific. Three subspecies recognized.
Subspecies and Distribution.
T. o. ornata (P. L. Sclater, 1859) – W slope of C Andes in Colombia (from Puracé, in Cauca) S locally in Ecuador (both slopes, and locally on slopes above C valley).
T. o. media J. T. Zimmer, 1930 – E slope of Andes in extreme S Ecuador (Morona-Santiago and Zamora-Chinchipe; also specimen from E Carachi) and Peru (S on W slope to Lima; locally E slope from Cajamarca S to Marañón Valley).
T. o. macropteryx Berlepsch & Stolzmann, 1896 – E slope of Andes in Peru (Junín; isolated records S to Cuzco).



Descriptive notes. 12–13 cm; 10–15 g. Small, thin-billed greyish tanager with rich rufous head and underparts. Male nominate race has entire head and throat to mid-breast, sides, flanks and undertail-coverts deep orange-rufous, richest on crown, slightly paler on throat; centre of lower breast and belly white; upperparts, including uppertail-coverts, tail and upperwing-coverts, uniformly brownish-grey, mantle contrasting sharply with orange-rufous of head; primary coverts dusky, flight-feathers dusky, edged dull grey; iris dark brown; bill dusky; legs dark grey. Female is similar to male, but paler, more olive, on crown and nape (little contrast with back), and paler below, especially on throat. Immature is overall paler and duller, looking much like a dull female. Race *media* differs from nominate mainly in slightly larger size; *macropteryx* also differs in slightly larger size, as well as darker crown, deeper and richer colour on throat and breast, and more extensively white belly. Voice. Song, infrequently heard (or not often recognized), is thin, high-pitched and apparently somewhat variable, in simplest form a sibilant "ti, ti, ti sib'bit-sib'bit-sib'bit-sib'bit se-bee", rising slightly at end, or ending may include complex jumble of notes, or may end in thin slightly rising trill. Some songs may be delivered as duet, second bird giving high chipping notes. Extent and frequency of song repertoire in this species (and congeners) not well understood. During foraging gives very high-pitched, thin "seek" notes.
Habitat. Shrubby montane-forest borders, especially scrubby or drier secondary montane woodland, patches of second growth away from forest, and wooded ravines; rarely, *Polylepis* woodland. In general scarce or absent in humid or wet regions. At 2000–3400 m in Colombia, but most records c. 2400–3000 m; in Ecuador mostly 1800–3000 m, but possibly once as low as 1200 m; in Peru 1600–3300 m, locally to 3800 m, on E Andean slope.
Food and Feeding. Insects; six stomachs contained animal matter, including beetles (Coleoptera), spiders (Araneae) and a caterpillar. Single birds, pairs, and families of 3–4 and more rarely up to 8 individuals forage alone or sometimes in association with mixed-species flocks. Restless and active as it moves through along branches and foliage, from below eye level up to canopy of low scrubby trees. Gleans insects from leaves, twigs, and arboreal dead leaves, also inspects flowers and occasionally hangs upside-down. Has been seen to probe *Diglossa* incisions in tubular flower corollas.
Breeding. In Ecuador, egg-laying noted on 1st Mar, fledglings mid-Mar, and nest-building at end Apr, suggesting breeding season from at least end Feb to end May, also active nests found in Mar–Apr in SW (Yungilla Valley, in Azuay) and juvenile in Mar in NW. Following details mainly from Azuay. Nest a small open cup, outside diameter c. 8·5 cm and depth 7·5 cm, made from coarse grass, narrow bamboo leaf blades, twigs and petioles, with fine pale grass and petioles tightly woven on inside of cup, placed c. 0·4–1·2 m above ground in grass or young second-growth bush in semi-open area. Clutch 2 eggs, white with red-brown blotches and streaks; no information on incubation and nestling periods.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon and rather local. Local in Colombia, and in Ecuador apparently more numerous in S. Tolerates highly degraded second growth and scrub, even along steep ravines, but near-complete deforestation and conversion to pastureland of much of this species' formerly wooded range poses a significant long-term risk. There are few protected areas within its range in Colombia.
Bibliography. Fjeldså & Krabbe (1990), Greeney *et al.* (2006), Hilty & Brown (1986), Isler & Isler (1999), Koepcke (1970), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Moynihan (1963b), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sibley & Monroe (1990), Vogt (2003), Walker (2001).

34. Brown-flanked Tanager

Thlypopsis pectoralis

French: Tangara à flancs bruns **German**: Braunflankentangare **Spanish**: Tangara Pectoral

On following pages: 35. Orange-headed Tanager (*Thlypopsis sordida*); 36. Buff-bellied Tanager (*Thlypopsis inornata*); 37. Rust-and-yellow Tanager (*Thlypopsis ruficeps*); 38. Chestnut-headed Tanager (*Pyrrhocoma ruficeps*); 39. White-rumped Tanager (*Cypsnagra hirundinacea*); 40. Pardusco (*Nephelornis oneilli*); 41. Black-goggled Tanager (*Trichothraupis melanops*).

Taxonomy. *Nemosia pectoralis* Taczanowski, 1884, Acancocha, Junín, Peru.
May form a superspecies with *T. ornata*, and the two have been considered conspecific. Monotypic.
Distribution. E slope of Andes in Huánuco, Pasco and Junín, in C Peru.



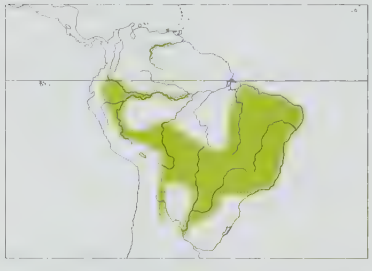
Descriptive notes. 12 cm; 14–17 g. A small, greyish tanager with rufous head and chest. Male has entire head to upper breast dark orange-rufous, contrasting with olive-grey to brownish-grey upperparts and tail; upperwing-coverts brownish-grey, primary coverts dusky, flight-feathers dusky, edged buffy grey; sides and flanks greyish-brown, contrasting with upper breast, centre of breast to belly white, undertail-coverts buff; iris dark brown; bill blackish; legs dark horn-grey. Distinguished from very similar *T. ornata* by brownish (not orange-rufous) sides and flanks. Female is like male, but throat paler. Immature is duller than adult, with olive-grey wash on crown. Voice. A soft high "tsit". A twittery "seet seet seet" is possibly a song, but song repertoire not known for certain.
Habitat. Dense shrubs on dry slopes, shrubbery along streams, alder (*Alnus*) thickets, hedgerows, occasionally humid forest borders or tall grass, weeds, brush and thickets adjacent to cultivated areas. Mainly dry to semi-arid zones in semi-open intermontane valleys. At 2500–3200 m.
Food and Feeding. Mostly tiny insects, also caterpillars and small adult moths (Lepidoptera). Usually in pairs, individuals staying close together, often no more than 1–2 m apart; has been seen in small mixed flocks with *T. ornata*. Forages mostly just inside outer foliage, working upwards from c. 1–3 m up in shrubs and small trees; during mid-day tends to remain within shrubs and less visible. Forages by hopping actively among interior branches and vines, inspecting curled dead leaves, sallying for disturbed or fleeing insects, peering or pecking at seed pods and flowers, and gleaning or reaching for insects on bare twig and branch surfaces and both surfaces of green leaves.
Breeding. Juveniles seen in Dec and Feb in Huánuco and Mar in Junín. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Peruvian High Andes EBA. Uncommon. Confined to a relatively small area, mainly on drier W side of E cordillera in C Peru, where it persists in highly degraded areas. Population trends undocumented, but the species is probably declining; could become vulnerable in the future from loss of dry scrub and woodland through persistent firewood-cutting. Few, if any, protected areas exist within this species' range.
Bibliography. Fjeldså & Krabbe (1990), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Moynihan (1979), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Zimmer (1930, 1947a).

35. Orange-headed Tanager

Thlypopsis sordida

French: Tangara à tête orange **German**: Orangekopftangare **Spanish**: Tangara Cabecinaranja

Taxonomy. *N.[emosia] sordida* d'Orbigny and Lafresnaye, 1837, Yuracares, Bolivia.
May form a superspecies with *T. inornata*. Three subspecies recognized.
Subspecies and Distribution.
T. s. orinocensis Friedmann, 1942 – R Orinoco (from near Soledad, in Bolívar, S to S of Puerto Ayacucho, in Amazonas), in C Venezuela.
T. s. chrysopis (P. L. Sclater & Salvin, 1880) – extreme S Colombia (E of Andes), E Ecuador, E Peru and W Brazil (E to R Madeira and R Jiparaná).
T. s. sordida (d'Orbigny & Lafresnaye, 1837) – S & E Brazil S of R Amazon (E & S Pará E to Ceará and Paraíba, S to Mato Grosso do Sul, São Paulo and Rio de Janeiro), E Bolivia, N Argentina (S to Tucumán, Corrientes and Misiones) and Paraguay.



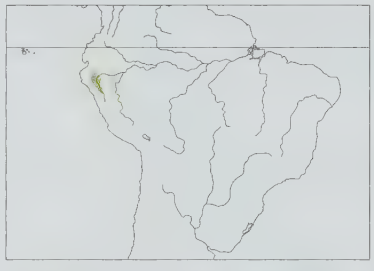
Descriptive notes. 13 cm; 14–19 g. Small, rather drab, thin-billed tanager with yellow-orange head, and proportions like those of a New World warbler (Parulidae). Male nominate race has crown and side of head orange-rufous, turning bright yellow on lores, ocular area and throat; upperparts, including upper-tail-coverts, tail and upperwing-coverts, sandy-grey, primary coverts dusky, flight-feathers dusky, edged grey; underparts are buff to cinnamon, becoming whitish on centre of lower breast, belly and undertail-coverts; iris dark brown; bill dusky; legs horn-grey. Female is duller than male above, especially on crown, has lores, face and throat duller yellow, and yellow of head less extensive and contrasting less with back. Immature resembles female, but even dingier, greyish-olive above, including crown, and paler below. Race *orinocensis* has chest, upper breast, sides and flanks pale grey, tinged greyish-cinnamon; *chrysopis* is much like previous, but upperparts pure grey with little or no olive wash, and breast and sides light greyish-brown. Voice. Song (solo) varies geographically: in N Peru and Ecuador a high-pitched, jerky, rising-and-falling "pits'a, see-a, pits'a, see-ee", ending on high-pitched note; in NW Argentina (Calilegua National Park) a high-pitched, halting and jerky "seet, sit, a see-fits-za", also with rising-and-falling pattern. Duets (songs?) or excited chatter in N Peru and Bolivia a few high notes followed by fast, high chittering, given when perched or in flight, "seet seet t-t-t-t-t-t-t-t-t-t-d-dit". Year-round song in E Brazil (Rio de Janeiro) includes several song types, typical being a thin, high "tsap-tsip, tsip, tsip-tsop-tswit". Also in Brazil a high trill, "tsi . . . . tsrrrri". Calls include high "tseet" or "seet" or "sit", often doubled, tripled or repeated rapidly; rapid high chittering "sit-it-t-t-t-t-t-t", also "seet-a", given more slowly.
Habitat. In Venezuela and in W Amazonia found mainly in early successional vegetation on river islands and riverbanks, e.g. in tall *Gynerium* grass, willow (*Salix*), *Tessaria*, *Cecropia* and associated shrubbery, or in younger second growth near rivers. In areas S of Amazonia found in dry to semi-humid zones in canopy of open woodland, parks, shrubby gardens and *cerrado*, and in lighter riparian vegetation along watercourses. In NW Argentina occurs in scrub, brush and borders of dry open woodland, especially along intermittent riverbeds. Rarely or never found inside continuous forest or woodland. To c. 100 m in Venezuela and c. 400 m in Colombia; elsewhere to c. 800 m, and locally to 1500 m in Bolivia. The only member of the genus in Amazonian lowlands.
Food and Feeding. Of eight stomachs examined, three contained only vegetable matter, four only animal matter, and one contained both; contents included orthopterans, beetles (Coleoptera), flies (Diptera), spiders (Araneae), fruit pulp and seeds. Found in pairs and in family parties of 3–4 individuals, sometimes with mixed-species flocks but at least as often away from them. Forages in restless, active manner, much like parulid warblers; hops rapidly and gleans insects, mostly from foliage from about eye level or higher, to tops of small trees. More rarely flutters, or hovers, or sallies short distances to air for fleeing prey.
Breeding. One nest found, in Dec in Argentina: an open cup c. 2 m up; contained 2 eggs, bluish-white, marked with brown and cinnamon. Regularly parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Seasonal movements reported in Brazil (Mato Grosso) and in N Argentina, where moves from Andean slopes to lowlands during austral winter months.
Status and Conservation. Not globally threatened. Uncommon to locally common. Occurs in a wide variety of mostly edge and secondary habitats. In a few areas it is under pressure from human colonization and clearing of land, but it is found within protected areas in almost all parts of its range, and occurs in such different ecosystems as those of Manu National Park, in Peru, and Calilegua National Park, in Argentina. Furthermore, is locally common in young successional vegetation on river islands and along river floodplains and is well adapted for using an ever-shifting mosaic of habitats, both on islands and on adjacent mainland.
Bibliography. Allen (1891), Burns (1997a), Burns *et al.* (2002, 2003), Contreras (1979a), Dinelli (1918), Dunning (1982), Fry (1970), Hellmayr (1910), Hilty (1999, 2003, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Moojen *et al.* (1941), Moore *et al.* (2009), Narosky & Yzurieta (1987), Naumburg (1930), Niethammer (1956), Oren & Parker (1997), de la Peña & Rumboll (1998), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sick (1985, 1993), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sibley & Monroe (1990), Sick (1993), Sick & Pabst (1968), Souza (2002), Weske (1972), Zimmer (1947a).

36. Buff-bellied Tanager

Thlypopsis inornata

French: Tangara à ventre roux **German**: Braunbauchtangare **Spanish**: Tangara Sencilla

Taxonomy. *Nemosia inornata* Taczanowski, 1879, Tambillo, Cajamarca, Peru.
May form a superspecies with *T. sordida*. Monotypic.
Distribution. Extreme SE Ecuador (extreme upper Marañón drainage near Zumba, in S Zamora–Chinchipe) and NC Peru (middle and upper R Marañón and upper R Huallaga/R Utcubamba, in W Amazonas and Cajamarca).



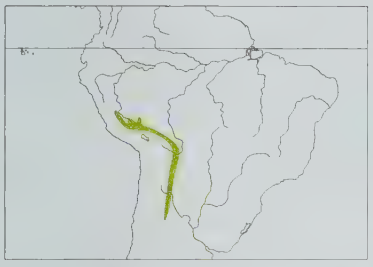
Descriptive notes. 13 cm; 14–17 g. Rather plain thin-billed tanager with rufous cap. Male has crown and nape rich dark cinnamon-rufous, contrasting with uniformly olive-grey upperparts including back, rump, uppertail-coverts; upperwing-coverts olive-grey, tinged brownish, primary coverts dusky; flight-feathers dusky, outer feathers narrowly edged greyish-olive, inner feathers edged and tinged brownish; tail olive-grey with brownish tinge; forehead, lores, ocular area, cheek, throat and underparts pale orange-buff, centre of belly and undertail-coverts whitish with buff tinge; iris dark brown; bill dark grey to blackish, often paler and bluer on lower mandible; legs horn-grey. Female is similar to male but duller, with crown and nape much duller, olive-grey with cinnamon tinge, and not contrasting strongly with upperparts; ear-coverts more strongly tinged cinnamon, rest of face and underparts buff with orangish tinge. Immature is similar to female, but upperparts mostly greyish-olive, underparts yellowish. Voice. Dawn song a thin, high "ti, sit, seet seet, suueet suueet, seet seet seet, sit sit" or similar variation, "suueet" notes higher-pitched, drawn out and forced; entire song high-pitched, leisurely in pace, and somewhat variable, sometimes without clear ending. Call a thin "sip" or "seep" during foraging; also "seet-a" repeated softly several times.
Habitat. Dry, shrubby semi-arid second growth, light canopy of dry forest, dry scrub and brush along rivers and ravines, and brushy clearings. At c. 450–2000 m in Peru, also sightings to 2200 m above Balsas (in upper Marañón Valley); 650–1200 m in S Ecuador. May meet or overlap in range very locally with *T. ornata*, but in general favours drier habitats at lower elevations.
Food and Feeding. Mostly small arthropods. Occurs in pairs and in small family groups. Forages at various heights, often quite near ground, and ranges out into tall grass and low shrubs; also well up in tree canopy in dry woodland. Movements fairly active, somewhat like those of a New World warbler (Parulidae). Gleans items from leaves, especially from outer leaves of acacia (*Acacia*), and leaf clusters, and has been seen regularly to check small dead or dry leaves and small clusters of dead leaves; occasionally probes or inspects flowers.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Marañón Valley EBA. Uncommon to locally fairly common. Utilizes dry woodland and secondary and degraded vegetation communities that are, at present, under pressure for conversion to agriculture only in a few areas where irrigation for rice-growing is possible. There appear to be few or no reserves within the tiny range of this species.
Bibliography. Clements & Shany (2001), Dorst (1957a), Fjeldså & Krabbe (1990), Isler & Isler (1999), Lysinger *et al.* (2005), Meyer de Schauensee (1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Taczanowski (1884), Zimmer (1947a).

37. Rust-and-yellow Tanager

Thlypopsis ruficeps

French: Tangara à ventre jaune **German**: Goldkappentangare **Spanish**: Tangara Alisera

Taxonomy. *S.[ylvia] ruficeps* d'Orbigny and Lafresnaye, 1837, near Palca, Apupaya ("between Cochabamba and Incasivi"), Bolivia. Monotypic.
Distribution. Andes from SC Peru (E slope from Ayacucho, Apurímac and Cuzco) S through Bolivia to NW Argentina (vicinity of Tucumán).
Descriptive notes. 12 cm; 9·6–13 g. Small, brightly coloured thin-billed tanager. Male has crown, side of head to below eye, and malar area bright rufous, upperparts, including uppertail-coverts and upperwing-coverts, contrastingly bright olive-green; primary coverts blackish; flight-feathers dusky, edged bright olive-green, tertials dusky with olive-green outer webs, tail olive-green, slightly duller than upperparts; central throat and underparts bright yellow, sides and flanks tinged olive; iris dark brown; bill dark grey to blackish, often paler and bluer on lower mandible;



legs horn-grey. Female is similar to male, but duller, forehead and ocular area buffy yellow, tinged rufous, middle crown to nape mostly olive (like back). Immature is much duller and less distinctive than adult, rather like a *Basileuterus* warbler in appearance, mainly olive-green above, with ill-defined yellowish eyebrow, yellowish facial area may show tinge of fulvous colour, yellow below, olive sides and flanks. VOICE. Song, sometimes as duet, a short burst of chittering notes, similar to that of *T. sordida*. Utters soft "sit" and "tzit" notes when foraging.

Habitat. Bushy second growth and forest borders in humid areas, borders of cloudforest, *Chusquea* bamboo, and occasionally in patches of *Polylepis* woodland; humid sections of yungas forest at S end of range in Bolivia and N Argentina. In all areas favours low shrubbery. Generally at c. 1500–3700 m in Peru and Bolivia, but most records at 1850 m or higher; occurs at slightly lower elevations in NW Argentina.

Food and Feeding. Eleven stomachs contained only insects. Occurs alone, in pairs, and in groups of up to 5–6 individuals, often associated with mixed-species flocks containing New World warblers (Parulidae), other tanagers and emberizids. Moves quickly and restlessly, always on the go, and usually in rather thick low shrubbery, where difficult to see for more than a moment. Median foraging height 3 m, rarely above 9 m. In Bolivia, 86% of 40 foraging observations were of birds searching leaves, primarily taking prey from undersides of leaves; also searched flowers, dead leaves and branches, and a majority of prey items were taken without acrobatics (56%) or by reaching. In Peru took prey from foliage and flowers, and gleaned bamboo leaf bases and internodes.

Breeding. Juveniles seen in Jun (Cuzco) and May and Jul (Puno) in Peru, and in Feb (La Paz) and May (Cochabamba) in Bolivia; fledgling in Jan in NW Argentina (Jujuy). No other information.

Movements. Appears to be at least partially migratory in extreme S of range (vicinity of Tucumán, in Argentina); over rest of range no seasonal movements reported.

Status and Conservation. Not globally threatened. Fairly common to locally common throughout range. Record from Martín García I (off NE Buenos Aires), in E Argentina, presumed to have involved a vagrant; isolated record from Huánuco, in C Peru, well N of normal range, may have involved a wandering individual or an erroneous identification. Occurs in a number of protected areas scattered along E face of Andes, including Manu National Park (Peru), Madidi, Isiboro Sécure, Carrasco and Amboró National Parks (Bolivia) and Calilegua National Park (Argentina). In addition, there are extensive areas of appropriate contiguous habitat in this species' range that are not protected, but appear not to be under immediate threat.

Bibliography. Bertonatti *et al.* (1994), Clements & Shany (2001), Dinelli (1918), Fjeldså & Krabbe (1990), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Morrison (1948), Moynihan (1979), Narosky & Yzurieta (1987), de la Peña & Rumboll (1998), Remsen (1985), Remsen *et al.* (1987), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Weske (1972), Zimmer (1947a).

Genus *PYRRHOCOMA* Cabanis, 1851

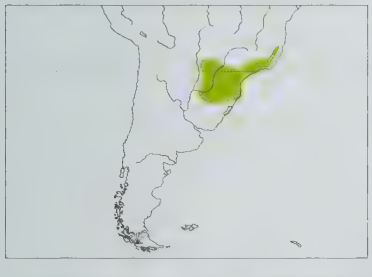
38. Chestnut-headed Tanager

Pyrrhocoma ruficeps

French: Tangara à tête marron **German**: Zimtkopftangare **Spanish**: Tangara Pioró

Taxonomy. *Tachyphonus ruficeps* Strickland, 1844, Rio de Janeiro(?), Brazil.
Monotypic.

Distribution. NE Argentina (Misiones) and SE Paraguay E to SE Brazil (Espírito Santo S to C Rio Grande do Sul).



Descriptive notes. 14 cm; mean 15·6 g. Small, rather slight and slender tanager with strong bill and contrasting head. Male has head and throat dark chestnut, with black forehead, ocular area and chin (forming small rounding mask); otherwise dark grey above and below, upperwing-coverts dusky, broadly edged dark grey, primary coverts blackish; underparts slightly paler than upperparts, with centre of lower breast and belly greyish-white (not in strong contrast to rest of underparts); iris dark brown; bill blackish above, mostly blue-grey below; legs dark grey. Female is much duller than male, mainly brownish-olive above, with crown and nape pale dull rufous, lores and chin buff, side of head dingy greyish-buff with tinge of cinnamon; throat and underparts dull greyish-buff with olive tinge, palest on belly. Immature male resembles female, and may retain this plumage for considerable time; subadult male like female, but shows partially chestnut head and some grey in plumage. VOICE. Often noted first by voice. Song, usually from concealment in bamboo, of 3 high sibilant notes followed by 2 or 3 similar but slightly lower ones, e.g. "pseee-pseee-pseee, tweee-tweee-tweee", frequently repeated at c. 5-second intervals. Call a thin, light "tsick" and hissing "pseee".

Habitat. Dense undergrowth in forest, bamboo thickets, second growth and shrubbery along forest borders. From near sea-level to c. 1000 m in Rio Grande do Sul; mainly 1100–1400 m in Rio de Janeiro.

Food and Feeding. One stomach contained only insects. Seen mainly in pairs or families, and generally independent of mixed-species flocks. Forages mostly within 3 m of ground, more rarely to 8 m up. Inconspicuous, and typically stays in dense shrubbery and bamboo thickets, where difficult to observe. Behaviour recalls that of a *Buarremon* brush-finch.

Breeding. Eggs white with a few dark spots, mostly at larger end. No other information.

Movements. Some movement inland during austral winter believed to occur.

Status and Conservation. Not globally threatened. Uncommon to fairly common. Occurs in several national parks, including Ybycuí National Park (Paraguay), Iguazú National Park (Argentina) and Iguaçu, Itatiaia and Tijuca National Parks (Brazil). Over much of this species' range, however, relatively little suitable habitat remains outside reserves. Population trends undocumented and in need of investigation.

Bibliography. Belton (1985), Bertoni (1926), Burns (1997a), Burns *et al.* (2002, 2003), Capllonch *et al.* (2005), Diamond & Lovejoy (1985), Holt (1928), Ihering (1900), Isler & Isler (1999), Narosky & Yzurieta (1987), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Souza (2002), Voss (1977a), Willis (1979).

Genus *CYPSNAGRA* Lesson, 1831

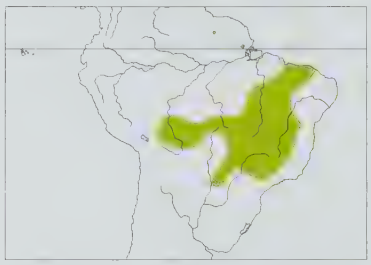
39. White-rumped Tanager

Cypsnagra hirundinacea

French: Tangara hirundinacé **German**: Weißbürzeltangare **Spanish**: Tangara Culiblanca

Taxonomy. *Tanagra hirundinacea*, Lesson, 1831, São Paulo, Brazil. Two subspecies recognized.

Subspecies and Distribution.
C. h. pallidigula Hellmayr, 1907 – NE Bolivia (W to W Beni) and C & E Brazil (from Humaitá, on R Madeira, E to SE Pará, N Maranhão, N Ceará and W Paraíba, and S to N Mato Grosso, N Goiás and W Bahia); isolated populations in S Suriname, S French Guiana and extreme NC Brazil (SC Amapá).
C. h. hirundinacea (Lesson, 1831) – E Bolivia, EC Paraguay (Laguna Blanca) and S Brazil (S Mato Grosso E to S Goiás and S Bahia, S to São Paulo).



Descriptive notes. 16–16·5 cm; 25–34 g. Boldly patterned tanager with fairly thick bill. Nominate race has head to just below eye, nape to upper back, uppertail-coverts and tail glossy black, lower back and rump white, rather wide white band on median coverts; upperwing-coverts glossy black, primary coverts black, flight-feathers blackish, white patch at base of primaries (outer webs of feathers white), basal two-thirds or more of outer primaries edged white (white conspicuous in flight); throat rusty amber, becoming creamy buff on underparts, palest on belly, and with flanks, thighs and undertail-coverts tinged cinnamon; iris dark brown; bill black; legs dark grey. Sexes similar. Immature has pattern echoing that of adult, but upperparts brownish and underparts creamy buff. Race *pallidigula* is similar to nominate, but has pale buff supraloral stripe (usually), also paler below, with buffish-ochre throat, whiter underparts. VOICE. Song, heard mainly prior to sunrise, a fast, loud series of melodic whistles with liquid quality, "whew chid-di-di-wee-wee-tyóó chid-d-o-wóó chi-d-dee-tyóó", the 3–6 phrases usually ending emphatically, and given over and over in rapid succession by pairs in antiphonal or synchronized duet. Female also may accompany male with simple "cha, cha, cha..." or more melodious "chewluh, chewluh, chewluh...". Songs, mostly from high in bush or tree, c. 5–10 seconds long, with short variable pause of c. 2–6 seconds between. Call of both sexes a low "kwet", "chat", and rattle.

Habitat. Primarily grasslands with scattered low trees and shrubs up to c. 2–5 m tall. In E Bolivia found in similar habitat and also in somewhat more wooded situations consisting of open woodland with dense grass and some scrubby undergrowth (*campo sucio*), as in S Los Fierros savannas of Noel Kempff Mercado National Park. May occur also in agricultural areas and edges of settled areas if enough suitable open terrain exists; has been reported also at woodland edges and in *Mauritia* palm groves within savannas. Recorded to c. 1000 m in Brazilian tablelands and to 700 m in Bolivia.

Food and Feeding. Mainly insectivorous, but reported also as eating fruit of *Annona*, *Byrsonima*, *Eugenia* and *Erythroxylum*. In C Brazil food items included beetles (Coleoptera), orthopterans, and alate ants (Formicidae) and termites (Isoptera); observed while taking large orthopterans (4–5 cm long) and a 3-cm caterpillar. Stomachs of four birds contained animal matter, including a large spider (Araneae) and a small beetle, and seeds. In C Brazil most often in pairs or trios, occasionally up to six together, even in breeding season, groups occupying territories of c. 5 ha; observations at Amos National Park (Brazil) and Noel Kempff Mercado National Park (Bolivia) have almost always been of pairs or trios, latter consisting of adult pair and an offspring. Pair strongly territorial, and quick to sing and duet to announce territorial ownership; at least in Bolivia, territories appear to be much larger than the 5 ha reported in Brazil. In C Brazil foraged low in vegetation and on ground, and opportunistically sallied to air for flying ants and termites. Hops slowly and methodically along interior branches of scrubby trees and peers with head and neck outstretched. Seen to take large orthopterans and a caterpillar from inside a curled green leaf and from beneath a leaf.

Breeding. In Brazil nesting recorded in Sept and Nov in Goiás and Nov in São Paulo. Co-operative breeder; one or two offspring from previous broods often assist with nesting duties. Nest a tightly woven cup of grass, occasionally with some leaves or twigs, sometimes lined with soft cotton-like plant material (of *Eriotheca*), placed 1–2 m above ground in low fork in small tree. Clutch 3–4 eggs, usually 4, pale blue, sparsely spotted with black or dark brown dots, these forming wreath at larger end; no information on incubation and nestling periods.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Fairly common locally. Occurs in several large protected areas, among them Noel Kempff Mercado National Park (Bolivia) and Das Emas and Brasília National Parks (Brazil). Extensive deforestation and land alteration have destroyed much habitat within this species' range, and continue to do so. Present population represents only a small percentage of the original. The species is worthy of monitoring.

Bibliography. Belton (1985), Burns (1997a), Burns *et al.* (2002, 2003), Cavalcanti & Pimentel (1988), Haverschmidt & Mees (1994), Hellmayr (1910), Holt (1928), Isler & Isler (1999), Naumburg (1930), Pelzeln (1869), de la Peña & Rumboll (1998), Ragusa-Netto (1997, 2000, 2002b), Renssen (1974), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914), Souza (2002), Tostain *et al.* (1992), Voss (1977a).

Genus *NEPHELORNIS* Lowery & Tallman, 1976

40. Pardusco

Nephelornis oneilli

French: Pardusco d'O'Neill **German**: Brauntangare **Spanish**: Tangara Pardusca

Taxonomy. *Nephelornis oneilli* Lowery and Tallman, 1976, Bosque Unchog, on pass between Churubamba and Hacienda Paty above Acomayo, c. 3592 m, Huánuco, Perú.
Taxonomic affinities initially unclear, and had been suggested as being closely related to New World warblers (Parulidae); investigations of cytochrome *b* sequence data, however, indicate that it is related to a clade of mostly Andean tanagers in genera *Hemispingus*, *Cnemoscopus*, *Pyrrhocoma*, *Thlypopsis* and *Cypsnagra*. Monotypic.
Distribution. E slope of Andes of Peru in San Martín, La Libertad, Amazonas (Kuelap), and Huánuco (E of R Huallaga near Panao, and W to Cordillera Carpish).



Descriptive notes. 12·5 cm; male 16–19 g, female 13·5–15·5 g. Small, plain tanager with short, pointed and fairly thin bill, reminiscent of a New World warbler (Parulidae). Has crown, lores, side of head and upperparts, including uppertail-coverts, plain brown, eyering slightly paler than face; greater upperwing-coverts dull brown with ochraceous-tawny tips (faintly indicated wingbar); flight-feathers blackish-brown, faintly edged basally with tawny-olive; tail blackish-brown, outer web of each feather edged light brownish-olive; below, ochraceous to dull tawny ochraceous, throat slightly paler and shading to light buff; flanks and undertail-coverts slightly darker than belly; iris warm brown to dark brown; upper mandible dark brown to horn-coloured, lower mandible flesh-coloured; legs light brown, soles yellowish. Sexes similar. Immature male is similar to adult, but darker brown throughout, and with wing-coverts, flight-feathers and tail feathers almost completely lacking pale edgings. Voice. Group-members constantly utter thin "seep" contact calls while foraging. Also gives soft "chip" note. Possible song a series of weak, high and jerky warbled phrases.
Habitat. Isolated and semi-isolated patches of wet elfin woodland (c. 4–10 m in height), low trees and bushes, and shrubs 1–2 m tall growing in *Sphagnum* bogs and wet grassland; irregularly up to limit of tree growth. Most woody vegetation in habitat supports a wide variety of epiphytic growth, especially moss and lichens. Recorded at c. 3000–3800 m; this zone often shrouded in fog and mist for parts of each day, especially during Nov–Apr rainy season.
Food and Feeding. Arthropods make up all or most of diet. Contents of four stomachs were remains of a spider (Araneae) and parts of Lepidoptera, beetles (Coleoptera), homopteran bugs and flies (Diptera); also a small amount of fibrous plant material. Occurs in monospecific flocks of 5–15 individuals, and sometimes with mixed-species flocks of *Conirostrum*, *Diglossa* and other tanagers. Active, constantly on the move and, once found, rather easy to see; individuals and small parties move from bush to bush much in the manner of bushtits (*Psaltriparus*) in North America. Forages by flying into middle part of bushes, and then working upwards and outwards on to limbs; shrubs and small trees with dense crown of clustered small leaves are preferred foraging sites, where it peers from side to side and gleans small arthropods from lower and, less frequently, upper leaf surfaces and stems, then rapidly moves or flies to another site. Probes moss and lichens. Foraging posture usually upright, but occasionally may hang with head downwards or extend its legs to reach more distant surfaces. Groups may follow other birds into canopy of trees, but, in general, prefer low wooded edge.
Breeding. No information. Female reportedly had an old brood patch, but specimen showed no postnuptial moult.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in North-east Peruvian Cordilleras EBA. Locally fairly common. Despite small, patchy distribution and restricted habitat preference (wet tree-line regions), this species is fairly common in places; it occurs mostly in remote areas that are sparsely inhabited by humans. Possibly occurs in Cordillera Azul National Park. Current threats include deforestation, fires and, especially, firewood-cutting, which has continued for centuries and has gradually reduced and fragmented much tree-line habitat, including that within the range of this tanager. May be vulnerable to habitat loss in the longer term.
Bibliography. Bledsoe (1988), Burns (1997a), Burns *et al.* (2002, 2003), Clements & Shany (2001), Fjeldså & Krabbe (1990), Horváth (1977), Lowery & Tallman (1976), Raikow (1978), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007).

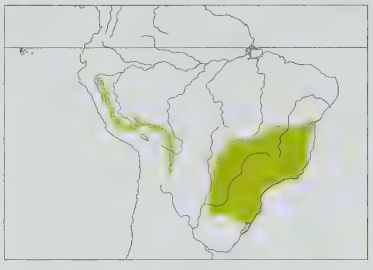
Genus *TRICHOTHRAUPIS* Cabanis, 1851

41. Black-goggled Tanager

Trichothraupis melanops

French: Tangara à front noir **German**: Schwarzgesichttangare **Spanish**: Tangara de Anteojos

Taxonomy. *Muscicapa melanops* Vieillot, 1818, Paraguay.
Recent molecular-genetic studies suggest that genus is most closely related to *Eucometis* and to *Tachyphonus surinamus* and *Lanio*, that it and *Eucometis* are sister-genera, and that *Coryphospingus* and *Rhodospingus* (both currently placed in Emberizidae) also are members of this clade. Present species consists of two geographically well-separated populations, one montane and the other primarily lowland; investigation required in order to determine whether these represent distinct taxa. Currently treated as monotypic.
Distribution. Narrowly along E slope of Andes from N Peru (S from S Amazonas and San Martín) S to Bolivia and N Argentina (N Jujuy); SE Brazil (S Mato Grosso, S Goiás and S Bahia S to N Rio Grande do Sul) and adjacent NE Argentina and E Paraguay (E of R Paraguay).



Descriptive notes. 16 cm; 16–26 g, 21·7–29·5 g (Brazil). Male has a black mask extending from forehead back onto broad patch around eye; yellow crown patch (usually concealed, or showing only as narrow yellow stripe); rear crown and nape to uppertail-coverts dark olive-grey with brownish tinge; upperwing-coverts dusky, primary coverts, flight-feathers and tail blackish; white band or patch at base of secondaries and white band in centre of primaries, the two forming broken wingband (white usually not visible when bird at rest); throat and underparts buff, paler on centre of belly, undertail-coverts tinged buffy cinnamon; underwing-coverts white; iris dark reddish-brown; bill blue-grey, often duskier on most of upper mandible; legs greyish-horn. Female is similar to male, but duller, with no yellow crown patch, little or no black on face and side of head, and less contrast between back and wings. Juvenile undescribed. Voice. Two song types described in Brazil: the first a rambling series of slurred whistles mixed with musical notes, "puu-eee, wa-é-wa-é, whur whur, j-eep, whit? pheee peee", which may include sweet and warbled notes, often mixed with harsh call notes; the second a long series of more varied notes and squeaky notes, also with slurred whistles, buzzy notes and short "psp" notes, in which the same note may be repeated 2–5 times. Frequently heard calls include burry "tswick" or "twzt" and high "tst". Andean population seems unusually quiet.
Habitat. In Andes found mainly in humid forest borders and forest light-gaps with thick undergrowth; c. 1000–1700 m in Andes, but as low as 300 m in foothills in Bolivia. E population in semi-open shrubby areas, forest borders, riparian woodland, second growth in clearings and, in SE Brazil, isolated woodlots as small as c. 21 ha; lowlands to c. 1500 m in SE Brazil, Paraguay and NE Argentina.
Food and Feeding. Of 31 stomachs examined, six contained only vegetable matter and 22 only animal matter, and three contained both; contents included beetles (Coleoptera), fruit, seeds, and pieces of shell of a snail (Pulmonata). Noted also as eating butterflies (Lepidoptera) and wasp larvae (Vespidae); in Paraguay reported as eating *Allophyllus edulis* fruits 7–10 mm long. Found in pairs and at times in small family groups, occasionally in larger groups of up to a dozen; regularly forages with mixed-species flocks, especially in Andes, and regular at army-ant (Formicidae) swarms in Brazil. Rather active and restless, frequently hopping from branch to branch and up through vine tangles; sallies to foliage or to air, mostly rather low, and occasionally drops to ground or ascends into tree crown for fruit. In Paraguay foraged mostly in dense foliage of tree crown, but also in all other parts of tree; reached out, leaned over, or made quick sallies to pick fruit, rarely hovered; rolled fruit in bill to remove exocarp, and dropped seeds or swallowed entire fruits.
Breeding. Breeding recorded in Brazil in Oct (São Paulo) and Nov (Rio de Janeiro). In SE Brazil, a cup-nest was 1 m up in bamboo in forest, contained 3 young. Eggs pinkish-white marked with brown, lavender and black, especially at large end. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common. Andean population uncommon and local; E population generally more numerous, and considered abundant in mountains of Espírito Santo and Rio de Janeiro (Brazil). Found in several protected areas in Andes, including Manu Biosphere Reserve, in Peru, and Madidi, Carrasco and Amboró National Parks, in Bolivia. Extensive intact, unprotected habitat also remains within this species' range in Andes. E population also occurs in numerous parks and reserves, including Serra da Bocainá, Itatiaia, Tijuca, Serra dos Órgãos, Caparaó and Iguaçu National Parks and Augusto Ruschi (Nova Lombardia) Biological Reserve, among others, in Brazil, and Iguazú National Park, in Argentina. In much of SE Brazil, deforestation is so complete that most of the unprotected habitat within the former range of this species has disappeared, and it is now confined largely to parks and reserves. Despite extensive range contraction and fragmentation in Brazil, this tanager seems not to be at risk and may even profit locally from bushy regrowth.
Bibliography. Belton (1985), Burns & Racicot (2009), Chubb (1910), Clements & Shany (2001), Descourtilz (1852), Diamond & Lovejoy (1985), Dunning (1982), Erickson & Mumford (1976), Euler (1867, 1900), Goeldi (1894), Holt (1928), Ihering (1900), de Lima Fávaro & dos Anjos (2005), Maldonado-Coelho & Duraes (2003), Mallet-Rodrigues *et al.* (2001), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Narosky & Yzurieta (1987), Ogilvie-Grant (1912), Parker & Goerck (1997), de la Peña & Rumboll (1998), Pereyra (1951), Remsen *et al.* (1987), Ridgely & Tudor (1989, 2009), Rodrigues *et al.* (1994), Schulenberg (2000a), Schulenberg *et al.* (2007), Short (1971), Sick (1985, 1993), Souza (2002), Willis (1979), Zimmer (1947a).

PLATE 4 ➤



PLATE 4

inches 3
cm 8

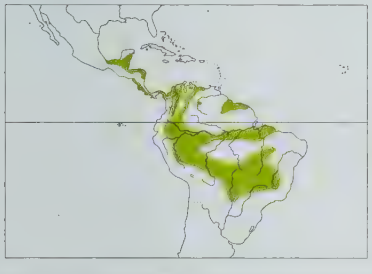
Genus *EUCOMETIS* P. L. Sclater, 1856

42. Grey-headed Tanager

Eucometis penicillata

French: Tangara à tête grise **German**: Graukopftangare **Spanish**: Tangara Cabecigrís
Other common names: Grey-crested Tanager (*cristata*)

Taxonomy. *Tanagra penicillata* Spix, 1825, no locality = Fonte Boa, Amazonas, Brazil.
Recent molecular-genetic studies suggest that this genus and *Trichothraupis* are sister-taxa. Marked geographical variation in size and plumage; also, genetic analyses have shown that, while two individuals from adjacent sites in Bolivia (race *albicollis*) differed in sequence divergence values of only 0·35%, populations from Middle America differed from Bolivian ones by 4·8%, as much as or more than that between many passerine taxa now recognized as separate species. Further study needed. Seven subspecies recognized.
Subspecies and Distribution.
E. p. pallida Berlepsch, 1888 – SE Mexico (on Caribbean slope from S Veracruz, N Oaxaca, and Yucatán Peninsula), N & C Guatemala, Belize and N Honduras (S to Olancho).
E. p. spodocephalus (Bonaparte, 1853) – both slopes of Nicaragua S to Costa Rica (S on Pacific slope to Guanacaste and on Caribbean slope to Alajuela).
E. p. stictothorax Berlepsch, 1888 – Pacific slope of Costa Rica (S from Puntarenas) S to Panama (Veraguas).
E. p. cristata (du Bus de Gisignies, 1855) – Panama (Caribbean slope from Coclé E to C Panama, and Pacific slope E from Veraguas) E to Colombia (S in Cauca Valley to Valle, and in Magdalena Valley to Huila; also E of Andes in Arauca), and NW Venezuela (E to Mérida and extreme W Portuguesa).
E. p. affinis Berlepsch, 1888 – N Venezuela from Falcón E to Miranda.
E. p. penicillata (Spix, 1825) – E of Andes from Colombia (Meta and Amazonas) S through E Ecuador to Peru (Ucayali), and E across much of NC Brazil to Atlantic (W Maranhão); also S Venezuela (NW Amazonas) and the Guianas.
E. p. albicollis (d'Orbigny & Lafresnaye, 1837) – E of Andes from N Bolivia (Pando, La Paz and Santa Cruz) E across C Brazil (Mato Grosso E to Minas Gerais and W São Paulo); also NE Paraguay (sight record Concepción).



Descriptive notes. 16–17 cm; 22·5–35 g. Nominate race has grey head, large bushy crest (white at feather bases usually concealed); upperparts including uppertail-coverts yellowish-olive, upperwing-coverts olive, tinged yellowish; primary coverts and flight-feathers dusky, edged yellowish-olive, inner flight-feathers and tertials mostly yellowish-olive with dusky inner webs; tail olive with yellowish edges; chin and throat whitish, fairly well demarcated from rich yellow underparts; iris reddish-brown; bill blackish; legs pale greyish-pink. Sexes similar. Immature is like adult, but lores dusky, and head and throat yellowish-olive like upperparts. Races differ mainly in size, in prominence of crest and in darkness of plumage: *pallida* is slightly smaller than nominate, with head and throat somewhat darker grey, no white in crown; *spodocephalus* is similar to previous, but slightly darker, and with orangish-yellow wash on chest; *stictothorax* is very like last, but with faint olive streaks/spots on breast; *cristata* has darker head, very pale grey throat with slight olive tinge, and shorter crest with little or no white at base; *affinis* is very like preceding race, but crest even shorter, and throat lacks olive tinge; *albicollis* has longish buffish-grey crest, buff-tinged throat, also pinkish or pinkish-grey bill. Voice. Songs may vary somewhat geographically (or possibly individually), but are typically high-pitched and sputtering. In Costa Rica a high, thin, rather sibilant medley, "whichis, whichis, whichis, whicheery whichis whichu", "tsee tseep SEEUr tsp-tsp tseeur tsp-tsp seeur ts-suur...", and similar; in Panama a musical "sputter, eat eat meat chop", "safurry chew, safurry chew..." or the like; in Brazil, a series of high whistles, descending near end, "tzee, tzee, tzee, zi, zi, zi, zi, zi, zi", sometimes longer or varied. Has variety of sharp unmusical call notes: in Mexico calls described as a high, sharp "siip" and "ssi-ssip", at times run into slightly lisping twitter, also a low, hard, clipped "tk" or "tuk" and soft clucking "ichik chik"; in Costa Rica as a high, thin "chip" or "pit", sometimes repeated incessantly, and high squeaky "tseeet", often repeated 2–3 times; in Colombia (Amazonas) alarm a sharp "schip".
Habitat. Varies over broad range. In N of range and W & N of Andes occurs in undergrowth of both dry and humid forest, especially in areas with dense shrubbery, as well as in gallery forest, forest borders and second-growth woodland of various ages, but in dry areas favours moister sites, such as along rivers. In NW South America also locally in low-elevation cloudforest, e.g. in coastal range of N Venezuela. In Amazonia, nominate race mainly in undergrowth of *várzea* forest and other low or poorly drained wooded sites, whereas S race (*albicollis*) occurs in undergrowth of tall moist forest (including gallery forest) and bushy forest borders and is often found near watercourses. Sea-level to 1700 m, mostly below c. 1000 m.
Food and Feeding. Arthropods; also fruit, including *Miconia* berries, arillate seeds etc. Nestling diet mostly insects. Found singly and in pairs in drier, more marginal sites, but may gather in much larger groups, sometimes of up to 15 individuals, over army-ant (Formicidae) swarms in humid areas N & W of Andes. In latter regions forages over army ants or away from them with equal facility; E of Andes seems infrequently associated with army ants, but S race *albicollis*, at least in Santa Cruz (Bolivia), seems to be again a regular follower of raids. Stays mostly in shady undergrowth and often somewhat wary, at least initially. Over ant swarms behaves in restless, active manner, often flicking wings and tail, and taking arthropod prey by sallying rapidly to the ground or substrate, or reaching and pecking prey from a perch. In all areas most foraging is from near ground level to c. 5 m up, more rarely much higher.
Breeding. Breeding reported in Apr in Belize; breeds Mar–Jul (two broods) in Costa Rica and Apr–Sept in Panama; nest under construction in Feb in Colombia (Reserva Reinita Cielo Azul, in Santander); breeding reported Feb, Sept and Nov–Dec in NC Brazil (Pará). Nest material brought by both sexes, both also build nest, taking 2–3 days, sometimes up to 6 days; a frail, thin-walled, shallow cup of rootlets and plant fibres, often lined with hair-like fungal rhizomorphs, typically c. 10 cm in outside diameter and 6 cm deep, placed 0·5–3 m (usually 1·5–2·1 m in Costa Rica) above ground in bush or tree at edge of or outside forest, especially alongside water or in isolated bush such as coffee shrub (20 nests reported in coffee), often in spiny palm in forest (e.g. in Costa Rica), more rarely in tall grass or in vines near forest; one nest in Colombia was in dense mass of exposed rootlets 1·8 m up and beneath cut roadbank in coffee plantation. Clutch 1–2 eggs, rarely 3, dirty white, grey or pale blue-grey or pinkish-buff, heavily mottled with brown (colour perhaps varying with race); incubation by female, in stints of c. 48–97 minutes, recesses of 20–55 minutes, constancy rate c. 62%, incubation period 14–16 days; chicks fed by both parents, nestling period 11–12 days. Of 24 nests of known outcome in Costa Rica, nine produced at least one young, giving success rate of 37·5%; main cause of failure was predation.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Variably uncommon and local in drier regions to common in some humid regions, especially N & W of Andes. Widespread across much of Amazonia, but much more numerous in some areas than in others. Primarily a forest-based species, although occurs also in second-growth woodland. Found in many protected areas, including Indio-Maíz Biological Reserve (Nicaragua), La Selva Biological Reserve and Braulio Carrillo and La Amistad National Parks (Costa Rica), Soberanía, Chagres and Darién National Parks (Panama), Los Katíos National Park (Colombia), Henri Pittier National Park (Venezuela), and various parks scattered over the Ecuadorian, Peruvian and Brazilian Amazon. The species is not likely to be at any near-term risk, although all of the Middle American populations have lost much of their former habitat outside unprotected areas and have undergone range contractions and suffered range fragmentation.
Bibliography. Binford (1989), Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Burton (1975), Davis (1972), Dugand (1947), Garrigues & Dean (2007), Haverschmidt (1952, 1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003, 2009b), Hilty & Brown (1986), Howell & Webb (1995), Land (1970), McDiarmid *et al.* (1977), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Naumburg (1930), Novaes (1973), Oniki & Willis (1972), Pacheco *et al.* (2007), Paynter (1955), de la Peña & Rumboll (1998), Pinto (1944b), Phelps (1943), Phelps & Phelps (1950, 1963), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Rodrigues & Gomes (2004), Russell (1964), Salaman *et al.* (2008), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1954, 1977, 1980b), Slud (1960, 1964), Smithe (1966), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Stone (1918), Strauch (1977), Wetmore (1943), Willis & Eisenmann (1979), Zimmer (1947a).

Genus *TACHYPHONUS* Vieillot, 1816

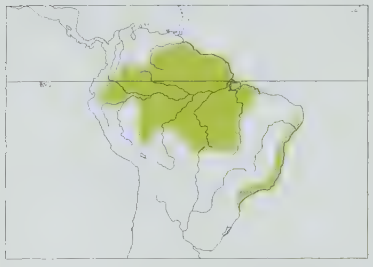
43. Flame-crested Tanager

Tachyphonus cristatus

French: Tangara à huppe ignée **German**: Haubentangare **Spanish**: Tangara Crestifuego
Other common names: Scarlet-crested Tanager; Natterer's Tanager (*nattereri*)

Taxonomy. *Tanagra cristata* Linnaeus, 1766, Cayenne, French Guiana.
Genetic data indicate that this species is sister to *T. rufiventer* and that *T. luctuosus* is sister to both of these. Present species exhibits marked geographical variation in plumage, with racial limits poorly defined. Very poorly known taxon *nattereri*, with distinctive male plumage, may represent a separate species but usually considered a race of present species or aberrant example of *madeirae*; a female specimen once thought possibly to be of *nattereri* was subsequently reassigned to *madeirae* (recent "discovery" of an additional specimen, presumably of *nattereri*, may shed light on this question). Taxonomic status of isolated E coastal race *brunneus* also worthy of investigation. Given the amount and complexity of variation within this species, and the fact that, conversely, differences between some races seem trivial, a full taxonomic review seems warranted. Ten subspecies currently recognized.
Subspecies and Distribution.
T. c. orinocensis J. T. Zimmer & Phelps, Sr, 1945 – extreme E Colombia and S & SE Venezuela (N & E Amazonas and W Bolívar E to R Paragua and R Caroní).
T. c. intercedens Berlepsch, 1880 – E Venezuela (E of R Caroní) E to Guyana and Suriname.
T. c. cristatus (Linnaeus, 1766) – French Guiana and NE Brazil (N of R Amazon and E of R Nhamundá).
T. c. cristatellus P. L. Sclater, 1862 – SE Colombia (from vicinity of Villavicencio, in Meta) and S Venezuela (SW Amazonas) S to extreme NW Peru and NW Brazil (S & E to Manaus).
T. c. fallax J. T. Zimmer, 1945 – S Colombia (SE Nariño), E Ecuador and N Peru (S to lower R Ucayali).
T. c. huarandosae Chapman, 1925 – Huarandosa (in Chinchipe Valley, near Marañón Valley) in N Peru.
T. c. madeirae Hellmayr, 1910 – C Brazil S of Amazon (from Teffé E to R Xingu and S into Mato Grosso), also adjacent SE Peru (E Madre de Dios) and adjacent N Bolivia (Pando and N Beni).
T. c. nattereri Pelzeln, 1870 – WC Mato Grosso (Villa Maria, near Cáceres), in SW Brazil.
T. c. pallidigula J. T. Zimmer, 1945 – NE Brazil (Pará and lower R Tocantins).
T. c. brunneus (Spix, 1825) – E Brazil from Rio Grande do Norte S, discontinuously, to NE Santa Catarina; possibly also Maranhão E to Paraíba.
Descriptive notes. 15 cm; 16·6–23 g. Canopy-dwelling tanager with fairly short thick bill and small orangish to red bib; crest often less impressive than its vernacular name suggests. Male nominate race is mainly glossy black above and below, with broad, flat crest bright orange, paler in front; rump and uppertail-coverts yellow-buff, upperwing-coverts, flight-feathers and tail black, white patch on outermost scapulars (often hidden); centre of throat straw to dull buffy orange, underwing-coverts white; iris dark reddish-brown; bill black, base of lower mandible blue-grey; legs horn-grey. Female is generally olive to rufescent brown above with richer brown crown, rich ochraceous below, with whitish to buff-white throat and faint narrow buff eyering. Juvenile undescribed. Races differ mainly in colour of crest and in size and colour of male's throat patch (smallest in NW races), also those N of Amazon have deeper black plumage than those S of river (except for *nattereri*): *intercedens* differs from nominate in having rump pale yellow-orange, also pale orange crest with

On following pages: 44. Yellow-crested Tanager (*Tachyphonus rufiventer*); 45. Fulvous-crested Tanager (*Tachyphonus surinamus*); 46. White-shouldered Tanager (*Tachyphonus luctuosus*); 47. Tawny-crested Tanager (*Tachyphonus delatrii*).



deep orange centre and yellow-orange bib (Gran Sabana of Venezuela), variable, crest rich yellow and bib dull yellow in Imataca region of Venezuela, and crest pale yellow with greyish-yellow bib in Guyana, female is much paler below than nominate, has no rufous tinge above; *orinocensis* has "bicoloured" crest, with front and sides bright yellow and centre and rear bright red, central throat patch pale orange, upper rump yellow and lower rump becoming orangish, female differs from nominate in warmer rufous-brown upperparts, darker brown crown, more greyish (not dull buff) throat and brighter underparts; *cristatellus* has crest entirely scarlet (the reddest of all races N of Amazon), central throat patch dull buff-orange, female is more rich yellow-buff below; *fallax* is similar to nominate, but tail slighter shorter, crest more orange (less scarlet), and with buff frontal band not so well developed; *huarandosae* is much like nominate, but crest much longer (longest of all races) and more orange; *madeirae* has crest the richest red of all races but relatively short, also has notably long wing and tail, and bend of wing blackish (but underwing white, as on all races), female more reddish-brown than that of nominate; *pallidigula* is similar to previous, but throat and rump paler, female like previous; *brunneus* differs from *madeirae* in having crest unusually long and full and slightly paler red, also has all-white bend of wing (unlike *madeirae*), female like previous; *nattereri* has orange crest, completely lacks throat patch, and has deep black body plumage with larger white wing patch and smaller buff rump patch. Voice. Thin "seeep" and "chet" notes during foraging. Song at Alta Floresta (Brazil) a rather uninspired and irregular series of up to c. 20 fairly high-pitched repetitive notes, each inflected upwards, "pseet!, pseet!...pseet-pseet!, pseet!, pseet!, ...", c. 1 note per second, the series on even pitch.

Habitat. Over most of Amazonian range found in *terra firme* forest and in tall old second growth; less often in *várzea* forest. In E & SE Brazil, geographically isolated race *brunneus* reported as favouring forest edge, open woodland, gallery and savanna forest, and second growth, rather different from preferred habitats in Amazonia. Lowlands to c. 1400 m in Venezuela, to 500 m in Colombia, locally to 1000 m in Ecuador and 800 m in Peru.

Food and Feeding. Mostly arthropods and fruit. Of eight stomachs examined, four contained only vegetable matter and two only animal matter, and two contained both; contents included fruit, berries, seeds, and insect remains. Contents of other stomachs included short-horned grasshoppers (Acrididae). In all areas found in pairs or small family parties, occasionally singly or in groups of up to six individuals, rarely to ten; associates with fast-moving canopy and subcanopy mixed-species flocks, of which it is a core member (over much of Amazonia most canopy flocks have a pair or family of present species). Forages mainly in canopy, but often drops lower to fruiting trees and shrubs; in fruiting trees stays mostly in outer foliage. Active and restless, seems always to be on the go, hopping quickly along slender, horizontal canopy branches and out into terminal foliage, gleaning arthropods from foliage, flutter-chasing or sallying in foliage, hopping in vine tangles, or reaching down, or even hanging downward occasionally, then pausing momentarily (as if to catch its breath), before rushing off to a fruiting tree. Because of restless behaviour is not an easy bird to observe at length.

Breeding. One in breeding condition on 25th Jan in Colombia (Macarena Mts). Nest reported as being a small open cup placed in bush or small palm near stream or pond in forest understorey (verification needed). Eggs white to yellowish-pink, spotted red and sometimes stained black. No other information.

Movements. Apparently resident in all areas. Seasonal movements possible in extreme S parts of range in SE Brazil.

Status and Conservation. Not globally threatened. Widespread and typically fairly common. Occurs in many protected areas, including e.g. Canaima National Park (Venezuela), Iwokrama Wilderness Reserve (Guyana), Voltzberg National Park (Suriname), and numerous parks in E Colombia, E Ecuador and Amazonian Brazil. Range also encompasses extensive areas of intact habitat, which, although not formally protected, are at low risk of development in foreseeable future. Isolated race *brunneus* in coastal SE Brazil found mainly in protected areas, such as Sooretama, Augusto Ruschi (Nova Lombardia) and Poço das Antas Biological Reserves, and Serra dos Órgãos and Tijuca National Parks. Deforestation extensive throughout SE Brazil, and *brunneus* may survive mainly in reserves and protected areas.

Bibliography. Burns & Racicot (2009), Clements & Shany (2001), Descourtilz (1852), Diamond & Lovejoy (1985), Dick *et al.* (1984), Gilliard (1941), Haverschmidt (1952, 1968), Haverschmidt & Mees (1994), Hellmayr (1910, 1936), Hilty (2003), Hilty & Brown (1986), Ihering (1900), Isler & Isler (1999), Marantz & Zimmer (2006), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Naumburg (1930), Novaes (1952), Olivares (1962), Olivares & Hernández (1962), Oren & Parker (1997), Pacheco *et al.* (2007), Parker & Goerck (1997), Pinto (1944a), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sazima *et al.* (1993), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914, 1935a), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977), Zimmer (1945).

44. Yellow-crested Tanager

Tachyphonus rufiventer

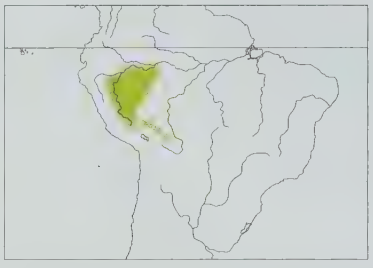
French: Tangara à crête jaune **German**: Gelbschopftangare **Spanish**: Tangara Crestiamarilla

Taxonomy. *Tanagra rufiventer* Spix, 1825, São Paulo de Olivença, River Solimões, Brazil.

Genetic data indicate that this species is sister to *T. cristatus* and that *T. luctuosus* is sister to both of these. Monotypic.

Distribution. E Peru (S of R Marañón and R Amazon) and adjacent W Brazil (SW Amazonas and W Acre) S to NW Bolivia (La Paz).

Descriptive notes. 15 cm; 15·5–20 g. Dark-plumaged, slender canopy-dweller best told by small "bow-tie" enclosing narrow dark buff throat. Male has buffy-yellow crown patch of variable intensity (almost always concealed), rest of crown, side of head and nape to back, upperwing-coverts, flight-feathers and tail black, rump and uppertail-coverts contrastingly deep buff (usually hidden by wings); bend of wing and outermost scapulars white (often concealed); constricted dark yellow-buff central throat patch enclosed by short narrow black band across base of throat (intensity and completeness of black throatband variable, sometimes obscure); underparts rich tawny, sides and flanks yellow-buff (intensity of colour of underparts variable); iris dark brown; bill blackish with most of lower mandible greyish-blue; legs dark grey. Female is olive above, with slightly contrasting greyish crown and side of head; throat whitish, becoming ochraceous buff on underparts, and darker ochraceous buff, tinged cinnamon, on undertail-coverts; intensity of colour of throat and undertail-coverts variable. Immature male is like female, but crown olive, like back, and throat yellowish.



Voice. Calls rather high-pitched and easily overlooked, most likely to be heard when birds foraging with mixed flocks; include reedy or slightly shrill "jjit" and higher "zeep", the two often given in combination, e.g. "zeep? jjit jjit jjeep", also a high "tswee". A high buzzy "dzz-dzz-dzz" is possibly a song.

Habitat. Humid *terra firme* and *várzea* forest and forest borders. Lowlands to c. 1250 m in Peru, to 1650 m in Bolivia. In S Peru and adjacent Bolivia largely confined to hilly terrain and foothills, and replaced by *T. cristatus* in lowland forest.

Food and Feeding. Of two stomachs examined, one contained only vegetable matter and the other both vegetable and animal matter, including fruit pulp and a caterpillar. Found in pairs, sometimes with juveniles, and is a core member of canopy or middle-level mixed-species flocks. Active and rapidly moving, its behaviour is much like that of *T. cristatus*. Peers at foliage, picks insects from upper surface of leaves, and sallies short distances (less than 0·5 m) to upper surfaces of leaves.

Breeding. No information.

Movements. Resident. Data from SE Peru suggest that, once mated, pairs probably remain on a permanent territory throughout life.

Status and Conservation. Not globally threatened. Fairly common. Distributed primarily in W Amazonia. Occurs in several protected areas, including the Pacaya-Samiria National Reserve and Manu Biosphere Reserve (Peru), Madidi National Park (Bolivia) and Serra do Divisor National Park (Brazil); found also in numerous private reserves around eco-lodges in W Amazonia, e.g. Explorama, Explornapo and ACEER Lodges, near Iquitos, in Peru. Range encompasses large areas of intact forest, which, although not formally protected, is at low risk of deforestation in short term.

Bibliography. Burns & Racicot (2009), Hellmayr (1936), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Munn (1985), O'Neill & Pearson (1974), Pearson (1971), Pinto (1944a), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Weske (1972), Zimmer (1945).

45. Fulvous-crested Tanager

Tachyphonus surinamus

French: Tangara à crête fauve **German**: Goldschopftangare **Spanish**: Tangara Crestifulva
Other common names: Napo Tanager (*napensis*)

Taxonomy. *Turdus surinamus* Linnaeus, 1766, Suriname.

Geographical plumage variation complex. Four subspecies recognized.

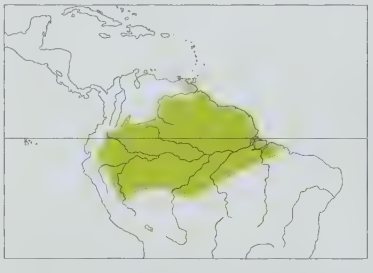
Subspecies and Distribution.

T. s. surinamus (Linnaeus, 1766) – E & S Venezuela (SE Sucre, E Monagas, Delta Amacuro, Bolívar and N & C Amazonas), the Guianas, and Brazil N of R Amazon (E from R Negro).

T. s. brevipes Lafresnaye, 1846 – SE Colombia (from Meta and Guainía) and S Venezuela (SW Amazonas) S to E Ecuador, NE Peru (N of R Amazon and R Marañón) and NW Brazil N of Amazon.

T. s. napensis Lawrence, 1864 – E Peru S of R Marañón (S to R Ucayali) and W Brazil S of R Amazon (E to Acre and R Juruá).

T. s. insignis Hellmayr, 1906 – Brazil S of Amazon (from R Madeira E to NE Pará).



Descriptive notes. 15–17 cm; 15–27 g. Canopy-dwelling tanager with fairly short, relatively thin bill. Male nominate race is mainly glossy black, with flat yellow-buff crown patch (often partly concealed), feathers of which can be raised as short crest; rump buff, bend of wing white, pectoral patch on side of chest (often partly concealed by bend of wing) buffy white, long flank feathers maroon-chestnut to carmine (usually forming protruding patch), underwing-coverts white; iris dark brown; bill blackish above, blue-grey below; legs dark grey. Female has mostly grey crown and side of head; conspicuous yellowish area around eye is rather variable, often broken by diffuse dusky line, and usually surrounded by olive; upperparts dark olive, throat and underparts buffy to greyish-white, breast tinged brownish, sides tinged greyish, and belly and undertail-coverts contrasting ochraceous. Juvenile like adult female but much duller and plainer; immature progressively more like adult, older males showing patches of black mottling, especially on head, mantle, chest and wings. Races differ primarily in colour of male's pectoral tufts, some also in colour of crown and flank patches: *brevipes* has white pectoral patch and dark rufous flank patch, also deep buff rump, female on average paler than nominate, underparts buffier, varying from cinnamon-buff or yellowish or orangish-buff, with flanks tinged olive; *napensis* is similar to previous, but male rump dark rufous; *insignis* resembles nominate, from which differs in darker, more tawny rump and paler, more tawny (not chestnut) flank patch. Voice. In SE Venezuela, infrequently heard song an extremely high, sibilant, almost hissing "sieeeee-siiiiiiii" (second part higher), or with one or two added "sii" notes at end; in Peru, described as a series of hummingbird-like screeches mixed with rich "chip" notes, e.g. "soo-see-soo-see'chip'chip soo-see-soo-see'chip...". Calls include high, weak "steep", varied to "steep-di-dit"; also very high "tseek-tseek-tseek" and buzzy rattle during foraging; also abrupt gravelly notes, e.g. "chur, chur-dit", and rattled "chu-di-di-di-dit".

Habitat. Interior of *terra firme* forest, especially in scrubby sandy-soil regions, lighter sandy-soil woodland, bushy forest borders, and scrub and bushy vegetation around large rocky outcrops; also, at least locally, in humid lowland *várzea*. Generally occurs in poorer-soil forests, in more bushy or semi-open areas, and in wider range of habitats than those in which allied *T. cristata* found. Lowlands to 1400 m in Venezuela; up to c. 500 m in Colombia, c. 900 m in Ecuador; 500 m in Peru.

Food and Feeding. Insects and small fruits. Of 20 stomachs examined, nine contained only vegetable matter and eight only animal matter, and thee contained both; contents included short-horned grasshoppers (Acrididae), fruit, berries, and seeds. Other stomachs contained bees (Hymenoptera), weevils (Curculionidae), caterpillars, bugs (Hemiptera, including homopterans), and craneflies (Tipulidae). Pairs or families follow mixed-species flocks in middle levels of forest, less frequently in high canopy (where *T. cristatus* occurs), and partial to shrubby forest edges or natural breaks in forest. Often at eye level or lower along forest borders and in bushes at edges of rocky outcrops.

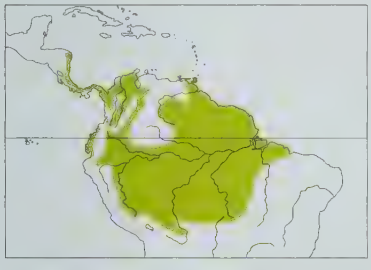
Energetic, nervous, and often seems to be constantly fidgeting; male flicks wings when excited, exposing the white flank patch momentarily (like a little winking light). Peers and flutters in foliage for insects. Not easy to observe at length.
Breeding. In Brazil nest reportedly a deep open cup, but nest location and egg details require verification. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Widespread and fairly common. Found in many protected areas and reserves, including Canaima National Park (Venezuela), Iwokrama Wilderness Reserve (Guyana), Voltzberg National Park (Suriname), and Pico da Neblina, Serra da Mocidade, Serra do Divisor and Viruá National Parks (Brazil), also Nukak Natural Reserve and Cahuinarí, Chiribiquete and Amacayacu National Parks (Colombia) and Pacaya-Samiria National Reserve (Peru); occurs also in various private reserves around eco-lodges, e.g. Junglaven, in S Venezuela (Amazonas), and Explorama and Explornapo Lodges, near Iquitos, in Peru. This species range encompasses large areas of intact forest not formally protected, but at low risk of deforestation in the immediate future, ensuring at least the short-term viability of this species.
Bibliography. Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Gilliard (1941), Haverschmidt (1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Novaes (1970), Oren & Parker (1997), Pearson (1972), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1907, 1935a), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977), Zimmer (1945).

46. White-shouldered Tanager

Tachyphonus luctuosus

French: Tangara à épaulettes blanches **German**: Trauertangare **Spanish**: Tangara Luctuosa

Taxonomy. *T.*[*achyphonus*] *luctuosus* d'Orbigny and Lafresnaye, 1837, Guarayos, Bolivia.
Recent genetic data indicate that *T. cristatus* and *T. rufiventer* are sister-species, with present species sister to both. Five subspecies recognized.
Subspecies and Distribution.
T. l. nitidissimus Salvin, 1870 – Caribbean coast from E Honduras S to NW Panama (Bocas del Toro).
T. l. axillaris (Lawrence, 1874) – Pacific coast of Costa Rica (San José) S to Panama (W Chiriquí).
T. l. panamensis Todd, 1917 – C Panama (from Coclé) E on both slopes to N Colombia and W Venezuela (Maracaibo region), and S on Pacific coast to W Ecuador and extreme NW Peru.
T. l. flaviventris (P. L. Sclater, 1856) – extreme NE Venezuela (Sucre) and Trinidad.
T. l. luctuosus d'Orbigny & Lafresnaye, 1837 – E base of Andes from Venezuela (Barinas) S to N & C Bolivia, and generally from SE Colombia, S & E Venezuela (S of R Orinoco, and in Delta Amacuro and Monagas), the Guianas and Amazonian Brazil E to W Maranhão, S to Mato Grosso and W Goiás).



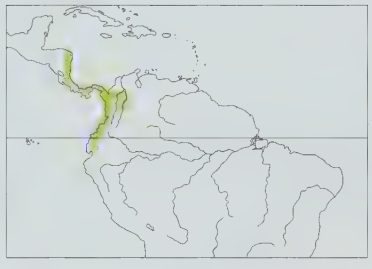
Descriptive notes. 13–14 cm; 11·5–15 g. Thin-billed tanager. Male nominate race is almost entirely glossy black, with conspicuous white patch on shoulder (marginal, lesser and median upperwing-coverts white), and white underwing-coverts; iris dark brown; bill blackish, basal half of lower mandible slightly paler; legs dark grey. Female is very different, has grey head, bright olive-green upperparts, including wing-coverts, greyish-white throat, and yellow underparts often tinged olive on breast; looks very like a smaller, uncrested version of *Eucometis penicillata*. Juvenile like adult female but much duller and more uniform; immature male progressively more like adult, older males darker, latterly showing patches of black, especially on head, mantle, wings and underparts, and white on shoulders. Race *nitidissimus* male has concealed yellow crown patch, white shoulder patch larger than on nominate, female is mainly olive above with grey tinge on crown, and has whitish throat and yellow underparts, and both sexes have base of lower mandible much paler, greyish-flesh; *axillaris* male has semi-concealed orange-and-cinnamon crown patch, shoulder patch larger than on nominate, female is like previous but with buff throat, and bill all dark; *panamensis* male has white shoulder patch larger than other races, female is brighter, more olive-green, above than nominate and has whiter chin and throat and brighter yellow underparts; *flaviventris* has small white shoulder patch (same size as on nominate), differs from nominate in slightly longer bill and wing. Voice. Song a thin, high "seet-seet-seet" (sometimes 4 or more notes), 2 notes per second, sometimes in series mixed with "seet" or "quick seet-seet" notes; rather weak and easily overlooked. Rather insignificant calls include high-pitched, sharp, almost hissing "tseer"; in Peru, weak call notes "swee" and lower "chep".
Habitat. In Central America and W & N of Andes found most often in tall older second growth and along forest borders; in Amazonia confined more to humid *terra firme* and *várzea* forest, where occurs in dense foliage and vine tangles above treefalls and at small openings in forest, also forest borders and older second growth. Recorded also in plantations in Colombia. To 1100 m in S Venezuela; c. 1000 m, rarely to 2200 m, in Colombia; mostly below 800 m, with small numbers as high as 1300 m, in Ecuador; up to c. 1000 m in Peru.
Food and Feeding. Insects, also small amounts of fruit. Of three stomachs examined, one contained only vegetable matter and two only animal matter, including spiders (Araneae), termite workers (Isoptera), grasshoppers (Caelifera), beetles (Coleoptera). Other items recorded included a lepidopteran, an orthopteran, and a mantis (Mantodea). Of 223 observations of feeding, only 12% involved fruit; fruit items noted in Panama included *Miconia* species, *Zanthoxylum*, *Xylopia* and *Lindackeria*. Trinidad data suggest larger proportion of fruit (29%) in diet. Pairs or families are normally core members of mixed-species flocks, foraging from lower midddle levels to subcanopy; pairs may travel and forage alternately with understorey or canopy mixed flocks. A very active, energetic species notable for its fondness for middle-storey forest vine tangles. Mostly hops or flits short distances in foliage and vines, and actively snatches insect prey from upper leaf surfaces by lunges, flutter-chases or short sallies. In Panama, almost half of 75 foraging records were between 9·5 m and 15 m up, and a further 35% were higher; 75% of foraging sites were tops of leaves, majority involving acrobatics such as lunges, leaps and sallies in outer foliage. Trinidad data suggest a lower range of foraging heights, mostly 3–15 m, and a larger proportion of fruit taken. In threat display to competitors, male puffs up shoulder feathers in bold display of white.
Breeding. Following details from Trinidad. Breeding recorded in Apr, Jun and Sept; nest a deep open cup of dry grass, lined with fine fibres, placed 1–1·5 m up in undergrowth; clutch 3 eggs, rich buff to pale cream, blotched reddish-brown. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Widespread and common to locally common. E of Andes found in many protected parks and reserves, including Voltzberg National Park (Suriname), Iwokrama Wilderness Reserve (Guyana), Canaima National Park (Venezuela), and Cahuinarí, Chiribiquete and Amacayacu National Parks (Colombia), also Cuyabeno Faunistic Reserve and Yasuni National Park (Ecuador) and Pacaya-Samiria National Reserve and Manu Biosphere Reserve (Peru); occurs also in numerous private reserves around eco-lodges, e.g. Napo Wildlife Centre, in Ecuador, and Explorama and Explornapo Lodges, near Iquitos, in Peru. Its range encompasses large areas of intact forest not formally protected, but at low risk of deforestation in immediate future, ensuring viability of this species at least in short term. Populations in Central America (primarily Caribbean slope) and W of Andes in Colombia and Ecuador also occur in numerous national parks and public and private reserves; as a result of widespread deforestation in unprotected areas within these regions, however, these populations have suffered local habitat contractions and range fragmentation and have almost entirely disappeared from some former areas. So long as parks and reserves are maintained, these W populations are considered unlikely to become at risk.
Bibliography. Beebe (1909), Belcher & Smooker (1937), Brosset (1964), Burns & Racicot (2009), Burton (1975), Chapman (1926), Davis (1972), Dunning (1982), Eisenmann (1952), ffrench (1991), Friedmann & Smith (1955), Garrigues & Dean (2007), Greenberg (1981b, 1984), Greenberg & Gradwohl (1980), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Howell (1957), Jahn *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Monroe (1968), Naumburg (1930), O'Neill (1974), Pacheco *et al.* (2007), Phelps (1943), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Slud (1964), Snow & Snow (1971), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Stiles *et al.* (1999), Strauch (1977), Tostain *et al.* (1992), Willis (1980), Zimmer (1945).

47. Tawny-crested Tanager

Tachyphonus delatrii

French: Tangara de Delattre **German**: Schwarzachseltangare **Spanish**: Tangara de Delattre

Taxonomy. *Tachyphonus Delatrii* Lafresnaye, 1847, Buenaventura, south-west Colombia.
Colour and size of coronal patch variable, but not in any seemingly systematic way, and naming of geographical races unwarranted. Monotypic.
Distribution. E Honduras S on Caribbean coast to Panama (sight record also in Veraguas, on Pacific slope of Panama), and from Colombia (N base of W & C Andes E to middle Magdalena Valley) S on Pacific coast to NW Ecuador (Esmeraldas and Pichincha), also Gorgona I, in Colombia.



Descriptive notes. 14 cm; 14–21 g. Noisy dark-plumaged tanager with fairly slender and sharply pointed bill, male with bright "Mohawk" crest. Male is mainly glossy black above and below, with prominent but close-cropped tawny to orange-yellow to dark yellow crown patch (colour variation possibly related to age); underwing-coverts white, small (usually concealed) white patch at bend of wing; iris reddish-brown; bill black, basal half of lower mandible pale greenish-grey to bluish-grey; legs blackish. Female is very dark overall, has head greyish-brown, upperparts uniformly dull dark olive-brown, slightly paler below, especially on throat; wing-coverts, flight-feathers and tail dusky. Subadult male is much like female, but darker, and may show evidence of tawny-yellow crest even before black feathers appear. Voice. Calls include metallic "tchit" or "zick", a higher "tsip" or "tchewp", and a distinctive high, sibilant "zeeet" or "pseeet" with scratchy quality. Song unrecorded.
Habitat. Humid and wet forest interior, but most numerous in overgrown forest borders, tall second growth and shrubby cut-over areas. Lowlands to c. 800 m in all areas; occasionally to 1200 m in Costa Rica and 1500 m in Colombia.
Food and Feeding. Few details of diet. Stomach of one bird from Panama contained bits of elytra of a beetle (Coleoptera) (4% of contents) and fragments of 25 ants (Formicidae) of two species (96%). When foraging, almost always found in large, noisy, fast-moving flocks of 6–12 (occasionally up to 20) individuals in lowlands, generally in smaller groups of 3–4 birds at higher elevations; in monospecific flocks or sometimes joined by a few other species, or temporarily joins large mixed-species flocks. Troops tend to sweep rapidly through an area, creating considerable commotion, chattering constantly as they hop, peck at prey, lunge, flutter in front of leaves, and occasionally hang downward in acrobatic manner, mostly to search foliage. Seldom remain in view for more than a few moments.
Breeding. Probably breeds in Mar–Jun in Costa Rica; in NW Colombia 18 breeding-condition birds between Feb and May, one in Mar (in Chocó) and one in Feb (in W Valle). One Apr nest in Costa Rica was a deep, bulky cup, one side higher and forming a partial roof, constructed mostly from green moss, with lining of fine material, placed 1·5 m up in dense shrub beside forest trail; contained 2 eggs, pale green with a wreath of fine black blotches and scrawls. No further information available.
Movements. Mainly resident. Some local movements suggested: in Colombia, nearly absent in middle Magdalena Valley in Mar, whereas was common there during May.
Status and Conservation. Not globally threatened. Locally fairly common. One old report from Bolivar–Chimborazo border, in C Ecuador, well S of current range. Occurs in many parks and reserves, including La Selva Biological Reserve and Braulio Carrillo National Park (Costa Rica), Soberanía, Chagres and Darién National Parks (Panama), the Comarca Kuna Yala Indigenous Reserve (also Panama), and Los Katíos National Park and Tambito Natural Reserve (Colombia); probably also in other protected areas in SW Colombia and W Ecuador. Found also in many areas of unprotected forest and second growth and, while range contraction and fragmentation has occurred in many parts, the species is well adapted to utilize second-growth woodland, and its short-term viability seems assured. It may be most at risk in parts of W Ecuador, where virtually all former lowland forest habitat has now been removed and converted to settlement and agriculture.
Bibliography. Burns & Racicot (2009), Carriker (1910), Davis (1972), Donegan & Dávalos (1999), Garrigues & Dean (2007), Hilty & Brown (1986), Huber (1929), Isler & Isler (1999), Jahn *et al.* (2002), Karr (1971), Marcus (1983), Meyer de Schauensee (1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ross & Whitney (1995), Salaman *et al.* (2008), Slud (1960, 1964), Stiles & Skutch (1989), Stiles *et al.* (1999), Wetmore *et al.* (1984).

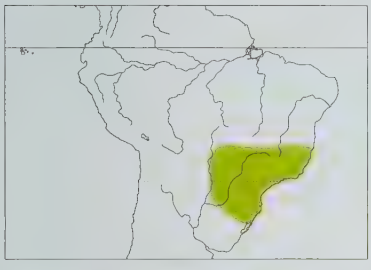

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48. Ruby-crowned Tanager

Tachyphonus coronatus

French: Tangara couronné **German**: Krontangare **Spanish**: Tangara Coronada

Taxonomy. *A.*[*gelaius*] *Coronatus* Vieillot, 1822, Páxaros, Paraguay.
Recent molecular-genetic data indicate that this species and *T. rufus* are sister-species, and that *T. phoenicius* is sister to both of these. Monotypic.
Distribution. SE Brazil (N Mato Grosso do Sul E to extreme SE Bahia, S to C Rio Grande do Sul), E Paraguay and NE Argentina (Misiones and N Corrientes).



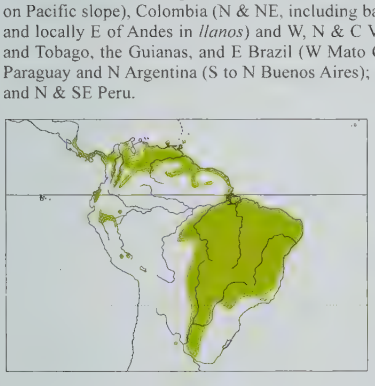
Descriptive notes. 16 cm; 26–33 g. Male is mainly glossy blue-black, with narrow (usually concealed) red patch in centre of rear crown; underwing-coverts white (usually conspicuous in flight), and may show small white patch on scapulars (usually hidden); iris dark brown; bill black, lower mandible bluish-grey with black on tip often extending over distal half; legs dark grey. Female has head greyish, otherwise mostly rufous-brown above, rump and tail more rufescent, dull yellowish-buff below, throat paler, breast with faintly indicated dusky streaking. Subadult male has mixture of brown and black in plumage. Voice. Song varies individually, typically rich melodious phrases, e.g. "whit-it chéw, chew-chew", a whistled "whildit, dit" or "whildit deo", or "whilt cheo", "chit chur whee-o, whit dittle chit...", and so on; in Brazil has been described as a monotonous, staccato, leisurely series of phrases each of 3–4 syllable, e.g. "chep-chep-cho, tsewléé-tsuk, tsewléé-tsuk". Calls, by both sexes, include emphatic "chet" and "twick".
Habitat. Found mostly in semi-open, lightly wooded or shrubby areas, including open woodland, shrubby forest borders, uncultivated fields (*capoeiras*), orchards, plantations, parks, gardens and settled areas with woodlots and patches of thick vegetation; generally not in clearings and open areas. Lowlands to c. 1300 m.
Food and Feeding. Arthropods, also wide variety of fruit, and seeds. Among fruits recorded in diet are melastomes (including *Leandra*), *Cecropia*, palms, bananas, oranges, and bromeliad fruits (*Neoregelia* and *Nidulariam*). Of 22 stomachs examined, one contained only vegetable matter and eight only animal matter, and 13 contained both; contents included orthopterans, beetles (Coleoptera) including weevils (Curculionidae) and leaf beetles (Chrysomelidae), ants (Formicidae) and other hymenopterans, fruits, also seeds including those of figs (*Ficus*). Mainly singly and in pairs; seasonally in small family parties seen, more rarely larger groups, and usually not with mixed-species flocks. Forages at middle heights or higher in open woodland, lower along forest borders. Restless, often constantly flicking wings and, when excited, showing red crest. Peers in foliage for arthropod prey.
Breeding. In Brazil, breeding reported in Oct–Jan in Rio de Janeiro and São Paulo. Cup-nest of grass, lined with rootlets, placed less than 2 m up in thicket, coffee bush or other dense vegetation, sometimes beside stream. Clutch 2–3 eggs, pink to white, blotched and smeared with shades of red and brown, more at large end and sometimes with black scrawls; incubation in captivity 13 days; no information on nestling period.
Movements. May be partially migratory in Rio de Janeiro, in SE Brazil.
Status and Conservation. Not globally threatened. Locally common throughout range. Occurs in numerous protected areas in both Argentina and S Brazil, and adapts well to a variety of edge, second-growth and disturbed habitats. Not at any apparent risk.
Bibliography. Belton (1985), Burns & Racicot (2009), Davis (1946), Descourtilz (1852), Diamond & Lovejoy (1985), Erickson & Mumford (1976), Euler (1867, 1900), Holt (1928), Ihering (1900), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Moojen *et al.* (1941), Narosky & Yzurieta (1987), Nehrkorn (1899), Norgaard-Olesen (1974), Ogilvie-Grant (1912), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Santos (1948), Schubart *et al.* (1965), Short (1971), Sick (1985, 1993), Snethlage & Schreiner (1929), Souza (2002), Willis (1979).

49. White-lined Tanager

Tachyphonus rufus

French: Tangara à galons blancs **German**: Schwarztangare **Spanish**: Tangara Negra

Taxonomy. *Tanagra rufa* Boddaert, 1783, Cayenne, French Guiana.
Recent molecular-genetic data indicate that this species and *T. coronatus* are sister-species, and that *T. phoenicius* is sister to both of these. Despite extensive range, no regular geographical variation identified. Monotypic.
Distribution. SE Nicaragua, Costa Rica (Caribbean coast), SW Panama (Caribbean slope and locally on Pacific slope), Colombia (N & NE, including base of Santa Marta Mts, most of Andean region, and locally E of Andes in *llanos*) and W, N & C Venezuela (including Margarita I) E to Trinidad and Tobago, the Guianas, and E Brazil (W Mato Grosso S to N Paraná) S to extreme E Bolivia, Paraguay and N Argentina (S to N Buenos Aires); also isolated populations in NW & SE Ecuador and N & SE Peru.



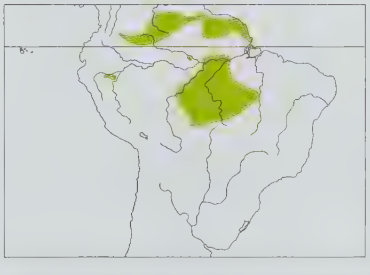
Descriptive notes. 17 cm; 25·7–42·5 g. Male is entirely glossy blue-black, except for white underwing-coverts (flash of white when bird in flight); small amount of white at bend of wing and occasionally on marginal coverts (almost always hidden when bird at rest); iris dark brown; bill blackish, lower mandible bluish-grey with black on tip often extending over distal half; legs horn-grey to dark grey. Female is uniformly rufous, slightly paler below; flight-feathers dusky, edged and tinged rufous. Immature is like female; subadult male similar, but with variable amount of black mottling and patchiness (which can appear almost anywhere in plumage). Voice. Infrequently heard song in Venezuela, sometimes given in flight, a bouncy, chattery "chuéé, chuit, chuit-chuit-chuit" and so on, first syllable strongest; in Mérida (W Venezuela) a soft tentative "cheewank, wink, cheewank, wink, cheewank...", first note falling, second rising, in leisurely hypnotic cadence. In Trinidad described as a somewhat musical "chip-chiwer, chip-chur, chip-wheeeo, cheeru, chéép-chooi" or "chip-chip-wheer", repeated rapidly over and over. Dawn song of 2–4 phrases separated by pauses of 5–6 seconds. In Ecuador song described as a musical but repetitive "chip chirp weep chirp chip chirp weep...". Call a soft, rising "sweet".
Habitat. A non-forest species found in shrubby clearings, moist and humid forest borders, cultivated areas, plantations and gardens. Lowlands to c. 1800 m, occasionally slightly higher; humid foothill and montane areas in Venezuela and Colombia.
Food and Feeding. Of 22 stomachs examined, seven contained only vegetable matter and eleven only animal matter, and four contained both; contents included ants (Formicidae), beetles (Coleoptera), bugs (Hemiptera), flies (Diptera), spiders (Araneae), feather fragments, also fruit, berries and seeds; also reported as eating caterpillars, a moth (Lepidoptera) and a katydid (Tettigoniidae) in Venezuela. Observed to consume papayas (*Carica papaya*), guavas (*Psidium*) and other commercial and garden fruits. In Trinidad, 28 species of fruit recorded in diet, epiphytes accounting for 35%, *Miconia* for 20% and *Cecropia* for 14% of the total. Almost always in pairs, partners keeping close together and staying low in bushy clearings; often pop up into the open briefly before flying off, one following its mate in low flight across an opening. Usually independent of mixed-species flocks. Rather active, often flicking wings as it hops and peers in foliage, but forages mostly less than 6 m above ground, and often on ground; in all areas tends to stay out of sight when foraging. Of 238 records of feeding attempts in Trinidad, 60% involved fruit, 30% insect-seeking, and 10% were at flowers; small fruits usually mashed before being eating; flowers or flower parts picked or squeezed, presumably for nectar. Gleans and picks insects from leaves, makes short sallies to air, and regularly drops to ground for insects; of 74 observed instances of insect-catching, 51% were on the ground, 32% in foliage, 14% in aerial sallies, and 3% from branches. Has occasionally been noted at army-ant swarms and taking flying termites (Isoptera).
Breeding. Recorded in May in Panama, Feb, Apr, Jun and Oct in Venezuela (Mar–May in upper R Orinoco), Feb–Aug and Nov (mostly Apr–Jun) in Trinidad, Jan–Mar in Peru, and, in Brazil, Oct–Jan in Pará and Oct in Mato Grosso. Bulky cup-nest of leaves, tendrils and rootlets, placed 1·2–6 m above grund in shrub or tree, once reported in tall grass, and occasionally to 12 m up in tree or banana plant. Clutch 2–3 eggs (infrequently 1), white to light purplish with darker markings; incubation by female, period 14–15 days; chicks fed by both adults, no information on duration of nestling period. Parasitized by Shiny Cowbird (*Molothrus bonariensis*).
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Common and reasonably widespread in suitable habitat in Venezuela and Colombia; scarce and local, but perhaps increasing, in Ecuador; widely distributed across E Brazil. Occurs in numerous protected areas throughout its ample range, and is well adapted for using a variety of edge, second-growth and disturbed habitats. Has profited from partial deforestation and settlement, and has expanded into areas that were formerly unsuitable. In Argentina, was rarely reported around Buenos Aires prior to c. 1999, but since then has gradually increased and is, at least for the moment, well established, with breeding confirmed. Uncertain if escaped cagebirds were the source of Buenos Aires population, although the species is not commonly kept in captivity.
Bibliography. Allen (1891), Belcher & Smooker (1937), Burns & Racicot (2009), Chapman (1926), Cherrie (1916), Collins & Araya (1998), Davis (1972), Diamond & Lovejoy (1985), Donegan & Dávalos (1999), Euler (1900), Ffrench (1991), Forbes (1881), Friedmann & Smith (1950), Fry (1970), Garrigues & Dean (2007), Gilliard (1959), Ginés *et al.* (1951), Hallinan (1924), Hartman (1955), Hartman & Brownell (1961), Hilty (1997, 2003), Hilty & Brown (1986), Haverschmidt (1948, 1968), Haverschmidt & Mees (1994), Isler & Isler (1999), Jahn *et al.* (2002), Layard (1873), Lysinger *et al.* (2005), Miller (1963), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Narosky & Di Giacomo (1993), Novaes (1973), Novaes & Pimentel (1973), Ogilvie-Grant (1912), Olivares (1963), Peixoto Velho (1932), de la Peña & Rumboll (1998), Phelps & Phelps (1963), Pinto (1944a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sick (1985, 1993), Slud (1964), Snethlage (1935a), Snethlage & Schreiner (1929), Snow, B.K. & Snow (1971), Snow, D.W. & Snow (1964), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Stone (1918), Strauch (1977), Taczanowski (1884), Thomas (1982), Todd & Carriker (1922), Tostain *et al.* (1992), Walker (2001), Wetmore (1926), Zimmer (1945).

50. Red-shouldered Tanager

Tachyphonus phoenicius

French: Tangara à galons rouges **German**: Rotschultertangare **Spanish**: Tangara de Galones

Taxonomy. *Tachyphonus phoenicius* Swainson, 1838, Bioko; error = possibly east Peru.
Recent molecular-genetic data indicate that *T. coronatus* and *T. rufus* are sister-species, and that present species is sister to both of them. Monotypic.
Distribution. Three geographically separated populations. E Colombia E locally to S Venezuela, the Guianas and N Brazil (N Roraima and N Amapá); NE Peru (W Loreto S of R Marañón S to San Martín and N R Ucayali); Brazil mostly S of R Amazon (locally on N bank) between R Madeira and R Tapajós, S to NW Mato Grosso and, perhaps discontinuously, to Bolivia (E Beni).



Descriptive notes. 15 cm; 17–25 g. Male is almost entirely glossy blue-black, with white underwing-coverts; small amount of red mixed with white at bend of wing and on marginal wing-coverts (often visible in flight, but rarely so when at rest); iris dark brown; upper mandible black, lower mandible pale blue-grey with small black tip; legs horn-grey. Female has crown and side of head dark brownish-grey, feathers of crown with dark centres and paler edges (giving slightly scalloped appearance), slightly darker mask extending through lores, ocular area and to below eyes, this contrasting sharply with whitish throat; upperparts, including uppertail-coverts, tail, and upperwing and its coverts, dark brownish-grey; white of throat merges with grey-tinged dirty white on breast and sides; lower underparts dingy creamy white.

On following pages: 51. Fulvous Shrike-tanager (*Lanio fulvus*); 52. White-winged Shrike-tanager (*Lanio versicolor*); 53. Black-throated Shrike-tanager (*Lanio aurantius*); 54. White-throated Shrike-tanager (*Lanio leucothorax*).

Juvenile is like female, but streaked dusky below. Voice. Song, in SE Venezuela (1400 m), a musical but rather repetitive and medium-pitched "cheurt- che'e'e't-che'e'e't, cheurt- che'e'e't-che'e'e't-che'e'e't,...", delivered at leisurely pace and in rather sing-song fashion; may continue for up to several minutes with scarcely a break. In general sings relatively little; song possibly seasonal. Call notes include high, thin, insignificant "chup", "cheup" and "tsit".
Habitat. Occurs predominantly in white-sand or other sandy-soil zones with savanna, scattered high bushes, thickets, patches of light woodland and scrubby vegetation around rocky outcrops; also scrubby savanna openings in sandy-soil forest regions. In C Brazil mainly lowlands to c. 400 m; locally to 1350 m in Peru; to 2000 m in tepuis of S Venezuela.
Food and Feeding. Arthropods and small fruits. Of nine stomachs examined, two contained only vegetable matter and seven only animal matter; contents included ants (Formicidae), beetles (Coleoptera) including weevils (Curculionidae), bugs (Hemiptera), and seeds. Spiders (Araneae) found in other stomachs. Single individuals, pairs and families are often restless and nervous-acting as they wander alone in bushy savanna, or less often with small mixed-species parties in scrubby woodland or borders. Can be rather wary and difficult to approach. Hops and flits mostly 1–6 m up in dense, leathery foliage of savanna bushes. Reported as regular in upper foliage of palms and woodland patches in N Peru.
Breeding. Breeding reported in Feb and Mar in Suriname. Grassy cup-nest built on ground and concealed in grass or near bushes in Suriname. Clutch 1–2 eggs, greyish, spotted and entirely blotched chocolate-brown at larger end. No other information.
Movements. Probably resident; no local or migratory movements reported. Breeders in N Argentina possibly migratory.
Status and Conservation. Not globally threatened. Uncommon to fairly common, but often quite local; generally found at low density. Each of three geographically isolated populations occurs in a number of protected areas, e.g. Kaieteur National Park (Guyana) and Canaima National Park (Venezuela). Isolated sandy-soil population in NE Peru occurs in Pacaya-Samiria National Park, but much of its range also is in nearby unprotected areas, which are subject to deforestation and human settlement. Large population S of R Amazon in Brazil is, as elsewhere, local in sandy-soil regions. This species is adapted to scrubby second growth and semi-open habitats, and is capable of persisting in degraded areas.
Bibliography. Burns & Racicot (2009), Friedmann & Smith (1950), Gilliard (1941), Haverschmidt (1952, 1956, 1968, 1975), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Novaes (1978, 1980), Olivares (1959), Phelps & Phelps (1950, 1963), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914), Snyder (1966), Souza (2002), Tobias (2007), Tostain *et al.* (1992), Zimmer (1945).

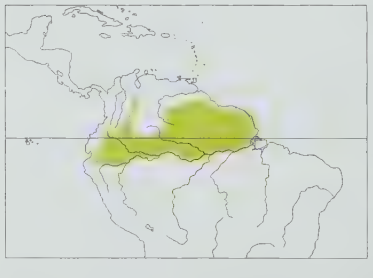
Genus *LANIO* Vieillot, 1816

51. Fulvous Shrike-tanager

Lanio fulvus

French: Tangara mordoré **German**: Braunbrust-Würgertangare **Spanish**: Tangara Fulva

Taxonomy. *Tangara fulva* Boddaert, 1783, Cayenne, French Guiana.
Genetically most closely related to the two Middle American species *L. aurantius* and *L. leucothorax*; replaced S of R Amazon by *L. versicolor*. Original spelling has often been cited as "*sulva*", but this stems from typographical error in a later copy; original spelling is "*fulva*". Two subspecies recognized.
Subspecies and Distribution.
L. f. peruvianus Carriker, 1934 – E base of Andes in W Venezuela (Táchira) S to S & SE Colombia, E Ecuador and NE Peru (S to N bank of R Marañón and R Amazon in San Martín and Loreto).
L. f. fulvus (Boddaert, 1783) – SE Venezuela (S of R Orinoco), the Guianas, and N Brazil (N of R Amazon, E to Amapá).



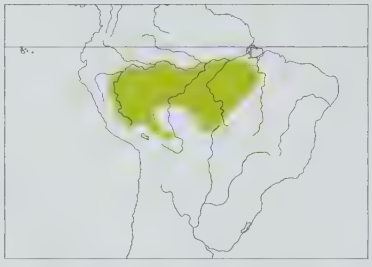
Descriptive notes. 15–17 cm; 19–30 g. Slender tanager with strong, sharply hooked bill with well-developed "tooth" on cutting edge of upper mandible. Male nominate race has entire head and throat black (like a hood), upperwing and tail black, upperparts apricot-yellow, brightest on nape and gradually shading to rufescent brown on uppertail-coverts; large patch on breast tawny-rufous, remaining underparts yellowish-ochre, turning cinnamon on undertail-coverts; iris dark brown; bill black; legs blackish. Female somewhat variable, has greyish-brown crown, becoming warm brown on upperparts, richest on rump and uppertail-coverts; wing feathers dusky, washed warm brown on outer edges (warm brown predominates on folded wing), folded tail appears ochraceous to rufescent brown; side of head pale dull reddish-brown, becoming paler, more grey-buff on throat, changing to ochraceous olive on breast and orangish-buff on belly and undertail-coverts (sometimes strongly tinged greenish-yellow below); legs brownish-grey to pinkish-grey. Immature male is like female, but with blackish patches on head, and lower underparts slightly paler yellowish. Race *peruvianus* male has body plumage overall darker, more fulvous, than nominate, only nape bright yellow. Voice. Noisy. Frequently utters very loud, sharp, descending "tseuuu!" (may help those in mixed-species flock to keep track of flock location in canopy). Alarm call, also false alarm call, the same descending note, but repeated rapidly several times (twice normal rate) and with strong harmonic structure; non-alarm notes delivered at half the rate of alarms and descend through twice frequency range. Song, at dawn, a high forced "tzee-a, tzee-a, tzee-a".
Habitat. Fairly common to common in tall, humid *terra firme* and *várzea* forest, and at forest borders in lowlands and lower slopes. Lowlands to c. 1350 m; in Ecuador regularly to c. 1100 m, once to 1750 m.
Food and Feeding. Of four stomachs examined, two contained only vegetable matter and two contained both vegetable and animal matter; contents insects and seeds. Other stomachs contained click beetles (Elateridae), weevils (Curculionidae), and bugs (Hemiptera) including homopterans. Acts as sentinel in middle-level to canopy mixed-species flocks, in which almost always at the centre of flock activity. Single individuals or separated pairs sit rather upright on relatively open middle-level or subcanopy perches and alertly watch activities of other birds, mostly above them, waiting for their varied activities to dislodge or flush prey, which present species then chases down in rapid sallies like those of tyrant-flycatchers (Tyrannidae). Also occasionally sallies to foliage or branches. Because of its open-perch position and visibility, this species is almost always the first member of flock to sound alarm at approaching danger.
Breeding. Few data. Breeds in Oct in French Guiana. One nest reported as built in a palm, although this may not be a typical nest-site. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Relatively widespread and fairly common. Range incorporates a number of protected areas, including Canaima National Park (Venezuela), Iwokrama National Park (Guyana), Voltzberg Nature Park (Suriname), Tinigua, La Paya, Chiribiquete, Amacayacu and Cahuinarí National Parks and others (Colombia), Cuyabeno Faunistic Reserve and Yasuní National Park (Ecuador), and Pacaya-Samiria National Reserve (Peru). Also occurs widely in unprotected lowland Amazonian and Guianan forests. Not likely to be at risk globally in immediate future, although foothill populations at E base of Andes in Venezuela and Colombia have undoubtedly declined significantly as a result of extensive and uncontrolled deforestation, and these populations are now severely fragmented.
Bibliography. Burns & Racicot (2009), Chubb (1921a), Dick *et al.* (1984), Gilliard (1941), Haverschmidt (1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950, 1963), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977), Zimmer (1945).

52. White-winged Shrike-tanager

Lanio versicolor

French: Tangara versicolore **German**: Gelbstirn-Würgertangare **Spanish**: Tangara Aliblanca

Taxonomy. *T.[achyphonus] versicolor* d'Orbigny and Lafresnaye, 1837, Yuracares, Bolivia.
Despite close approach geographically by *L. fulvus*, which replaces this species N of R Amazon, the two are differentiated genetically by a remarkably large amount (7/0%). Two subspecies recognized.
Subspecies and Distribution.
L. v. versicolor (d'Orbigny & Lafresnaye, 1837) – S of R Amazon in E Peru (S of R Marañón), W Brazil (E to R Tapajós) and N Bolivia.
L. v. parvus Berlepsch, 1912 – EC Brazil S of Amazon (from R Tapajós E to lower R Tocantins, S to Mato Grosso) and extreme NE Bolivia.



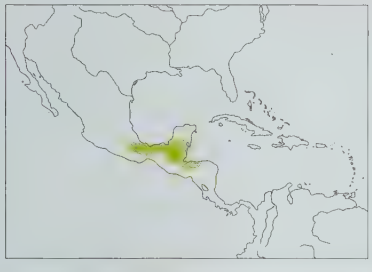
Descriptive notes. 13–15 cm; 13–20 g. Slender tanager with strong, sharply hooked bill, upper mandible with well-developed "tooth" on cutting edge. Male nominate race has head black, with dark olive-yellow forecrown (hard to see in field) and dark olive throat; most of upperwing-coverts white, forming large conspicuous patch, otherwise wing and tail black; upperparts, including uppertail-coverts, ochraceous to cinnamon, brighter and more yellow on rump; breast, belly and entire lower underparts deep yellow, tinged brownish-ochre on chest; iris dark brown; bill black; legs blackish. Female is nearly uniformly coloured above, mainly warm olive-brown, wing browner and rump and tail tinged rufescent brown; throat and breast ochraceous brown to ochraceous cinnamon, more yellow on middle of lower underparts; bill dusky horn-grey, legs greyish-brown. Juvenile mainly dingy brown; immature female slightly duller than adult female; immature male like adult female, older birds acquiring black mottling on head, with flight-feathers and tail becoming dusky. Race *parvus* male is probably indistinguishable from nominate, female differs from nominate in having throat, breast and flanks more olive to olive-brown and undertail-coverts paler. Voice. Commonest call a loud, forceful, often repeated "twéééu!", explosive and descending, given as contact call (to indicate whereabouts of flock to various flock-members); uttered in rapid series in alarm. Dawn song a fairly high, whistled "tee-uu, tee-uu, tee-uu, tee-uu", this occasionally given also as day song but usually then shorter; a brief "twée-chu-twít-tu-weét" is apparently also a song.
Habitat. Upper levels of humid *terra firme*, transitional and *várzea* forest, infrequently also at forest borders, and occasionally wanders to large shady trees in clearings adjacent to tall forest. Generally not in river-edge second-growth vegetation. Lowlands and foothills to c. 1200 m; most records below c. 900 m.
Food and Feeding. Of four stomachs examined, one contained only vegetable matter and three contained only animal matter; contents were insects and fruit pulp. Occurs mainly in pairs or families that are, in many respects, pivotal to cohesion of canopy mixed-species flocks. Individuals sit very upright, usually on fairly open vine or horizontal branch in subcanopy or somewhat below other members of canopy mixed flock, from where they call continually, watch carefully and sally rapidly to bark or leaf surfaces or to air for prey, most of which has been dislodged or disturbed by other flock-members; flight fast, and individuals capable of aerobatics as they pursue mostly insect prey; may deliberately utter false alarm calls to warn away other birds pursuing same flying prey (false alarms infrequent, but increase when adults feeding young).
Breeding. Nest-building and one nest with nestlings in Nov in SE Peru. Nest was cup-shaped, made from plant fibres woven in concentric rings, with base of twigs and dead leaves, outer diameter 8 cm and height c. 8 cm, inner depth c. 2 cm; placed 0·9 m above ground at base of leaves of a trunk-epiphyte fern (*Lomariopsis japurensis*). Nest held two chicks c. 5 days old and nearly naked (only grey down feathers on capital, spinal and ventral tracks); both adults observed to carry food, including a caterpillar and unidentified items, to nest. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Widespread and fairly common to common across almost entire Amazonian Basin S of Amazon. Occurs in numerous protected areas and parks, including Manu Biosphere Reserve and Tambopata-Candamo Reserve Zone (Peru), Madidi National Park (Bolivia), and Serra do Divisor, Jaú and Amazonica National Parks (Brazil). Extensive intact habitat also exists outside protected areas, and this species seems at little risk.
Bibliography. Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Isler & Isler (1999), Marantz & Zimmer (2006), Mee *et al.* (2002), Munn (1984, 1985), Munn & Terborgh (1979), Naumburg (1930), Oren & Parker (1997), Ridgely & Tudor (1989, 2009), Schulenberg (2000c), Schulenberg *et al.* (2007), Snethlage (1914), Souza (2002), Tello (1999), Terborgh & Weske (1969), Weske (1972), Zimmer (1945).

53. Black-throated Shrike-tanager

Lanio aurantius

French: Tangara à gorge noire **Spanish**: Tangara Gorjinegra
German: Schwarzkehl-Würgertangare
Other common names: Great Shrike-tanager

Taxonomy. *Lanio Aurantius* Lafresnaye, 1846, Colombia; error = Guatemala.
May form a superspecies with *L. leucothorax*, and in the past often treated as conspecific. Recent molecular data indicate that the divergence between the two is only 0·9%; their geographical distributions are discrete (although approach each other in Honduras), and the two differ mainly in some plumage characteristics; they perhaps represent a recent speciation event combined with rapid plumage divergence. Monotypic.
Distribution. Caribbean slope of SE Mexico (from C Veracruz) E to lower Yucatán Peninsula, S to N & C Guatemala, Belize and Honduras (E to vicinity of La Ceiba).



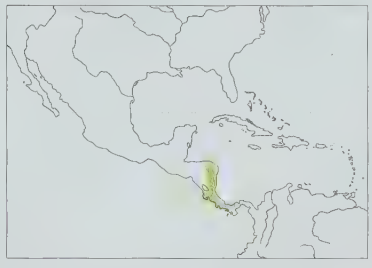
Descriptive notes. 19–20 cm. Slender tanager with fairly long tail and hooked bill, upper mandible with well-developed "tooth" on cutting edge. Male has head, nape, throat, upperwing and tail black, rest of plumage mainly bright yellow, lesser wing-coverts tipped white (white usually concealed by scapulars), small brownish-ochre wash across chest; iris dark brown; bill black; legs blackish. Female has head grey, with olive tinge on crown, upperparts tawny-brown, strong rufescent tinge on rump and tail; throat grey, paler than head, breast and belly yellow, olive wash on chest, sides and flanks, with ochre undertail-coverts; bill blackish. Immature male is much like female, but brighter yellow below, and brighter, more cinnamon-brown, above; acquires adult plumage in c. 1 year. Voice. Rather noisy, with loud contact and alarm calls that arouse other foraging birds. Common call a sharp, rhythmic "chee'choo", often repeated persistently, and may be preceded by other notes, e.g. "shih, shih, chee'choo, chee'choo..."; also gives loud descending "teeuw" and soft warble mixed with "teeuw" notes. Song may be a descending "twt, dit, doo, tchew, tchew", last notes loud and slurred; apparent song also described as "stcheee" followed by c. 4 rich "chee" notes, each falling slightly in scale, and ending with several more level "chee" notes.
Habitat. Interior of tall humid forest, less frequently along forest borders. Sea-level to 1200 m; most records below 750 m.
Food and Feeding. Few data on diet; insects recorded. Occurs in pairs in middle and upper levels of tall forest, or occasionally lower, typically in rather open portions of forest, and almost always with mixed-species flocks. Perches alert and upright, often without moving for periods of time, and seems to behave as sentinel for other members of mixed flock; utters loud sharp alarm notes at slightest provocation. Sallies for fleeing prey, which it often captures in air at the end of fast aerobatic chases. Behaviour similar to that of *L. versicolor*.
Breeding. No information.
Movements. Resident. Possible wandering in winter reported.
Status and Conservation. Not globally threatened. Locally fairly common. This species occurs in a number of protected areas, including Tikal National Park (Guatemala) and Cockscomb Wildlife Sanctuary (Belize). Deforestation throughout its range in S Mexico is extensive and has resulted in dramatic range contraction and fragmentation. Large amounts of unprotected habitat remain, however, in N Guatemala, Belize and Honduras. Despite local population declines, this species' long-term viability should be assured so long as protected areas in its range are maintained; the future of such unprotected intact habitat is, however, uncertain.
Bibliography. Blake (1953), Burns & Racicot (2009), Davis (1972), Edwards & Tashian (1959), Eisenmann (1955), Griscom (1932), Howell & Webb (1995), Isler & Isler (1999), Land (1970), Monroe (1968), Paynter (1955), Peterson & Chalif (1973), Russell (1964), Salvin & Godman (1883), Smithe (1966), Tashian (1952), Wetmore (1943), Willis (1960a).

54. White-throated Shrike-tanager

Lanio leucothorax

French: Tangara à gorge blanche **Spanish**: Tangara Gorjiblanca
German: Weißkehl-Würgertangare

Taxonomy. *Lanio leucothorax* Salvin, 1865, Tucurrique, Costa Rica.
May form a superspecies with *L. aurantius*, and in the past often treated as conspecific. Recent molecular data indicate that the divergence between the two is only 0·9%; their geographical distributions are discrete (although approach each other in Honduras), and the two differ mainly in some plumage characteristics; they perhaps represent a recent speciation event combined with rapid plumage divergence. Four subspecies recognized.
Subspecies and Distribution.
L. l. leucothorax Salvin, 1865 – Caribbean slope from Honduras (Olancho) S to E Costa Rica (S to Limón, also locally on W slope in Guanacaste).
L. l. reversus Bangs & Griscom, 1932 – Las Agujas (NW Puntarenas), in W Costa Rica.
L. l. ictus Kennard & J. L. Peters, 1927 – lowlands and foothills around Almirante Bay (NW Panama).
L. l. melanopygius Salvin & Godman, 1883 – Pacific slope from W Costa Rica (Puntarenas S of entrance to Gulf of Nicoya) S to W Panama (Chiriquí, both slopes in Veraguas, and foothills on Caribbean slope of W Coclé).



Descriptive notes. 20 cm; 30–45 g. Slender tanager with fairly long tail and strong bill sharply hooked at tip, upper mandible with well-developed "tooth" on cutting edge. Male nominate race has crown, nape and side of head black, upperparts to rump rich yellow, upperwing, uppertail-coverts and tail black; lesser upperwing-coverts white, forming narrow white bar (often concealed); chin black, throat white, becoming buff-tinged on chest, rest of underparts, including belly and undertail-coverts, bright yellow, thigh black, underwing-coverts white; iris dark brown; bill black; legs blackish. Female is much duller than male, head greyish-brown, dusky tinge on ear-coverts, upperparts reddish-brown, upperwing and tail dusky with feathers broadly edged brown, throat and chest buffy brown, tinged with grey (except on centre of throat), and shading to olive on breast and golden-yellow on belly; sides, flanks and undertail-coverts tinged cinnamon; bill dusky, legs possibly less blackish than male's. Immature is like female, but more rufescent, face russet with dusky scaling, upperparts dull chestnut-rufous, wing-coverts and flight-feathers brighter rufous, throat ochraceous buff, becoming bright ochraceous on chest and sides and buff-yellow on belly, with flanks and undertail-coverts pale rufous, bill greyish. Race *melanopygius* male differs from nominate in having most of upperparts (except for mantle) and lower belly and undertail-coverts black, female has throat paler, brownish-grey; *ictus* is similar to previous, but male has feathers of rump broadly tipped yellow, female throat intermediate between previous and nominate; *reversus* is much like *melanopygius*, but male has only rump (not back) black. Voice. Variety of sharp, sometimes scratchy chips and chatters. Commonest vocalization when with foraging flocks a loud, forceful whistle, "chéééw", sometimes several in succession, "chéééw, chéééw, churr-churr..." etc. Song a deliberate and rather low-pitched series of melodic notes followed by some higher whistles; song may be repeated over and over rapidly, or slowly.
Habitat. Interior of humid and wet lowland and foothill forest; throughout range occurs mainly in hill terrain and adjacent humid and wet foothills. Lowlands to c. 900 m in SE Costa Rica; mainly foothills on Caribbean slope of Panama.
Food and Feeding. Arthropods; fruit occasionally eaten. Of four stomachs examined, two contained only animal matter and two contained both animal and vegetable matter. Stomach contents included orthopterans, including cockroaches (Blattaria) and katydids (Tettigoniidae), homopteran bugs, beetles (Coleoptera) including weevils (Curculionidae), butterflies (Lepidoptera), and fruit. Travels in pairs or in families of three or four individuals that associate with mixed-species flocks at middle level to canopy; most typically encountered at subcanopy heights. Noisy, active, and quick to sound loud alarm notes at approach of danger. Perches erect on open branches or vines, often a little below other foraging species in mixed flocks, and occasionally down to eye level; watches alertly, often with rapid head movements, then sallies rapidly and aerobatically for insects or potential prey items dislodged by other flock-members. Prey often captured in air in large sweeping sallies. Large prey may be beaten against branches before being swallowed. Behaviour of this species is much like that of congeners.
Breeding. Recorded in May. One nest in Costa Rica was in low bush by stream inside forest; contained 2 eggs, white with bold chocolate-brown and greyish spots, more at larger end. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common throughout much of range. Occurs in a number of protected areas, among them Indo-Maíz Biological Reserve (Nicaragua), La Selva Biological Reserve and Braulio Carrillo, Carara, Corcovado and Chirripó/La Amistad National Parks (Costa Rica) and La Amistad National Park (W Panama). Unprotected intact habitat within the species' range is extensive in Nicaragua. On the other hand, deforestation nearly complete in unprotected portions of range in Costa Rica and Panama (e.g. in W Panama mostly extirpated in Chiriquí except on Burica Peninsula), and it now survives largely within confines of protected areas. Despite extensive contraction of its former range and habitat fragmentation, this species' long-term survival seems secure so long as protected areas within its range are maintained.
Bibliography. Bangs & Griscom (1932), Burns & Racicot (2009), Carriker (1910), Davis (1972), Garrigues & Dean (2007), Howell (1957), Isler & Isler (1999), Kennard & Peters (1927), Monroe (1968), Ridgely & Gwynne (1989), Ross & Whitney (1995), Slud (1960, 1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).


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ssp carbo
ssp atrosericeus
ssp venezuelensis
ssp connectens
PLATE 6
inches 3
cm 8

Genus *RAMPHOCELUS* Desmarest, 1805

55. Crimson-collared Tanager

Ramphocelus sanguinolentus

French: Tangara ceinturé **German**: Flammentangare **Spanish**: Tangara Acollarada

Taxonomy. *Tanagra* (*Tachyphonus*) *sanguinolentus* Lesson, 1831, Mexico.
In the past, was sometimes placed in a monotypic genus, *Phlogothraupis*. Bears close resemblance to others of present genus, and recent molecular-genetic studies support retention in latter. Two subspecies recognized.
Subspecies and Distribution.
R. s. sanguinolentus (Lesson, 1831) – SE Mexico (from Veracruz, N Oaxaca, Tabasco and Quintana Roo) S through Belize to Honduras.
R. s. apricus (Bangs, 1908) – Caribbean slope of E Honduras S to NW & C Panama, locally on Pacific slope in N Costa Rica.



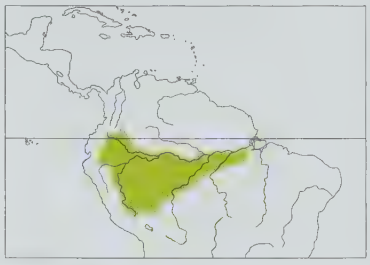
Descriptive notes. 17 cm; 35–48 g. Distinctive, with fairly long tail and heavy conical bill. Has forecrown, face and throat black, crown, nape, side of neck and breast glossy crimson; uppertail-coverts and undertail-coverts also glistening crimson, rest of body, including wing, tail and mid-breast to belly, deep black; iris reddish-brown; bill mostly whitish-blue-grey; legs dark horn-grey. Sexes essentially alike; some females slightly duller, but most indistinguishable from male. Immature has red areas of adult plumage replaced by dull rufous to brick-red with dusky feather bases (imparting mottled appearance), black areas dull brownish-black, bill duller, tomia greyish-horn. Voice. Song a leisurely sequence of rising and falling whistled notes separated by pauses, "tueee-teew, chu-che-wee chew, tewee". Overall not so vocal as some others of genus. Has variety of thin, metallic calls, including "tsewee" and "weet weee", and a grating "chuck".
Habitat. Thickets and bushes along humid-forest borders, adjacent pastures with trees, bushy second growth of various stages, especially rank vegetation along streams and in old plantations. Lowlands up to c. 1200 m.
Food and Feeding. Insects; also many fruits, including melastomes and figs (*Ficus*). Lives in pairs throughout year, also in family groups for short period after nesting season; occasionally accompanies mixed-species flocks containing other tanagers, and may join other species briefly at fruiting trees. Forages mostly 2–10 m up in leafy foliage of tall shrubs and lower part of trees, in general somewhat higher than *R. passerinii* and *R. costaricensis*. Hops and peers in foliage.
Breeding. Breeding reported in May in Belize, Mar–May in Nicaragua and Apr–Jun in Costa Rica. Male sings from elevated perches; more territorial than *R. passerinii*. Rather compact nest of leaves and small vines, sometimes covered with green moss, placed 1–2·5 m above ground in thick foliage in bush or vine tangle. Clutch 3 eggs, pale blue, spotted with brownish-black and faintly marked with lavender, especially at larger end. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally common. Range encompasses a number of parks and reserves, including Palenque National Park, Cascadas de Agua Azúl, Selva del Ocote, Sian Ka'an and Calakmul Biosphere Reserves, and Punta Put and Teacuterminos Lagoon Reserves (all in Mexico), Crooked Tree Wildlife Sanctuary, Cockscomb Wildlife Sanctuary and privately operated Chan Chich Lodge and Nature Reserve (Belize), Capiro–Calentura National Park and Guaimoreto Lagoon Wildlife Refuge (Honduras), Indo-Maíz Biological Reserve (Nicaragua), and La Selva Biological Reserve and Braulio Carrillo National Park (Costa Rica). Range also encompasses much suitable habitat that is not formally protected. Utilizes a variety of forest edge, bushy second-growth and disturbed habitats that buffer this species against potential habitat loss; indeed, it profits somewhat from the opening-up of heavily forested areas. Its range has contracted locally, especially in Chiapas, in Mexico, where areas have been almost completely deforested.
Bibliography. Anon. (1998), Berrett (1962), Binford (1989), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Davis (1972), Garrigues & Dean (2007), Howell, S.N.G. & Webb (1995), Howell, T.R. (1957), Huber (1932), Isler & Isler (1999), Land (1970), Lowery & Dalquest (1951), Nehrkorn (1899), Peters (1929), Richmond (1893), Ridgely & Gwynne (1989), Russell (1964), Slud (1960, 1964), Smithe (1966), Stiles & Skutch (1989), Wetmore (1943), Wetmore *et al.* (1984).

56. Masked Crimson Tanager

Ramphocelus nigrogularis

French: Tangara masqué **German**: Maskentangare **Spanish**: Tangara Enmascarada
Other common names: Crimson Tanager

Taxonomy. *Tanagra nigrogularis* Spix, 1825, "ad flumen Solimoëns in sylvis pagi St. Pauli" = São Paulo de Olivença, River Solimões, Brazil.
Monotypic.
Distribution. E of Andes in Colombia (from Meta and Amazonas) S to E Ecuador and E Peru (S to Madre de Dios), and E, mostly S of R Amazon, to NC Brazil (to lower R Xingu, in E Pará).
Descriptive notes. 17 cm; 27–36 g. Distinctive red-and-black tanager with stout bill, lower mandible somewhat expanded at base. Has base of forehead, area around eye and upper throat black (forming mask), rest of head, nape, side of neck, and lower throat and most of underparts glistening red; back, rump and shortest uppertail-coverts glistening red, rest of upperparts, including entire wing and tail, jet-black; large black patch on centre of lower breast and belly; thigh black, and variable amount of black mixed with red on rear flanks and undertail-coverts; iris reddish-brown; upper mandible is black, lower mandible gleaming white with black tip; legs dark horn-grey. Sexes similar, female sometimes very slightly duller than male. Immature has plumage pattern similar to that of adult, but is much duller, dull brick-red and dusky. Voice. Dawn song a cheerful, semi-musical "wheet chu, wheet, chu..." or "chuck wheet? chuck wheet?..." monotonously repeated with rising and then falling (or vice versa). Day songs similar but somewhat more varied, a rich slow series, "wheet, chu-chu wheeet wheet, chu-chu wier wheeet..." and so on. Often noisy, groups giving sharp, metallic "tchi" and "tsit" notes; probably in alarm "whi-it" and "wheeeeet" and other notes.



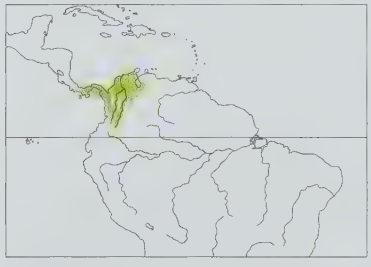
Habitat. Shrubby *várzea* forest borders, second growth and vegetation along margins of oxbow lakes and rivers, bushy clearings and sometimes short distances into humid forest where light-gaps or old overgrowth clearings present; seldom far from watercourses, but usually not in early successional vegetation. Lowlands to c. 600 m, rarely to 1100 m in Peru.
Food and Feeding. Prey items in SE Peru included spiders (Araneae), caterpillars, katydids (Tettigoniidae), and various unidentified items; in Brazil, reported as eating guavas (*Psidium*), custard apples (probably *Annona* species), and fruits of Passifloraceae. Contents of three stomachs were vegetable matter, including fruit pulp, berry pits and seeds. Typically troops around in noisy groups of 3–8 individuals, occasionally more, and only infrequently in pairs, larger groups sometimes assembling in dense bushes and cane brakes to roost; groups usually composed of 2–4 adults and variable number of young or first-year birds. Groups may associate with mixed-species flocks or other tanagers such as *R. carbo*, but more often forage independently of them. Forages at various heights, mostly about eye level to middle levels, occasionally to 25 m or higher. Hops and flies short distances as it gleans or pecks arthropods, mostly from foliage; takes prey items from both surfaces of foliage, and may reach out or cling to leaves to seize items.
Breeding. Two nests found, in Jul in E Ecuador and Aug in SE Peru. Nest a bulky cup of dead dicot leaves wrapped around adjacent stems, sparsely lined with brown, thin, flexible fibres, outside diameter c. 9 cm and height 8 cm, inner cup 6·5 cm wide and 5 cm deep, suspended between numerous stiff vertical stems of grass and sedges (Cyperaceae) or in clump of regrowth branches covered with epiphytes; Ecuador nest was c. 0·2 m above ground and 0·3 m from a lake edge, the Peruvian nest more than 100 m from nearest permanent body of water but in low-lying area subject to seasonal flooding. Clutch 2 eggs, bluish with sparse, heavy black splotches overlying denser, much paler lavender flecking, measurements 22 × 17·9 mm and 22·2 × 17·6 mm. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Locally common, and widespread across W & C Amazonia. Occurs in numerous lowland national parks and eco-lodge reserves, including Yasuní National Park and Cuyabeno Wildlife Reserve (Ecuador), Manu Biosphere Reserve (Peru) and Amazonica and Serra do Divisor National Parks (Brazil). Range also encompasses vast areas of intact habitat that is not formally protected and is at extremely low risk. This species is adapted to a variety of streamside, river-edge and floodplain-edge habitats that buffer it from potential threats.
Bibliography. Burns & Racicot (2009), Descourtilz (1852), Dunning (1982), Goodfellow (1901), Greeney & Sheldon (2009), Hellmayr (1910), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Moore *et al.* (2009), Moynihan (1962c), Novaes (1958), Ogilvie-Grant (1912), Pearson (1972), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Souza (2002).

57. Crimson-backed Tanager

Ramphocelus dimidiatus

French: Tangara à dos rouge **German**: Scharlachbauchtangare **Spanish**: Tangara Dorsirroja

Taxonomy. *Ramphocelus dimidiatus* Lafresnaye, 1837, Cartagena, Colombia.
May form a superspecies with *R. melanogaster*, *R. carbo* and *R. bresilius*. Geographical variation minimal, and taxonomic review of the various described races desirable; *molochinus* possibly indistinguishable from nominate. Proposed race *isthmicus* (described from Frijoles Station, on Panama railroad) invalid, as supposed differences attributable to age and individual variation. Four subspecies provisionally recognized.
Subspecies and Distribution.
R. d. arestus Wetmore, 1957 – Coiba I, off SW Panama.
R. d. dimidiatus Lafresnaye, 1837 – Panama (except W) E across N Colombia (S to upper Cauca Valley, middle Magdalena Valley, and Norte de Santander) to W Venezuela (Maracaibo region and W slope of Andes).
R. d. limatus Bangs, 1901 – Pearl Archipelago, in Gulf of Panama.
R. d. molochinus Meyer de Schauensee, 1950 – upper Magdalena Valley, in Colombia.
Introduced on Tahiti, in Society Is.



Descriptive notes. 16 cm; c. 24–34 g. Stout-billed tanager with lower mandible notably enlarged at base. Male nominate race has head, mantle, throat and chest deep blackish maroon-red, becoming redder on back and bright red on lower back, rump and uppertail-coverts; feathers of head very short, dense and plush-like, feathers of back glistening; entire wing and tail black; breast and lower underparts bright red, thigh and narrow patch in centre of belly black; iris reddish-brown; upper mandible dusky, lower mandible gleaming bluish-white with dusky tip; legs grey to blackish. Female resembles male, but much duller, foreparts dull dusky brown, tinged reddish, and becoming dull reddish on back and almost black on throat; usually some dull pinkish-red around bill; lower back, rump, and breast and belly red, as

On following pages: 58. Huallaga Tanager (*Ramphocelus melanogaster*); 59. Silver-beaked Tanager (*Ramphocelus carbo*); 60. Brazilian Tanager (*Ramphocelus bresilius*); 61. Scarlet-rumped Tanager (*Ramphocelus passerinii*); 62. Cherrie's Tanager (*Ramphocelus costaricensis*); 63. Flame-rumped Tanager (*Ramphocelus flammigerus*); 64. Lemon-rumped Tanager (*Ramphocelus icteronotus*).

on male but considerably duller; upper mandible dusky grey, becoming dark brownish-grey basally, lower mandible dull dark brownish-grey. Immature is very like female, but duller; subadult male much like female. Races differ minimally: *limatus* male is like nominate, but black of belly less extensive and red in plumage, especially on rump, more scarlet (less orange); *arestus* is darkest race, male with black of belly reduced as in previous, but deeper red throughout, especially on belly, female darker than others; *molochinus* differs little from nominate, male throat and chest slightly darker red, and crown and nape perhaps slightly darker crimson. Voice. Dawn and day song in Venezuela, typically from semi-exposed perch c. 3–12 m up, a long, slow series of rather clipped single or double notes, "reet, skréa, seek, reé-a, séea, bz-weet, wit-weet, fzeet, reéza, bzeep, skeéa...", slightly buzzy, the notes rising and falling and continuing for up to several minutes without clear break; dawn song may be given mainly during breeding season. Commonest call during foraging a nasal "chank", much like that of *R. carbo*; also other notes, given in context of greeting, alarm and threat.

Habitat. Thickets, shrubby clearings, cultivated areas, parks, gardens, and moist to humid forest borders; smaller numbers in dry zones in scrubby second growth. Normally not inside humid forest, but on Coiba I (Panama), probably in absence of competitors, does occur inside forest. Readily colonizes forested areas opened up for cultivation. Lowlands to c. 1620 m in Panama; to 1300 m in Venezuela; to 1700 m, very locally (e.g. Bogotá) to at least 2600 m, in Colombia.

Food and Feeding. Of six stomachs examined, three contained only vegetable matter and three contained both animal and vegetable matter; contents included soft seeds, grass seeds, larvae, lepidopterans, a bug (Hemiptera) and a spider (Araneae). Almost always conspicuous and noisy, and in monospecific groups that troop about in undergrowth or middle levels along wooded borders, but in pairs or families when breeding; several sometimes associate with small mixed-species flocks. Forages by hopping and peering in foliage, usually fairly low, for fruit and insects. Will come to feeding trays for fruit. Overall, behaviour much like that of *R. carbo*. May gather in large numbers to roost, e.g. more than 50 in citrus grove in W Venezuela in Jan; several dozen at roost in Panama.

Breeding. Breeding reported in Feb–Jun in Panama; in Colombia, juvenile seen in Feb and eggs in May in Colombia, and 14 breeding-condition birds Apr–Aug from Santa Marta area S to Huila, others in Nov and Dec. Nest built by female, a cup of dead leaves and coarse plant fibres, with lining of finer material, usually well concealed 1–3 m up in bush or thick foliage of small tree or shrubbery. Clutch 2 eggs, laid on consecutive days, pale blue or greenish-blue, sparingly marked with deep chocolate-brown, black or lilac, most heavily at large end; incubation by female alone, no information on duration; chicks fed by both sexes, in at least one case female brought mainly insects and male brought berries; young leave nest at 10–11 days, unable to fly, and remain hidden in nearby bush; offspring of previous generation may remain with nesting pair and sometimes assist with feeding of young.

Movements. Resident; no local or seasonal movements reported.

Status and Conservation. Not globally threatened. Fairly common to locally common in variety of forest-edge, shrubby and settled areas. Since 1990 or earlier, in Colombia, a small population has been resident in Bogotá in Jardín Botánico, Parque de Niza and elsewhere, and more recently also in Plaza de Tenjo; originally, was only an occasional visitor to Sabana de Bogotá. Occurs in a number of parks and reserves, and its range encompasses large amounts of unprotected but suitable habitat. Adapted to many kinds of second growth and disturbed habitats, a fact which buffers this species against potential threats and, in many cases, allows it to profit and expand as forested areas are opened up and settled. On Tahiti (Society Is), where introduced at some time prior to 1940, uncommon in coastal areas on W side of the island.

Bibliography. Allen (1905), Álvarez-Rebolledo *et al.* (2003), Brawn *et al.* (1996), Burns & Racicot (2009), Burton (1975), Davis (1972), Dunning (1982), Hallinan (1924), Hartman (1955), Hartman & Brownell (1961), Hilty (2003), Hilty & Brown (1986), Holyoak & Thibault (1975), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1947), Moynihan (1962b, 1962c), Norgaard-Olesen (1974), Ogilvie-Grant (1912), Olivares (1970), Phelps & Phelps (1950, 1963), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sclater & Salvin (1879), Skutch (1954), Stone (1918), Strauch (1977), Todd & Carriker (1922), Wetmore *et al.* (1984), Willis & Eisenmann (1979), Wyatt (1871).

58. Huallaga Tanager

Ramphocelus melanogaster

French: Tangara du Huallaga **German**: Schwarzbauchtangare **Spanish**: Tangara del Huallaga
Other common names: Black-bellied Tanager

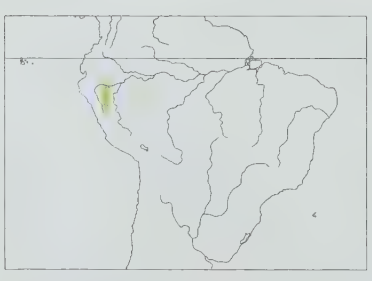
Taxonomy. *Rhamphopis melanogaster* Swainson, 1838, Moyobamba, San Martín, Peru.

May form a superspecies with *R. dimidiatus*, *R. carbo* and *R. bresilius*. A geographical replacement of *R. carbo*, with very slight range overlap in Marañón drainage (no known overlap in Huallaga Valley), and some evidence of intergradation; molecular analysis indicates that levels of divergence between the two (1·1%) are lower than those generally found for other species in genus (2·4–4·0%). Races differ minimally. Two subspecies currently recognized.

Subspecies and Distribution.

R. m. melanogaster (Swainson, 1838) – N Peru in San Martín and Huánuco (to confluence of R Huayabamba and R Huallaga) S to NW Ucayali (R Ucayali).

R. m. transitus J. T. Zimmer, 1929 – EC Peru (E slope drainage) in upper Huallaga and Chinchao Valleys.



Descriptive notes. 17 cm; one male 25 g. Male nominate race has lustrous dark crimson head, becoming deep black on mantle and back, bright red lower back to uppertail-coverts; upperwing and tail black; throat and chest deep red, red extending to breast, where separated rather abruptly from brighter red of lower breast and flanks; centre of lower breast and belly black; iris reddish-brown; upper mandible dusky, lower mandible white with dusky tip; legs dusky grey. Female is mainly dusky reddish-brown above with bright red rump and uppertail-coverts, has lower throat and chest dusky, tinged reddish, and rather sharply separated from cinnamon-red breast and lower underparts; usually a narrow area of dull red on base of forehead, lores, ocular area, basal malar area and chin, forming distinctive area surrounding bill, also base of upper mandible and basal half of lower mandible paler than on male, dull bluish-grey; distinguished from very similar female of *R. carbo* by brighter red colour on rump and uppertail-coverts, also pinkish-red area around bill (present on most, but not all, females; usually lacking or indistinct on *R. carbo* female). Immature undescribed. Race *transitus* is much like nominate, but male rump brighter red, and upper throat paler red and less sharply set off from breast. Voice. Day song a short, fairly musical series of repeated phrases, similar to that of *R. carbo*. Call note a slightly burry "chwipo" or "chwick", much like that of congeners; similar note used in alarm.

Habitat. Forest edge, shrubby clearings, second growth, river borders, cultivated areas and gardens, often in vegetation around settled areas; c. 800–2100 m.

Food and Feeding. Few data. Diet and foraging behaviour apparently much as for *R. carbo*. Occurs in small flocks of 6–8 individuals.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Huallaga Valley Secondary Area. Locally common. Found in a few protected areas, including Río Abiseo (in San Martín) and Tingo Maria National Park (in Huánuco). Occurs in second growth and disturbed habitats, something which buffers this species against potential threats and, in many cases, allows it to benefit and expand as forested areas are opened up and settled. Currently extending its range to extreme NW Ucayali (R Ucayali drainage) E of Tingo Maria, doubtless in response to deforestation and clearance. Despite its small range, this species seems unlikely to be facing any risks in the immediate future.

Bibliography. Burns & Racicot (2009), Clements & Shany (2001), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Tallman (1974), Zimmer (1930, 1945).

59. Silver-beaked Tanager

Ramphocelus carbo

French: Tangara à bec d'argent **German**: Purpurtangare **Spanish**: Tangara Picoplata
Other common names: Maroon Tanager, Common Silverbeak

Taxonomy. *Lanius* (*Carbo*) Pallas, 1764, Suriname.

May form a superspecies with *R. dimidiatus*, *R. melanogaster* and *R. bresilius*. Molecular analysis indicates that levels of divergence between this species and *R. melanogaster* (1.1%) are lower than those generally found for other species in genus (2·4–4·0%); the two overlap slightly in range in N Peru (Marañón drainage), with some evidence of hybridization. Has hybridized with *R. bresilius* in E Brazil (SE Minas Gerais). Eight subspecies recognized.

Subspecies and Distribution.

R. c. capitalis J. A. Allen, 1892 – NE Venezuela (Anzoátegui E to Paria Peninsula, S to Monagas and Delta Amacuro).

R. c. magnirostris Lafresnaye, 1853 – SE Sucre, in NE Venezuela; Trinidad.

R. c. venezuelensis Lafresnaye, 1853 – E base of Andes in N & W Venezuela (Falcón E to Miranda, S to Táchira) and Colombia (Arauca, Boyacá).

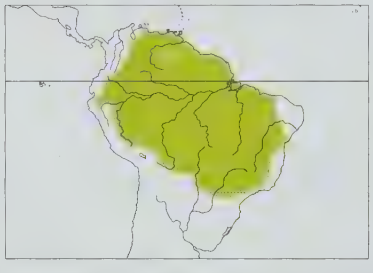
R. c. unicolor P. L. Sclater, 1856 – E base of Andes in Colombia (from Casanare region S to Meta).

R. c. carbo (Pallas, 1764) – SE Colombia, E Ecuador, E Peru (S to Ucayali), Venezuela S of R Orinoco, the Guianas, and N, W & C Brazil (S to N Mato Grosso).

R. c. connectens Berlepsch & Stolzmann, 1896 – SE Peru and adjacent NW Bolivia.

R. c. atrosericeus d'Orbigny & Lafresnaye, 1837 – N & E Bolivia.

R. c. centralis Hellmayr, 1920 – E Brazil (C Mato Grosso E to Bahia, Minas Gerais and N São Paulo) S to NE Paraguay.



Descriptive notes. 16–17 cm; 21·5–27 g (*atrosericeus*), 23·5–37·5 g (other races). Dark tanager with heavy bill, lower mandible greatly expanded basally. Male nominate race has head, neck and throat deep carmine (feathers short, dense and plush-like); upperparts, including uppertail-coverts and upperwing-coverts, carmine-black, contrasting somewhat (in good light) with redder head and neck; flight-feathers and tail dusky black; dark red of throat deepens to rich deep crimson on chest, and to deep black (but with dark crimson tinge) on lower underparts and undertail-coverts; iris reddish-brown; upper mandible dark blue-grey, lower mandible gleaming silvery white and usually with small dark tip; legs dark horn-grey. Female is mainly rich dark rusty red above, slightly redder on lower back and rump, wing dusky, upperwing-coverts and tertials edged rufescent brown, tail dusky; rich reddish-brown to warm brown below, greyish tinge on breast; bill entirely brownish-dusky. Immature male is very like female; older immature brighter. Races differ mainly in plumage tone, generally brighter in N and darkest in S: *capitalis* male has upperparts pure black, only head deep red, chin to breast deep crimson, female has redder rump and uppertail-coverts and more reddish coloration on lower underparts; *magnirostris* is much like nominate, but with larger, heavier bill, male with white base of lower mandible larger, female more uniformly reddish below; *venezuelensis* male differs from nominate in having red parts of plumage on average brighter red, upperparts black with tinge of dark red, deep crimson of chin to breast changes to dull charcoal (dull blackish) on lower underparts; *unicolor* male is very close to nominate, but red foreparts on average slightly brighter and rear parts more uniformly blackish, with back and belly only slightly darker than breast; *connectens* male is slightly paler above and below than nominate, and with brownish tinge (less red) on back, rump and lower underparts, female paler than nominate female; *centralis* male is much like previous, but throat slightly darker red; *atrosericeus* is darkest of all races, male essentially velvety black with dark scarlet hue on head to mid-breast, sharply separated from rest of underparts, female distinctively plain black-brown all over, sometimes with some dull red edges on belly feathers. Voice. Dawn song (occasionally later in day) an energetic and semi-musical but rather repetitive series of phrases without much richness, "tu tu tweep, chip-tup tweep, tu tu tweep, chip, sput, seek..." and so on; some individuals sing leisurely, even simpler, repetitive "spit weet, sput, wheer..." over and over. Day song much like dawn song, but shorter, less sustained, and given infrequently, e.g. "chick chi-ti-wee" or sometimes just a single note repeated again and again. Call, given almost constantly as groups troop around edges of clearings, a loud, metallic "chank".

Habitat. Bushy forest borders, overgrown clearings, second growth, shrubbery around habitations, and bushy vegetation along riverbanks in humid areas. Sometimes in rather dry scrubby or degraded areas. May occur in open woodland, but not inside dense forest, although occasionally moves across top of forest canopy. Scarce or locally absent in *llanos* of C Venezuela and adjacent E Colombia. Lowlands to c. 1200 m in most areas, but locally higher following clearing and deforestation; to 1900 m in Venezuela, and at least 2000 m in Peru (Urubamba Valley).

Food and Feeding. Arthropods and fruit; occasionally eats flowers (possibly for nectar) or drinks nectar. About half of diet is fruit, especially melastome berries; in Trinidad reported as taking 40

species of fruit, 64% of which was of *Miconia* and *Clidemia* berries. Of 31 stomachs examined, 14 contained only vegetable matter, seven only animal matter and ten both; contents included *Cecropia* fruit, seeds, caterpillars, beetles (Coleoptera) including snout beetles (Curculionidae) and leaf beetles (Chrysomelidae), spiders (Araneae), orthopterans, ants (Formicidae), and bugs (Hemiptera). Other stomachs contained berries of Solanaceae and Loranthaceae, cactus fruits (*Cerus*) and winged termites (Isoptera). Of 588 observations in Trinidad, 50% involved foraging for insects, 45% fruit-eating, and 5% at flowers; data similar in Peru. Smaller fruits swallowed whole; larger ones mashed, or pieces pecked from them, and may mash the pulp and discard the tough skin of some fruit species. Travels in groups that are noisy, engaging and omnipresent. Bands of 4–10 individuals, occasionally more, troop noisily about in undergrowth along forest borders or in gardens and clearings; may briefly join mixed-species flocks along borders or briefly associate with other birds in fruiting trees and shrubs. Often acts in quite nervous manner, with much agitated flicking of wings and tail, as it peers in foliage for fruit and insects. Forages from near ground to c. 12 m up, also regularly ascends into canopies 25 m high for fruit, and in general forages higher up when with mixed-species flocks. Hops rapidly and heavily in foliage, and chases disturbed and fleeing insect prey. In Trinidad, 77% of insect-seeking was on foliage, 13% in grass and weeds, 7% in aerial sallies, and remainder on seedheads, twigs and branches. Has been noted at army-ant swarms in Brazil and elsewhere.

Breeding. Breeding reported in Jan–Mar in E Colombia, Apr and May in Venezuela, Dec–Sept in Trinidad, Dec–Aug in Suriname and Jul and Aug in French Guiana; in Brazil, Sept–Feb in Pará and Nov in Mato Grosso. Nests sometimes close together. Sometimes co-operative breeder; helpers may attend young. Pairs seem not to defend territories against conspecifics; in various displays, male points bill upwards to maximize exposure of silvery colour. Bulky deep cup-nest of dead leaves and plant fibres, sometimes with a few green leaves on outside, placed c. 1–3 m above ground, occasionally higher, in bush; nest sometimes reused. Clutch 1–3 eggs, usually 2, greenish to bluish with blackish, brown, grey and/or lilac markings, especially at larger end; incubation by female, period c. 12 days; chicks fed by both parents, no information on duration of nestling period.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Common and widespread E of Andes and across Amazonia. Occurs in parks and reserves throughout its range, and is found also in vast areas of unprotected but suitable habitat. Adapted to many kinds of second growth and disturbed habitats, which buffers this species against potential threats and allows it to profit and expand as forested areas are opened up and settled.

Bibliography. Allen (1891), Beebe (1909), Belcher & Smooker (1937), Burns & Racicot (2009), de Carvalho (1957b), Collins & Araya (1998), Dick *et al.* (1984), Dunning (1982), ffrench (1991), Friedmann & Smith (1950, 1955), Fry (1970), Gibson (1987), Ginés *et al.* (1951), Haverschmidt (1948, 1952, 1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Ingels (1977, 1978, 1987), Isler & Isler (1999), McCarthy (2006), de Melo Valente (2000), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Moynihan (1962b), Niethammer (1956), Novaes (1969, 1973, 1980), Novaes & Pimentel (1973), Pearson (1971), de la Peña & Rumboll (1998), Phelps & Phelps (1950, 1963), Pinto (1944b), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sazima (2008), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1968), Snethlage (1935a), Snow & Snow (1971), Snyder (1966), Souza (2002), Taczanowski (1884), Thomas (1982), Tostain *et al.* (1992), Walker (2001), Weske (1972), Willis (1977), Zimmer (1945).

60. Brazilian Tanager

Ramphocelus bresilius

French: Tangara du Brésil **German**: Brasiltangare **Spanish**: Tangara Brasileña

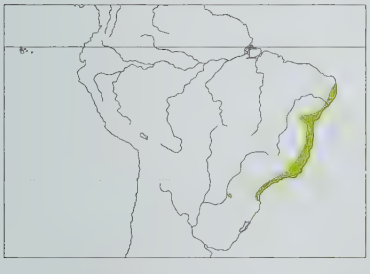
Taxonomy. *Tanagra bresilia* Linnaeus, 1766, "in India Occidentali et Orientali"; error = Pernambuco, eastern Brazil.

May form a superspecies with *R. dimidiatus*, *R. melanogaster* and *R. carbo*. Hybrids between this species and *R. carbo* reported from E Brazil (Rio Doce area of Minas Gerais), but molecular analyses show that differentiation between these two taxa is typical of expected values for well-differentiated species (2·4–4·0%). Two subspecies recognized.

Subspecies and Distribution.

R. b. bresilius (Linnaeus, 1766) – coastal E Brazil from Paraíba S to Bahia (Ilhéus).

R. b. dorsalis P. L. Sclater, 1855 – SE Brazil from E Minas Gerais, S Bahia and Espírito Santo S to NE Santa Catarina; extreme NW Argentina (N Misiones).



Descriptive notes. 18 cm; 27·9–35·5 g. Typical tanager with heavy bill, lower mandible greatly expanded at base. Male nominate race is mainly rich glistening red, feathers of head, neck and throat short, dense and plush-like, back very slightly darker red than rest of plumage, and central back sometimes with small amount of black showing (feathers black basally); wing and tail black, median upperwing-coverts sometimes with inconspicuous red tips; iris reddish brown; bill mostly blackish, basal half of lower mandible gleaming white; legs dull brown to slate-grey. Female is rather plain, mainly greyish-brown on head, throat, neck and entire upperparts, including wing-coverts, flight-feathers and tail; forecrown and rump somewhat tinged reddish; greyish-brown of throat merges into dull brownish-red on breast, belly and undertail-coverts; bill dusky brown. Immature male is like female, but bill black (not brownish); older immature acquires bright red-and-black plumage of adult male in second year, but may show dusky mottling on back, rump and uppertail-coverts. Race *dorsalis* is similar to nominate, but back of male is darker red. Voice. Song described as a melodious and leisurely "jewle-jewle-jewle...", repeated. Harsh chattering notes heard from small groups. Possible dawn song from captive bird a long series of "wheeeee" or "wheee-eeee" notes. Captive gave possible whisper song consisting of "chuup chuh-wheeee" phrases combined with call notes in a melodious jumble lasting c. 10 minutes. Various call notes include hard "jep, jip, "ist" and "sst-sst".

Habitat. Variety of shrubby non-forest habitats, including overgrown clearings, forest borders, parks, gardens, city plazas, and edges of swampy woodland and marshes; often near water, as well as in shrubbery close to ocean. Lowlands; small numbers up to c. 800 m.

Food and Feeding. Reported as eating pulpy fruits, including *Eugenia*. Of five stomachs examined, two contained only vegetable matter, two only animal matter and one both; contents included seeds, fruit pulp, insects, and a small quantity of white sand. Found in pairs much more than in groups (unlike many other in genus). Flies low between bushes, and tends to remain hidden during middle of day.

Breeding. Breeding reported in Nov in São Paulo and Rio de Janeiro. Nest an open woven cup of grasses, vines and fibres, placed in bush or low tree or hidden among clumps of marsh grass. Clutch 2–3 eggs, greenish-blue, sparingly marked with black and grey; in captivity, incubation by female only, period 13 days, chicks fed by both adults. Nest frequently parasitized by Shiny Cowbird (*Molothrus bonariensis*).

Movements. Reported as gathering in flocks in austral winter, suggesting that those in extreme S of range may undertake some minor migratory movements. More documentation required.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common; almost always in small numbers. Records in NW Argentina (at least one old record and a few recent ones) possibly refer to escaped cagebirds; research needed. Occurs in numerous protected areas in E Brazil, including, among others, Itatiaia, Tijuca and Serra dos Órgãos National Parks and Sooretama and Poço das Antas Biological Reserves. Also survives in urban and settled areas. Reported as relatively numerous in coastal lowlands of S Rio de Janeiro and NE São Paulo, but in declining numbers N in Espírito Santo and Bahia, where activities of bird-trappers may affect numbers. Utilization of a variety of habitats, including many second-growth and disturbed habitats, buffers this species against potential threats. In severely deforested areas some local populations may prove more sensitive, or have disappeared. The species does not appear likely to be at risk in immediate future.

Bibliography. Berla (1944), Burns & Racicot (2009), Castiglioni & Gonzaga (1999), Castiglioni *et al.* (1995), Chebez *et al.* (1984), Descourtilz (1852), Diamond & Lovejoy (1985), Dunning (1982), Euler (1900), Forbes (1881), Goeldi (1894), Guimarães (1926), Ihering (1900), McCarthy (2006), Mitchell (1957), Moojen *et al.* (1941), Moynihan (1962b), Narosky & Di Giacomo (1993), Norgaard-Olesen (1974), Ogilvie-Grant (1912), Parker & Goerck (1997), Peixoto Velho (1932), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Santos (1948), Sazima *et al.* (1993), Schubart *et al.* (1965), Sick (1985, 1993), Snethlage & Schreiner (1929), Souza (2002).

61. Scarlet-rumped Tanager

Ramphocelus passerinii

French: Tangara à croupion rouge **German**: Passerinitangare **Spanish**: Tangara Terciopelo
Other common names: Passerini's/Song Tanager

Taxonomy. *Ramphocelus Passerinii* Bonaparte, 1831, Cuba; error = Guatemala.

Often treated as conspecific with *R. costaricensis*, but recent DNA studies suggest that they can be regarded as separate species. DNA studies indicate that both are monophyletic and, although levels of divergence within the two taxa (0·1%, 0·6%) are much less than divergence between them (1·8%), this level of interspecific divergence is lower than that between most species of tanager (c. 2·4–4·0%); also, visual differences between the two are minimal (involving mainly females), and only minor vocal differences have been demonstrated; further evaluation of these taxa may be required. Monotypic.

Distribution. SE Mexico (SE Veracruz, S Tabasco and N Chiapas) E to C Guatemala and Belize, S on Caribbean coast to Costa Rica and NW Panama (Bocas del Toro).



Descriptive notes. 16 cm; 25·5–37 g. Thick-billed tanager with slightly enlarged base of lower mandible. Male is deep velvety black from head to back, upperwing-coverts, flight-feathers, tail and underparts, black feathers of head short, dense and plush-like; slightly elongated feathers of lower back, rump and uppertail-coverts bright scarlet; iris deep carmine to dark brown; bill pale blue-grey, black tip; legs dark horn-grey. Female has head brownish-grey, upperparts yellowish-brown with olive tinge (not in strong contrast to head), rump paler, upperwing-coverts dusky, broadly edged yellowish-olive, flight-feathers dusky, edged yellowish-olive, tail dusky; throat greyish-buff, becoming deep ochraceous, tinged olive, on breast and paler olive-tinged ochraceous on lower underparts. Immature male resembles female; older male acquires irregular patches of black mottling in plumage. Voice. Infrequently heard song a simple series of phrases of 2–4 notes, given a few times at dawn by male, e.g. "wah-wait chu", repeated, or "vireo viree vireo viree viree...", and occasionally interrupted with high squeaky "witchy-wit" notes. Male may sing initially from roost, later from exposed position with tail and wings drooped, revealing scarlet rump feathers; sings shorter phrases than, and not nearly so often or so persistently as, *R. costaricensis*. Variety of calls include sharp "ac" or "wac", dry scratchy "chuck", dry "pzzt", and sharp "whip" in alarm; sharp descending chatter in interactions.

Habitat. Inhabits second growth, dense humid thickets, bushy forest borders, overgrown pastures, gardens and shrubbery around homes and settlements, bushy borders of fields, occasionally a short distance inside forest; favours very humid zones. Present from lowlands up to c. 1200 m, occasionally higher.

Food and Feeding. Lives in pairs, families and little groups of up to c. 12 individuals. Move about actively in thick foliage, call and chatter, often fly across small clearings, and are generally conspicuous. Individuals, pairs or groups sometimes associate with mixed-species flocks along wooded borders, and readily mob noisily. Forage low, usually less than 7 m up, but may go much higher with mixed-species flocks, and also regularly drop to the ground in openings. Eat a wide variety of fruits and insects. Especially fond of melastomes and several species of arillate fruits, and also occasionally eats *Cecropia* fruit. Readily visits feeding platforms for fruit.

Breeding. Season early Mar through Jul in Panama. Nest built by female alone; three nests at Almirante (Panama) a compact, thick-walled, strongly woven cup, base of large leaves, sides of fibres and rootlets, lining of fine delicate hair-like fibres, one measured 120 × 120 mm with inside depth of 45 mm; nests mostly 3–7 m above ground and concealed in dense shrub or thicket. Clutch (from five nests in SE Nicaragua) 2 eggs, pale greyish-blue marked with small irregular black spots or fine irregular lines, mainly around larger end; incubation entirely by female, period 12 days; nestling period 11 or 12 days. May breed in immature plumage.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Uncommon to locally common. A generally widespread and familiar species of Caribbean slope of Central America. Occurs in a number of parks and reserves throughout its range, including e.g. Cascadas de Agua Azúl and Palenque National Park (Mexico), Tikal National Park (Guatemala), Cockscomb Basin Wildlife Reserve (Belize), Capiro–Calentura National Park (Honduras), Indo-Maíz Biological Reserve (Nicaragua) and La Selva Biological Reserve (Costa Rica). Also found in areas of suitable habitat that do not have formal protection, especially in Guatemala and Belize. This species is adapted to many kinds of second growth and disturbed habitats, which buffer it against potential threats and allow it, at least locally, to profit and expand as forested areas are opened up and settled. Several Caribbean areas,

e.g. in Costa Rica, are so severely deforested that some populations have declined or disappeared locally.

Bibliography. Burns & Racicot (2009), Burns *et al.* (2002, 2003), Carriker (1910), Davis (1972), Garrigues & Dean (2007), Hackett (1996), Hartman (1955), Howell & Webb (1995), Huber (1932), Isler & Isler (1999), Kiff (1973), Land (1970), McCarthy (2006), Moriarty (1977), Ogilvie-Grant (1912), Richmond (1893), Ridgely & Gwynne (1989), Russell (1964), Skutch (1954, 1962b), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).

62. Cherrie's Tanager

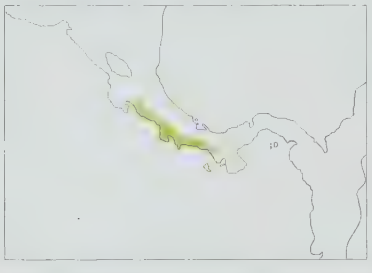
Ramphocelus costaricensis

French: Tangara du Costa Rica **German**: Cherrietangare **Spanish**: Tangara Costarricense

Taxonomy. *Ramphocelus costaricensis* Cherrie, 1891, Pozo Azul, Costa Rica.

Often treated as conspecific with *R. passerinii*, but recent DNA studies suggest that the two can be regarded as separate species. DNA studies indicate that both are monophyletic and, although levels of divergence within the two taxa (0·1%, 0·6%) are much less than divergence between them (1·8%), this level of interspecific divergence is lower than that between most species of tanager (c. 2·4–4·0%); also, visual differences between the two are minimal (involving mainly females), and vocal differences only minor; further evaluation of these taxa is desirable. Monotypic.

Distribution. Pacific slope of Costa Rica from Puntarenas (C & S regions) and NE Central Valley S to W Panama (Chiriquí and Veraguas).



Descriptive notes. 16 cm. Thick-billed tanager with slightly enlarged base of lower mandible. Male is deep velvety black from head to back and on wings, tail and underparts, black feathers of head short, dense and plush-like; slightly elongated feathers of lower back, rump and uppertail-coverts bright red; iris crimson to dark maroon; bill pale blue-grey, black tip; legs dark horn-grey. Distinguished from extremely similar *R. passerinii* in having rump very slightly tinged orange, although the two appear identical in the field (and barely separable in the hand). Female has head dark greyish-brown, upperparts brown, rump dark orange, upperwing and tail dusky brown, chest dark tawny-orange, ochraceous lower underparts; differs from female *R. passerinii* mainly in orange rump, broad and diffuse dark tawny-orange band across chest contrasting strongly with paler lower underparts, and general darker appearance. Immature resembles female; subadult male may show patches of black and red in plumage. Voice. Song, mainly at dawn from about Feb to mid-Aug in SW Costa Rica, a repetition of simple phrase of few notes, e.g. "viree-viree-vireo-vireo-vireo,...", continued for several minutes. At dawn male sings from perch close to roost, but after sunrise from exposed perch on top of bush or low tree; when singing, droops wings and tail and ruffles feathers of back to expose scarlet colour more fully. Sings more frequently and more persistently than does *R. passerinii*. Commonest calls a nasal "ac" or "wac", given almost constantly by both sexes when foraging or engaged in other activities; less frequently a sharp, dry "pzzt" on taking flight or to call mate; in excited greeting individuals may give an odd "zzt not churry not churry", sharply and rapidly; sharp "whip" in alarm.

Habitat. Second growth, dense humid thickets, bushy forest borders, overgrown pastures, gardens and shrubbery around homes and settlements, bushy borders of fields, occasionally a short distance inside forest; commonest in humid zones, but occurs also in moist sites and even dry ones. Lowlands to c. 1200 m, occasionally as high as 1700 m.

Food and Feeding. Wide variety of fruit and arthropods taken. Fruits eaten include melastomes, arillate fruits, *Cecropia*, and many kinds of fruit from feeders; arthropod prey includes caterpillars and spiders (Araneae) in foliage and grasshoppers (Caelifera) taken from ground. Nestling diet insects and some fruit. Occurs in pairs when breeding, but in small groups of varying sizes during rest of year, when sometimes joins small mixed-species flocks; throughout most or all of year may roost in small groups, sometimes up to a dozen together, low in dense shrubbery or garden. Forages mostly low, usually less than 7 m up, but higher when with a mixed flock. Takes insects by hopping and searching in foliage and pecking or lunging; occasionally sallies for prey, e.g. flying termites (Isoptera). Has been reported at an army-ant (Formicidae) swarm in second growth. Pairs or groups apparently do not defend a foraging territory.

Breeding. Reported in Mar–Sept, but few nesting attempts after Jul, in Costa Rica (El General Valley); rarely two broods, but may make second nesting attempt if first one in season fails. Despite preponderance of female-plumaged birds, appears to be monogamous; occasionally a third, dull-plumaged individual may accompany adults. Inter-nest distance sometimes as little as c. 1 m. Apparently does not defend a breeding territory. Nest built by female alone, accompanied by mate, and female may steal material from neighbouring nests; an open cup of dead leaves, fibres and grass, sometimes with green fern on outside, placed up to 6 m above ground (about two-thirds of all nests 1–4 m up) and concealed in bush or small tree, or in tall grass, ferns or sugar cane. Clutch 2 eggs, rarely 3, pale blue to pale grey with black, brown or pale lilac markings, usually in wreath at larger end; incubation by female alone, period 12–13 days; chicks fed by both parents, female typically bringing more food than male, often twice as much, nestling period c. 11–13 days; young leave nest unable to fly, hide in nearby bush. In Costa Rica, c. 25% of nesting attempts produce at least one fledgling; main predators appear to be snakes and toucans (Ramphastidae).

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in South Central American Pacific Slope EBA. Common within limited range. Females and female-plumaged birds outnumber males by c. 3:1. Occurs in a few protected areas, including Corcovado National Park (Costa Rica) and Volcán Barú and Chiriquí National Parks (Panama). The fact that this species is adapted to a variety of second growth and disturbed habitats buffers it against potential threats and allows it, at least locally, to profit and expand as forested areas are opened up and settled. No near-term risks known.

Bibliography. Anon. (1998), Barrantes & Hidalgo (2004), Burns & Racicot (2009), Davis (1972), Garrigues & Dean (2007), Hackett (1996), Isler & Isler (1999), Krueger & Williams (2006), Ridgely & Gwynne (1989), Skutch (1950, 1954, 1972, 1980a), Stiles & Skutch (1989), Wetmore *et al.* (1984).

63. Flame-rumped Tanager

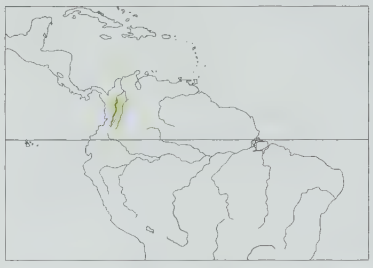
Ramphocelus flammigerus

French: Tangara flamboyant **German**: Feuerbürzeltangare **Spanish**: Tangara Flamigera

Taxonomy. *Ramphopis flammigerus* Jardine and Selby, 1833, Antioquia, Colombia.

Usually treated as conspecific with *R. icteronotus*, and, despite striking visual differences, genetic differences between the two taxa apparently minimal; also, the two now apparently interbreed freely in W Andes (along a relatively narrow but apparently stable band at middle elevations near crest of, or on, upper Pacific slope), where recent deforestation has permitted them to expand ranges and to meet. Differences between them, however, seem comparable to, and visually much more obvious than, those between *R. passerinii* and *R. costaricensis*, which are now regarded as two separate species. Present species is also very similar in appearance to both *R. passerinii* and *R. costaricensis*, although geographically well isolated from them; furthermore, it shows a high sequence divergence (4·7%) from these two species, indicating its genetic isolation. Monotypic.

Distribution. W Colombia on both slopes of Cauca Valley from C Antioquia S to Cauca, the upper Patía Valley in SW Cauca, and locally on W slope of Andes (mostly as expansion across low passes from Cauca Valley, from Risaralda, on upper R San Juan, S to NW Nariño); also W slope of E Andes above Magdalena Valley, in Santander.



Descriptive notes. 18 cm. Male is almost entirely deep black; head velvety black, with feathers very short, dense and plush-like; middle back to rump and uppertail-coverts glistening flame-scarlet; iris crimson to dark maroon; bill light blue-grey, black tip; legs dark horn-grey. Differs from very similar *R. passerinii* and *R. costaricensis* in having red of upperparts more scarlet (less deep red) and more extensive, reaching farther up on back. Female is blackish-brown to brown above, usually with slight mottled appearance on back, and with rump and uppertail-coverts reddish-orange; side of head brown, often somewhat mixed with dusky and grey, throat dingy greyish-yellow, underparts pale yellow, large diffuse reddish-orange patch on chest forming ill-defined band, undertail-coverts usually dull red or mixed red and yellow. Immature male is like female; subadult male extensively mottled black. Voice. Dawn song, delivered from top of low bush or sapling, an energetic series of mostly 2-note or 3-note phrases repeated over and over as male perches upright, with rump exposed and puffed out and wings drooped. Commonest call a loud slightly nasal "chink". Vocalizations similar to those of *R. icteronotus*.

Habitat. Humid forest borders, second growth, old pastures, shrubby areas, borders of fields, and bushes and vegetation around habitations; readily invades new forest clearings following deforestation. In moist or moderately humid to very humid areas. From 800 m to c. 2000 m.

Food and Feeding. Fruit and arthropods. Most often seen singly or in pairs, and less often in small family groups; unlike *R. icteronotus*, seems not to troop around in noisy groups. Perches on branches to take fruits, and perches on and pecks at large fruits. Occasionally sallies to seize aerial insects; also picks insects from foliage and grass. Behaviour otherwise much like that of *R. icteronotus*.

Breeding. Nest found in Feb in Calima Valley (W Valle) and four breeding-condition birds in Jul near Popayán (upper Cauca Valley). Calima Valley nest an open cup placed in low weeds. Eggs pale blue, marked with dark brown or black spots and sometimes with a few short lines, which may coalesce in wreath around large end. No other information.

Movements. Movements (possibly by wandering individuals) from E slope of W Andes to W slope not well documented; present in Anchicayá Valley (1050 m) only in Nov–Jan in 1972–1973.

Status and Conservation. Not assessed. Usually treated as conspecific with *R. icteronotus*. Restricted-range species: present in Colombian Inter-Andean Valleys EBA. Uncommon to locally fairly common. On Pacific coast seems nowhere to be as locally numerous as *R. icteronotus*, and distribution may be somewhat patchy. Occurs in several inter-Andean protected areas, including Reserva Hidrográfica de Río Blanco (in Caldas), Reserva Reinita Cielo Azul, Lago de Sonso Natural Reserve and Bosque Yotoco Reserve. This species' adaptation to a variety of second-growth and disturbed habitats buffers it against potential threats and allows it, at least locally, to profit and expand, especially to higher elevations, as forested areas are opened up and settled. Short-term risks seem minimal.

Bibliography. Burns & Racicot (2009), Chapman (1917), Dunning (1982), Hellmayr (1936), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ogilvie-Grant (1912), Plath (1946), Restall *et al.* (2006), Salaman *et al.* (2008), Sclater & Salvin (1879), Sibley (1958).

64. Lemon-rumped Tanager

Ramphocelus icteronotus

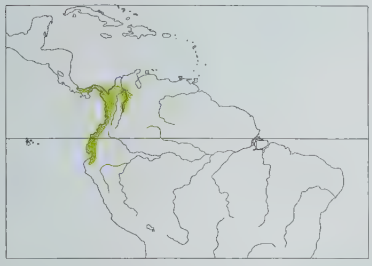
French: Tangara à dos citron **German**: Gelbrückentangare **Spanish**: Tangara Culigualda
Other common names: Yellow-rumped Tanager

Taxonomy. *R[h]amphocelus icteronotus* Bonaparte, 1838, Ecuador.

Usually treated as conspecific with *R. flammigerus*, and, despite striking visual differences, genetic differences between the two taxa apparently minimal; also, the two now apparently interbreed freely in W Andes of Colombia (along a relatively narrow but apparently stable band at middle elevations near crest of, or on, upper Pacific slope), where recent deforestation has permitted them to expand ranges and to meet. Differences between them, however, seem comparable to, and visually much more obvious than, those between *R. passerinii* and *R. costaricensis*, which are now regarded as two separate species. No races of present species described, but females and immatures from W Ecuador are more olive, less brown or grey, above than those farther N, and one individual from Panama and one from Ecuador showed a molecular-sequence divergence of 2·2%, approaching the levels at which many full species are recognized; further research required. Treated as monotypic.

Distribution. Panama from Caribbean slope in Bocas del Toro E across both slopes (from foothills of Veraguas) to Colombia (N base of W Andes, lower Cauca Valley and E to middle Magdalena Valley from Santander S to N Tolima, and on W slope of E Andes) and S along Pacific coast to SW Ecuador (Guayas, El Oro, W Loja) and adjacent NW Peru (Tumbes).

Descriptive notes. 18 cm; 29·6–35·6 g. Male is almost entirely deep black; feathers of head short, dense and plushy, resembling black velvet; middle back to rump and uppertail-coverts glistening lemon-yellow; iris crimson to dark maroon; bill light bluish-grey, black tip; legs dark greyish-horn. Differs from otherwise almost identical *R. flammigerus* in having lower back to uppertail-coverts brilliant lemon-yellow, instead of red. Female is greyish-brown above, sometimes tinged olive, side of head generally dingy greyish-brown; lower back, rump and uppertail-coverts pale yellow; throat dull whitish, becoming clear pale yellow on underparts. Immature male closely resembles female; older immature male mottled or blotched with black, especially on head and breast, as it gradually acquires adult plumage. Voice. Dawn song, from top of low bush or sapling, an energetic



and somewhat musical "tseee-yah" repeated tirelessly as male sits rather upright. Songs, sometimes varied slightly, or with occasional harsh notes added, given only during breeding season in Panama, but most of year in W Colombia (where climate far less seasonal); as with congeners, singing male droops wings and tail and slightly ruffles back and rump feathers to display as much colour as possible. Often rather noisy, groups constantly uttering loud, slightly nasal "chink" as contact notes and more rapidly in alarm; variety of other notes, some hoarse, others disyllabic, and rattle-like calls.

Habitat. Thickets, bushy forest borders, overgrown clearings, pastures and shrubbery around settled areas, dooryards, gardens and plantations; in Panama shows affinity for vicinity of water, although this not the case in Colombia. Sea-level to c. 1000 m; in Colombia occasionally to 1400 m, rarely to 2100 m.

Food and Feeding. Of eight stomachs examined, six contained only vegetable matter and two contained both vegetable and animal matter; contents included orthopterans, beetles (Coleoptera), fruit and seeds. Recorded as eating more than 22 species of fruit (72% of 170 feeding records), including those of melastomes (30% of all fruit eaten), especially *Miconia* berries, *Cecropia* (27%) and *Ficus* (19%). Occurs in pairs, in families, and in noisy, conspicuous groups of up to a half-dozen or more individuals, which spend most of the time in fussing and calling from thickets and shrubbery or in visiting small fruiting shrubs and trees. Often calls and flicks wings and tail in agitated manner, especially prior to flight. In W Valle, in Colombia, foraged mostly below 9 m (median height c. 7·5 m) but regularly went to tops of 25-m trees for fruit. Normally perched on twig or branch to take fruit or berries, which were swallowed whole, and perched on and pecked pieces from large fruits such as bananas, *Cecropia* catkins. Rarely took berries by sallying, but about half of 49 observations of insect-catching involved short sallies to air. Also peered and picked insects off foliage, grass, ferns and other substrates. Sometimes insect-searching was acrobatic, involving hanging from leaves or twigs.

Breeding. Season Feb to mid-May in Panama; in Colombia, nesting reported Dec through mid-Apr in W Valle del Cauca, and eleven breeding-condition birds Feb–May in NW; fledged young with adult in early Mar in SW Ecuador (Tambo Negro, in Loja). Nest a compact open cup of leaves and plant fibres, often with leaves and lichens on outside, placed 2–5 m up in bush or tree. Clutch 2 eggs, infrequently 3, blue or greenish-blue marked with black, brown or lavender, sometimes in wreath around large end; in captivity, female alone incubates, period 11–14 days, chicks fed by both adults, and nestling period 12–14 days. Immature males in female-like plumage may breed.

Movements. Resident over most of range, perhaps either scarce or a seasonal visitor on Pacific slope of Canal Zone region of Panama.

Status and Conservation. Not assessed. Usually treated as conspecific with *R. flammigerus*. Locally common to uncommon. Occurs sparingly in Caribbean W Panama, progressively more numerous to E; common and conspicuous in Darién (E Panama), Chocó-Pacific region of Colombia and S into Ecuador. Sightings in Tumbes Reserved Zone, in NW Peru. Found in many protected areas and is particularly numerous in second growth, disturbed and settled areas that are not formally protected. Has profited from partial deforestation and is almost certainly much more numerous and widespread now than formerly. No near-term risks are associated with this species.

Bibliography. Best *et al.* (1996), Brosset (1964), Burns & Racicot (2009), Burton (1975), Davis (1972), Donegan & Dávalos (1999), Goodfellow (1901), Greeney (1999), Hartman (1955), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), McCarthy (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Moynihan (1962b, 1966), Norgaard-Olesen (1974), Ogilvie-Grant (1912), Piana *et al.* (2006), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Scamell (1970), Sclater & Salvin (1879), Sibley (1958), Stone (1918), Storer (1989a), Strauch (1977), Wetmore *et al.* (1984).


ssp episcopus
ssp nesophila
ssp sayaca
65
ssp cana
66
ssp coelestis
ssp boliviana
PLATE 7
inches 3
cm 8
67
68
69
70
ssp palmarum
ssp violilavata
71
ssp melanoptera
ssp cyanocephala
ssp subcinerea
72
ssp bonariensis
♂
♀
73
ssp darwinii
♂
♀
ssp olivicyanea

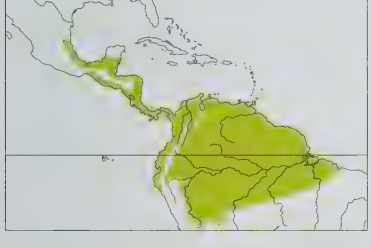
Genus *THRAUPIS* Boie, 1826

65. Blue-grey Tanager

Thraupis episcopus

French: Tangara évêque **German**: Bischofstangare **Spanish**: Tangara Azuleja
Other common names: Blue Tanager (when treated as conspecific with *T. sayaca*)

Taxonomy. *Tanagra Episcopus* Linnaeus, 1766, probably Cayenne, French Guiana.
Formerly known as *T. virens*, but present name (of same date) was formally awarded priority. Recent molecular-genetic data do not support monophyly of genus as currently constituted: six (including present species) of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. This species may form a superspecies with *T. sayaca* and *T. glaucocolpa*; replaced by former S of Amazonia. Sometimes considered conspecific with one or both of those, but believed to differ vocally from *T. sayaca* and differs markedly from *T. glaucocolpa* in plumage, voice and habitat; extent, if any, to which race *boliviana* of *T. sayaca* overlaps with present species, with which it shares some plumage features (e.g. white on shoulder), in N Bolivia requires investigation. Some geographical variation within present species is significant, but several races only slightly different and seem barely worthy of recognition; review of the various races seems warranted. Race *ehrenreichi* long treated as synonymous with *coelestis* but now known to be quite distinct; instead, *mediana* might prove to be a junior synonym of *ehrenreichi*. Fourteen subspecies provisionally recognized.
Subspecies and Distribution.
T. e. cana (Swainson, 1834) – SE Mexico (from extreme SE San Luis Potosí) S through Central America, including Pearl Is (off S Panama), to Colombia W of E Andes, Caribbean coast and N Venezuela (E to Sucre and Monagas).
T. e. caesitia Wetmore, 1959 – I Escudo de Veraguas (Bocas del Toro), off NW Panama.
T. e. cumatilis Wetmore, 1957 – Coiba I, off SW Panama.
T. e. nesophila Riley, 1912 – extreme NE Colombia, S & E Venezuela, and Trinidad.
T. e. berlepschi (de Dalmas, 1900) – Tobago.
T. e. quaesita Bangs & Noble, 1918 – SW Colombia (W Nariño) S on Pacific slope to NW Peru.
T. e. leucoptera (P. L. Sclater, 1886) – E slope of Andes in Colombia (Cundinamarca and Meta).
T. e. mediana J. T. Zimmer, 1944 – E Colombia, extreme S Venezuela (S Amazonas, S Bolívar) and N Brazil (E to R Jamundá, and S of Amazon between R Madeira and Tapajós) S to N Bolivia.
T. e. coelestis (Spix, 1825) – SE Colombia, W Brazil (E to R Negro and R Madeira) and NE Ecuador S to C Peru.
T. e. ehrenreichi Reichenow, 1915 – R Purús (NW Brazil).
T. e. episcopus (Linnaeus, 1766) – the Guianas, and N Brazil E of R Jamundá to NW Maranhão, and S to SE Pará and N Mato Grosso.
T. e. caerulea J. T. Zimmer, 1929 – SE Ecuador and N Peru (S to Huánuco).
T. e. major (Berlepsch & Stolzmann, 1896) – Chanchamayo Valley, in C Peru.
T. e. urubambae J. T. Zimmer, 1944 – Urubamba Valley and Amazonian drainage, in SE Peru.



Descriptive notes. 16 cm; 27–45 g. A pale grey and blue tanager with rather short, stout bill. Nominate race has entire head and underparts pale grey with variable blue to glaucous wash, upperparts slightly darker bluish-grey and contrasting with paler head; central tail feathers dull blue, outer feathers with progressively less blue, outermost pair edged blue; upperwing-coverts dark bluish with paler whitish edges, marginal and lesser coverts white; flight-feathers dusky, edged bright blue to turquoise-blue; iris blackish-brown; bill mostly dusky black, narrow base of upper mandible and all except tip of lower mandible blue-grey; legs horn-grey. Sexes similar. Immature is much duller than adult, often lacks contrast between head and back, and has shoulders and wing-coverts greyish, flight-feathers with dull greenish-aqua edgings. Races differ mainly in relative amounts of blue and grey shading in plumage, also in colour of upperwing-coverts, those in N & W of range having coverts pale blue to dark cobalt-blue, races in W & C Amazonia and upper Orinoco region having shoulders white to bluish-white and often a white wingbar (white tips of greater coverts) and prominent blue edging on tail: *cana* has ultramarine-blue lesser wing-coverts (usually hidden), dusky median coverts broadly edged dull blue, dusky greater coverts edged pale blue, primary coverts dark blue, flight-feathers prominently edged bright blue, outer half of each tertial feather dull blue, female similar but slightly duller, with edging on flight-feathers lighter blue; *caesitia* is like previous but darker, particularly below, where uniform from throat to undertail-coverts except for darker sides; *cumatilis* is slightly smaller than last, like *cana* but sides and flanks darker blue, underwing-coverts (especially outer ones) darker; *quaesita* is very like *cana*, but male has greater wing-coverts, primary coverts, and edging on flight-feathers and tertials bluish-green (not blue), female has wing-covert and primary edgings duller blue; *nesophila* has lesser and median coverts concolorous with rest of folded wing; *berlepschi* is brighter overall, with darker blue on rump and lesser wing-coverts; *coelestis* has head, mantle, back, rump and underparts slightly more bluish-grey than others, uppertail-coverts pale silvery blue, tail dull blue with dusky outermost feathers narrowly to broadly edged blue, lesser and median wing-coverts white, greater coverts dull cerulean-blue with prominent white tips (forming white wingbar), primary coverts dark blue, flight-feathers dusky, edged blue, tertials with outer half of feather dull blue and rounded tip whitish, female similar to male but greater coverts brighter blue and flight-feather edgings paler (brighter) blue; *ehrenreichi* has back richer blue than in previous, with crown and rump similar in tone to back rather than paler, edgings of flight-feathers and tail richer blue, white on wing-coverts slightly greyish, whitish edging less extensive on greater coverts; *leucoptera* has shoulder and lesser and median wing-coverts white, somewhat suffused or mixed greyish-blue, greater coverts with only faint whitish tips (no obvious wingbar), both sexes with flight-feather edgings lighter blue; *mediana* closely resembles previous, including whitish shoulder and lesser and median wing-coverts somewhat mixed with blue-grey but differs in both sexes having the greater wing coverts prominently edged white and with the flight-feathers and tail prominently edged blue (similar to *coelestis* and darker than *leucoptera*); *caerulea* has lesser and median wing-coverts white, greater coverts tipped white, is closest to *coelestis* and *major* and of same size, but purer blue than either; *major* is similar to previous, but paler; *urubambae* is very like last, but top of head paler and duller, and wingbar on average not so clearly white. Voice. Song, by both sexes (apparently briefer and weaker by female), a complex series of squeaky and twittering notes, pattern individually and perhaps geographically variable, but typically mixed with strained "tsuee" and "tsuup" notes; sometimes two birds, or mated partners, sing simultaneously, resulting in a jumble of notes; regional dialects reported, but in all areas song rather similar to that of *T. palmarum*. Commonest calls a rising "seeeee" and a dry, strained "tsuup", sometimes followed by a few twittery or squeaky notes.
Habitat. Broad spectrum of essentially non-forest habitats, including all kinds of settled areas, plantations, city parks, gardens, young to old second growth, forest borders, savannas with scattered trees, waste areas and margins of rivers and lakes in dry to humid regions; everywhere thrives in man-altered habitats and, in addition to using crevices in building as nest-sites, sometimes roosts in crevices or beams in building. Rare or absent from arid regions in Central America, and partly to mostly replaced by *T. glaucocolpa* in arid zones along Caribbean coast of Colombia and Venezuela. In region of overlap, race *caerulea* occurs upslope of race *coelestis*, the two intergrading in the upper Amazonian zone. Sea-level to c. 2700 m, mostly below c. 1800 m; locally to 2000 m in Urubamba Valley of Peru.
Food and Feeding. Mostly fruits and arthropods; also nectar. Eleven stomachs contained only vegetable matter; contents of other stomachs were mistletoe berries (Loranthaceae), termites (Isoptera), spiders (Araneae), and caterpillars. In Trinidad study, fed on 21 species of fruit, especially *Didymopanax morototoni* in Araliaceae (23% of all observations of fruit-eating), *Cecropia* (18%) and *Miconia* (12%). Everywhere found in pairs, and in some areas gathers in small loosely associated groups when not breeding, and may roost in larger groups; also briefly joins mixed-species flocks, and readily visits fruiting trees with other species. Noisy and conspicuous. Foraging behaviour versatile, as it peers head down along branches, scans foliage, sallies clumsily to air, takes variety nectar from flowers. In Trinidad, 82% of observed foraging attempts were at 8 m or higher, only 6% below 3 m; 53% of records were of fruit-eating, 37% of insect-seeking, and 10% at flowers. Took small fruits and berries while perched, but clung to larger fruits and pecked out pieces of fruit. Searches for insects by moving quickly through foliage and reaching up to undersurfaces of leaves, stretching and peering at tops of leaves, or lunging to snap prey. Also inspects undersides of branches and twigs by leaning down diagonally and fluttering or lunging to pursue escaping prey, and may sally short distances upwards to air for flying insects. In Trinidad, 56% of insects were obtained on foliage, 17% on branches and twigs, 11% on flowers and seedheads, and 16% in aerial sallies.
Breeding. Season mostly Feb–Jul in Middle America, Jan–Jul in Panama; more or less all months in N South America from Colombia E to Suriname, and in all months except Sept in Trinidad. Usually monogamous; one reported case of bigamy in Costa Rica. Nest built by both sexes, a thick deep cup of rootlets, moss, grass, ferns, leaves and other fine material, mostly 3–20 m up, but occasionally on or almost on ground or as high as 30 m above it, usually well hidden in leafy branch fork, base of palm frond, crevice in building, even in nest of other species such as thornbird (*Phacellodomus*); often pilfers material from unfinished or even occupied nests of other species, including other tanagers, euphonias and tyrant-flycatchers (Tyrannidae). Clutch 1–3 eggs, usually 2, whitish to greyish-green with brown or darker markings; incubation by female, period 12–14 days; chicks fed by both sexes, nestling period 17–18 days; in Costa Rica, one male and two females attended a nest with 4 eggs, both females incubated (dominant female for 77% of time), and all three adults fed young.
Movements. Resident. Some local movements in response to changing fruit abundance may take place.
Status and Conservation. Not globally threatened. Widespread and abundant. Perhaps the most familiar of all tanagers to rural and urban inhabitants alike, and one of the most familiar birds in settled areas in N Neotropics. In Colombia, expanded its range upwards in early 1980s, onto Sabana de Bogotá at 2600 m, where now numerous. Found in hundreds of parks and protected sites throughout its large range. Utilizes a variety of second-growth and disturbed habitats, in both urban and rural areas, which has permitted it to expand its range and increase its numbers almost throughout its range. Known to cause some damage locally to papaya (*Carica papaya*) and other fruits in gardens.
Bibliography. Allen (1905), Anon. (2000), Beebe (1916), Belcher & Smooker (1937), Binford (1989), Boyd (2001), Brawn *et al.* (1996), Cherrie (1916), Collins (1972), Collins & Araya (1998), Coopmans *et al.* (2004), Davis (1972), Dick *et al.* (1984), Dickey & van Rossem (1938), Donegan & Dávalos (1999), ffrench (1991), Fjeldså & Krabbe (1990), Friedmann & Smith (1950), Garrigues & Dean (2007), Ginés *et al.* (1951), Gómez *et al.* (2000), Hallinan (1924), Hartman (1955), Haverschmidt (1948, 1952, 1954a, 1968), Haverschmidt & Mees (1994), Hilty (1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Ingels (1978, 1983, 1985), Jahn *et al.* (2002), Land (1970), Leck (1975), Lovette & Bermingham (2002), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Miller (1963), Oniki (1972), Parkes (1994), Paynter (1955), Pinto (1944b), Ramo & Busto (1984), Restall *et al.* (2006), Ricklefs (1976), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Russell (1964), Salaman *et al.* (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Skutch (1954, 1969, 1972, 1980b), Slud (1964), Snow, B.K. & Snow (1971), Snow, D.W. & Snow (1964), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Thomas (1982), Todd & Carriker (1922), Tostain *et al.* (1992), Walker (2001), Weske (1972), Wetmore *et al.* (1984), Williams (1922), Willis & Eisenmann (1979), Young (1929), Zimmer (1944).

66. Sayaca Tanager

Thraupis sayaca

French: Tangara sayaca **German**: Sayacatangare **Spanish**: Tangara Sayaca
Other common names: Blue Tanager (when treated as conspecific with *T. episcopus*)

Taxonomy. *Tanagra Sayaca* Linnaeus, 1766, possibly Pernambuco, Brazil.
Recent molecular-genetic data do not support monophyly of genus as currently constituted: six (including present species) of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. This species may form a superspecies with *T. episcopus* and *T. glaucocolpa*; replaces former S of Amazonia. Sometimes considered conspecific with one or both of these; reported vocal differences from *T. episcopus* require confirmation; differs markedly from

On following pages: 67. Glaucous Tanager (*Thraupis glaucocolpa*); 68. Azure-shouldered Tanager (*Thraupis cyanoptera*); 69. Golden-chevroned Tanager (*Thraupis ornata*); 70. Yellow-winged Tanager (*Thraupis abbas*); 71. Palm Tanager (*Thraupis palmarum*); 72. Blue-capped Tanager (*Thraupis cyanocephala*); 73. Blue-and-yellow Tanager (*Thraupis bonariensis*).

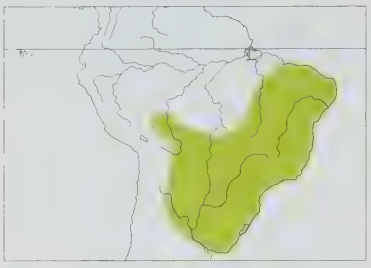
T. glaucocolpa in plumage, voice and habitat. Race *boliviana* could belong with *T. episcopus*, with which it shares some plumage features (e.g. white on shoulder), but in several other ways is closer to present species; extent, if any, to which this race overlaps with *T. episcopus* in N Bolivia requires investigation. Review of taxonomic status of both groups seems to be warranted. Three subspecies recognized.

Subspecies and Distribution.

T. s. boliviana J. Bond & Meyer de Schauensee, 1941 – N Bolivia.

T. s. obscura Naumburg, 1924 – C & S Bolivia S to W Argentina (S to Tucumán, Córdoba and Santa Fe).

T. s. sayaca (Linnaeus, 1766) – E & S Brazil (Mato Grosso E to Maranhão and Ceará, S to Rio Grande do Sul), Paraguay, NE Argentina (S to Buenos Aires) and Uruguay.



Descriptive notes. 16–17 cm; c. 28–34 g. A pale grey and blue tanager with rather short, fairly thick bill. Nominate race has head and upperparts uniformly dull grey, slightly tinged bluish (no contrast between head and back), throat and breast similar or very slightly paler and gradually fading to dull greyish-white on belly and almost white on undertail-coverts; lesser upperwing-coverts blue (often hidden), median coverts dusky, edged and tipped dull greenish-blue, greater coverts dusky, rather narrowly edged and tipped dull greenish-blue; primary coverts dusky, broadly tipped dull greenish-blue, flight-feathers dusky, edged greenish-blue, tertials greenish-blue with dusky to dusky bluish-green inner webs; tail dusky, tinged and faintly edged greenish-blue; iris dark brown; bill dusky grey, basal half paler blue-grey; legs horn-grey. Differs from *T. episcopus* mainly in slightly greyer plumage, with always grey (not white) lesser and median wing-coverts, and fringing on flight-feathers and tail more turquoise. Sexes similar. Immature is duller, darker and dingier than adult, and nearly identical to immature *T. episcopus* (separation even in hand problematic), both having greater wing-coverts tinged greenish-blue, dusky primary coverts, and distinct dull greenish-aqua edgings on flight-feathers. Race *boliviana* has lesser and median wing-coverts whitish, broadly edged blue-grey, and head slightly paler than back (plumage thus towards *T. episcopus*), but with greenish-blue wing edgings; *obscura* is much like nominate, but slightly darker. Voice. Song a high, squeaky and variable series of short, choppy phrases; songs complex, and may vary individually and geographically. Calls include sharp "chup" and higher "tzit". Vocalizations much like those of *T. episcopus*.

Habitat. Wide range of dry to humid and mostly open or semi-open habitats, including light woodland, savanna with scattered trees, second growth, scrubby vegetation, trees along river margins, hedgerows, cultivated areas, parks, gardens and urban areas; less numerous in humid forest borders and upper canopy of forest. In SE Brazil roosts among leafy foliage in both quiet areas and noisy, high-traffic sites with human and vehicular traffic nearby. Lowlands to c. 1000 m, locally higher; to c. 3200 m (recorded to 3600 m) in Bolivian Andes, and common to 3000 m in Argentina.

Food and Feeding. Fruits, seeds, also buds and parts of tender leaves; some arthropods. Recording as eating 36 species of fruit in SE Brazil, and reported as eating fruits of *Allophyllus edulis* in Paraguay; feeds also on many commercially grown fruits, such as oranges, papayas (*Carica papaya*), palm fruits and figs (*Ficus*). Of 20 stomachs examined, twelve contained only vegetable matter and one only animal matter, and seven contained both; contents included fruit pulp, seeds of *Cecropia*, *Ficus* and *Schinus*, and also hymenopterans. Occurs in pairs when breeding, but at other times usually in groups of three or four individuals or up to several dozen, which may roost, loaf or gather together at fruiting trees; joins groups of other birds at fruiting trees, and sometimes found with mixed-species flocks. Forages mostly in upper part of trees, but regularly descends lower to fruiting trees and shrubs. Hops rapidly in foliage, sallies to air for insects, and inspects flowerheads; behaviour much as that of *T. episcopus*.

Breeding. Breeding dates mainly Oct–Dec in SC Brazil (Minas Gerais and Mato Grosso) and Paraguay, more widely scattered elsewhere, e.g. Sept–Jan and Apr in Rio de Janeiro and Sept–Feb in Rio Grande do Sul, and Nov in Bolivia; single-brooded at least in Paraguay. Probably monogamous, as partners roost close together on same branch, female usually arriving first. Nest built by female, apparently accompanied by male, a compact cup woven with grass, flower stems, rootlets and moss, sometimes covered with lichens, and hidden in thick foliage 1·5–9 m up in fork of outer limb of tree, frequently an isolated tree near habitation; in Paraguay nesting site often reused from one year to the next. Clutch 2 eggs, rarely 3, varying from yellowish-white to grey to greenish, heavily or lightly marked with shades of brown; incubation by female, period 12–14 days; chicks fed by both adults, leave nest within 20 days; juveniles may remain with adults for considerable length of time after fledging. Nests sometimes parasitized by Shiny Cowbird (*Molothrus bonariensis*).

Movements. Partially migratory in S Brazil (Rio Grande do Sul) and in Uruguay, Paraguay and most or all of Argentina; large numbers of migrants spend winter months in NE Bolivia (vicinity of Noel Kempff Mercado National Park) and, at least during Jun–Sept, are regularly seen in loose flocks. Undocumented sight records of this species in SE Peru could, if verified, refer to migratory race *obscura*.

Status and Conservation. Not globally threatened. Widespread and common to locally abundant. Occurs in many protected areas and utilizes a wide range of second-growth and disturbed habitats, both urban and rural, which has allowed it to expand and increase in numbers almost throughout its range. Can become a pest in commercial fruit orchards.

Bibliography. Allen (1891), Belton (1985), Chubb (1910), Contreras (1979a), Descourtilz (1852), Eisentraut (1935), Erickson & Mumford (1976), Euler (1867), de Figueirido & Fernando (2003), Fjeldsa & Krabbe (1990), Guix & Ruiz (1998), Hilty (2009b), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Narosky & Di Giacomo (1993), Naumburg (1924), Niethammer (1956), Ogilvie-Grant (1912), Oniki & Willis (2002), Pacheco *et al.* (2007), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Ruschi (1979, 1981), Sazima (2008), Sazima & Sazima (2007), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sedano & Burns (2010), Short (1975), Sick (1993), Smyth (1928), Snethlage & Schreiner (1929), Souza (2002), Voss & Sander (1980, 1981), Wetmore (1926), Willis & Oniki (2002).

67. Glaucous Tanager

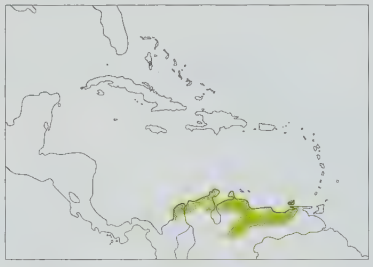
Thraupis glaucocolpa

French: Tangara glauque **German**: Blauflecktangare **Spanish**: Tangara Glauca

Taxonomy. *Th.*[*raupis*] *Glaucocolpa* Cabanis, 1851, Caracas, Venezuela.

Recent molecular-genetic data do not support monophyly of genus as currently constituted: six of eight species sampled (present species not yet analysed) embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. This species may form a superspecies with *T. episcopus* and *T. sayaca*. Sometimes considered conspecific with one or both of those, but differs markedly in plumage, voice and habitat. Monotypic.

Distribution. N Colombia (from N Bolívar and Atlántico) E across arid Caribbean coast of Venezuela (to Sucre, and inland in *llanos* S to Barinas, Apure, Guárico and N Anzoátegui); also Margarita I.



Descriptive notes. 16 cm; c. 31–37 g. Has head and upperparts dull smoky grey with greenish tinge (no contrast between head and back); central tail feathers dull greenish-grey, outer feathers dingy dusky grey, edged dull greenish; lesser upperwing-coverts light greenish-blue (often partly hidden), contrasting with duller median and greater coverts, which are greyish, tinged pale blue; primary coverts dusky, edged pale greenish-blue (looking blackish at distance), forming small but prominent spot contrasting sharply with flight-feathers, which are dusky, with basal half of primaries and all of secondaries strongly edged pale aquamarine; tertials dusky, outer half of each feather dull pale aquamarine (dull pale greenish-blue); throat smoky grey (like crown, but paler), underparts pale grey with strong turquoise-blue tinge, belly and undertail-coverts contrastingly white; underwing-coverts white; iris dark brown; bill dusky grey; legs grey. Sexes similar. Immature is like adult, but duller, underparts tinged buff. Voice. Song distinctive, a pulsating series of remarkably high-pitched notes that swell in volume as song progresses, "e-e-e-ee-ee-eee-eee-see-séé-séé-séé", infrequently heard, although more vocal at beginning of rainy season (May–Jun) in *llanos* of Venezuela. Infrequently heard call a high, thin, almost sweet "sweééeeeee", descending at end, singly at intervals of c. 10 seconds or so.

Habitat. Dry deciduous woodland, dry scrub and thorny vegetation, trees along streams, plantations, and gardens near coast. Local in *llanos*, where found mostly in groves of large trees, especially around ranch buildings. In E Falcón (Venezuela), especially during breeding (May–Jul), occurs much more in taller vegetation and in more humid sites (e.g. along streams) than in low, dry scrub. To 800 m.

Food and Feeding. Fruit and insects. Single individuals or pairs stay mostly well up in trees; also sometimes in small groups of 3–5 individuals. Forages for insects and fruit in canopy and upper levels. Occasionally visits feeding trays for cooked rice, e.g. at Hato Cedral (Apure), in W Venezuela. Overall much like *T. episcopus*, but generally less sociable, less conspicuous.

Breeding. Nest records in Apr–Jul (Anzoátegui) and Aug (Guárico) in Venezuela; three breeding-condition birds Apr–Jul in Colombia (César Valley). May usurp nests of thornbirds (*Phacellodomus*), or steal material from *Coereba flaveola* (and perhaps other species) for nesting. No other information available.

Movements. In E Falcón (Venezuela) numbers increase dramatically during May–Jul/Aug, remaining high perhaps until Oct or Nov. This local migratory movement (probably originating from larger geographical area that includes variety of moist and even humid habitats) concentrates population in desert scrub and acacia (*Acacia*) woodland and dry forest during rainy season. Similar movements may occur in Colombia, with possible seasonal occurrence of birds in humid areas (e.g. Serranía de Quinchas, in W Boyacá).

Status and Conservation. Not globally threatened. Generally uncommon, and found at low density. Less numerous and much less widespread than *T. episcopus*. Occurs in a few protected areas, including Henri Pittier, Morrocoy, Médanos de Coro and Juan Crisóstomo Falcón National Parks (Venezuela) and Santuario de Fauna y Flora los Flamencos (Colombia). Extensive suitable habitat is available to this species also in unprotected areas, including ranchland in W *llanos* region of Venezuela, and these areas should provide a buffer against potential threats, despite the species' relatively small population.

Bibliography. Friedmann & Smith (1950), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950, 1963), Remsen *et al.* (2010), Ridgely & Tudor (1989), Salaman *et al.* (2008), Schäfer & Phelps (1954), Sedano & Burns (2010), Thomas (1979).

68. Azure-shouldered Tanager

Thraupis cyanoptera

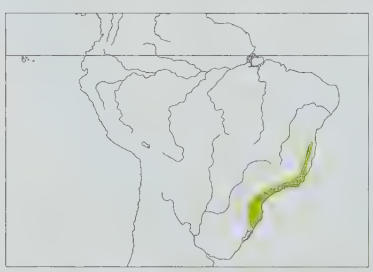
French: Tangara à épaulettes bleues **Spanish**: Tangara Cianóptera

German: Violettschultertangare

Taxonomy. *Saltator cyanopterus* Vieillot, 1817, Rio de Janeiro, Brazil.

Recent molecular-genetic data do not support monophyly of genus as currently constituted: six (including present species) of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. Monotypic.

Distribution. Coastal SE Brazil from SE Bahia, Espírito Santo and E Minas Gerais S, mostly on coastal slopes of Serra do Mar, to N Rio Grande do Sul.



Descriptive notes. 18 cm; 41–46 g. Fairly large, stout-billed tanager with bluish plumage. Has lores dusky, otherwise head and upperparts uniformly grey-blue (more blue than grey), top of crown more bluish, and becoming bright blue on rump, uppertail-coverts and tail; marginal and lesser upperwing-coverts deep shining violet-blue, greater coverts dusky with broad light turquoise-blue edges, primary coverts and flight-feathers dusky, both broadly edged light turquoise-blue; throat and underparts paler grey-blue than above, with contrasting greenish tinge on flanks; iris dark brown; bill blackish above, contrasting blue-grey below; legs dark horn-grey. Sexes similar. Immature is similar to adult, but duller. Voice. Song rather unlike those of congeners, starts with a soft jumble of notes and ends with several clear melodic notes, e.g. "jittle-jittle-jittle, jeeeyr-jurr", given quickly and frequently repeated two or three times; can also be transcribed as a squeaky "look heeere, right heeere, drink-drink-jrrr", complex at first, slower and musical at end. Call a thin, strained "sweee", much like that of others in genus; also various squeaky notes.

Habitat. Humid montane forest, open woodland, second growth and borders; generally much more of a forest-dwelling species than most congeners. Found mostly on seaward slopes of Serra do Mar. Lowlands to 1600 m, mostly below 1200 m.

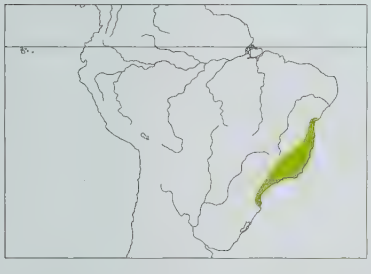
Food and Feeding. Observed to eat fruit of melastomes and palms (*Livistona*). Limited information somewhat conflicting. Foraging and feeding behaviour much like that of *T. sayaca*. Reported as foraging with mixed-species flocks in Espírito Santo, although near Rio de Janeiro was not found with mixed flocks; in Rio Grande do Sul was recorded only during austral winter and seen in single-species flocks of 15–20 individuals. Forages in tall trees; in Espírito Santo, searched moss on large limbs and branches. Seen to be aggressive towards *T. sayaca*.
Breeding. Reported as breeding in Oct in Espírito Santo. Clutch 2 eggs, pale blue, sparingly marked all over with small purplish-black spots. No other information.
Movements. Not well documented. Probably resident; may be migratory in extreme S of range.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Atlantic Forest Lowlands EBA. Uncommon to locally fairly common. Reports of this species at localities W to Paraguay believed to refer to misidentified *T. sayaca*. Occurs mainly inside humid forest and is less able to utilize forest edge and second growth than are most others in the genus, a factor that has contributed to its severe range contraction and fragmentation following deforestation. Believed to be in decline. Found in a number of protected areas, including Itatiaia, Tijuca, Serra dos Órgãos and Serra da Bocaina National Parks, Serra do Mar, Desengaño and Intervales State Parks, and Sooretama Biological Reserve. Possibly occurs in only relatively few areas outside protected sites.
Bibliography. Anon. (2010a), Belton (1985), Butchart & Stattersfield (2004), Davis (1945b, 1946), Diamond & Lovejoy (1985), Hamilton (1871), Holt (1928), Isler & Isler (1999), Ogilvie-Grant (1912), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Stattersfield & Capper (2000).

69. Golden-chevroned Tanager

Thraupis ornata

French: Tangara orné **German**: Schmucktangare **Spanish**: Tangara Adornada
Other common names: Archbishop's Tanager

Taxonomy. *Tanagra ornata* Sparrman, 1789, "in India Orientali"; error = Rio de Janeiro, Brazil.
Recent molecular-genetic data do not support monophyly of genus as currently constituted: six (including present species) of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. Monotypic.
Distribution. Coastal SE Brazil from SE Bahia S, extending inland to E Minas Gerais, to E Santa Catarina.



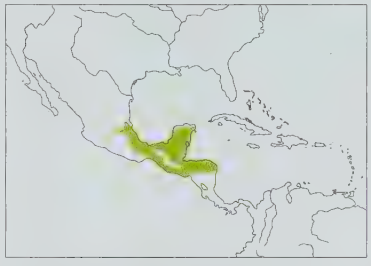
Descriptive notes. 18 cm; one female 33 g. Fairly large tanager with bill thinner than in congeners. Male has loral area dusky, otherwise head, neck and upper breast shining cadet-blue, brightest on crown, paler and tinged grey on throat; upperparts dingy dark blackish-olive, tail dusky with pale greenish-yellow to turquoise-blue fringes; bend of wing and lesser upperwing-coverts bright blue (usually concealed), median coverts bright golden-yellow (forming conspicuous patch), greater coverts dusky, edged and broadly tipped olive-green; primary coverts dusky with bluish outer webs, flight-feathers and tertials blackish, edged pale greenish-yellow to turquoise-blue; centre of breast dull blue to greyish-blue with violet tinge, centre of belly greyish, tinged bluish-green, undertail-coverts whitish with darker, smoky grey centres; iris dark brown; bill black, slightly paler base; legs blackish. Female is similar to male, but duller and greyer above and below. Immature is duller than adult, almost devoid of blue. Voice. Song a series of up to c. 9 squeaky notes mixed with squeezed and slurred notes, much like that of congeners. Reportedly only male sings and songs may differ among individuals. Call a high, rising "seeee" much like that of others of genus.
Habitat. Variety of wooded and semi-open habitats, including forest edge, shrubby clearings, gardens, settled areas and canopy of humid forest. Lowlands to 1750 m; more numerous in mountain regions than in lowlands.
Food and Feeding. Fruit and arthropods. Reported as eating fruits of *Livistona* palms, figs (*Ficus*) and bananas. Occurs in pairs when breeding, otherwise gathers in loosely associated groups up to c. 25 or more individuals; also joins with mixed-species flocks and, especially around fruiting trees, often aggressive towards both conspecifics and other species. Forages in restless active manner, mostly in canopy and treetops, occasionally much lower, even on the ground for fallen fruit. Searches for insects in lichens and moss by hopping along large limbs, and also peers at foliage and twigs. Regularly visits feeders.
Breeding. Recorded in Oct and Nov. Nest cup-shaped, usually 1·5–9 m up in foliage of outer branch of tree or bush, sometimes among epiphytic bromeliads, also seen to carry nesting material into bromeliads at least 15 m up; also reported nesting in old nest of hornero (*Furnarius*); often nests close to dwelling and in vicinity of humans. Clutch 3 eggs, white or reddish-white marked with brownish-black, purplish-grey or deep purplish-brown; female alone believed to incubate. No other information.
Movements. Partially migratory, those in S portion of range moving N and those at higher elevations in mountains of N part of range moving downslope during austral winter. Numbers decrease in mountains of Espírito Santo in winter months.
Status and Conservation. Not globally threatened. Locally fairly common. Found in numerous protected areas in SE Brazil, including Serra da Bocaina, Itatiaia, Tijuca and Serra dos Órgãos National Parks, Serra do Mar and Intervales State Parks, and Sooretama Biological Reserve. Outside parks and reserves, relatively little intact habitat exists within this species' historic range, but it is fairly common locally in numerous protected sites. In addition to mature forest, it utilizes a variety of second growth, edge and settled and urban areas with trees, which should ensure its continued survival.
Bibliography. Davis (1945a, 1946), Descourtilz (1852), Diamond & Lovejoy (1985), Goeldi (1894), Hamilton (1871), Holt (1928), Isler & Isler (1999), Mitchell (1957), Nehrkorn (1899), Ogilvie-Grant (1912), Parker & Goerck (1997), Ridgely & Tudor (1989, 2009), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002).

70. Yellow-winged Tanager

Thraupis abbas

French: Tangara à miroir jaune **German**: Abttangare **Spanish**: Tangara Aliamarilla
Other common names: Abbot's Tanager

Taxonomy. *Tanagra Abbas* W. Deppe, 1830, Jalapa, Veracruz, Mexico.
Recent molecular-genetic data do not support the monophyly of genus as currently constituted, with six of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic; further research required. Monotypic.
Distribution. E & SE Mexico (from c. 15 km NW of Gómez Farías, in S Tamaulipas, and SE San Luis Potosí, and from Oaxaca) S on Caribbean slope to NC Nicaragua and on Pacific slope to S Honduras (possibly also NW Nicaragua); a published sight record from N Costa Rica.



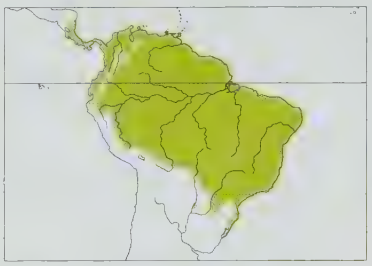
Descriptive notes. 17 cm; 38–55 g. A rather dull-plumaged tanager with yellow wingband and fairly thick bill. Head and neck campanula-blue (lilac-blue), brightest on crown, narrow black line over bill and lores, throat usually slightly greyer and paler, often with some black on chin; mantle, scapulars and back smoky blue-grey, mottled with dusky, rump buffy olive, uppertail-coverts dull blue-grey, tail black; lesser upperwing-coverts campanula-blue, median coverts more olive with pale blue tinge and concealed dusky bases, greater coverts buffy olive; flight-feathers and tertials deep black (folded wings forming distinctive triangular black area across rear half of body), broad, sharply defined straw-yellow band crossing lower mid-section of primaries (conspicuous at rest and in flight); blue of throat fades to blue-tinged grey on chest and upper breast, becoming dull buffy olive to yellowish-olive on sides, flanks, belly and undertail-coverts; iris dark brown; bill blackish; legs dark grey. Sexes similar. Juvenile has head and upperparts olive, mottled dusky on back, and is mostly greyish below. Voice. Song described as a slightly reedy descending trill, often with 1 or 2 introductory notes, "shee iiiiiiiiiiiiiiiiir", or preceded by 1 or 2 rough notes; also as a high, flat, trill 2–4 seconds long, "che-che-che-che-che...", often preceded by a single note. High, thin, strained calls include "sseeu" and "swee", given from perch or in flight, and other squeaky notes.
Habitat. Moderately dry to humid forest borders, clearings with trees, plantations, parks, gardens and other semi-open areas with scattered trees; not inside forest. Lowlands to c. 1800 m.
Food and Feeding. Insects and fruit; fond of figs (*Ficus*). Lives in pairs when breeding, at other times in pairs or groups up to about ten individuals, occasionally up to 50 or even more. Often attracted to fruiting trees, where typically aggressive and quarrelsome towards other birds and may attempt to drive them away. Often perches high on open bare branches, and may fly off considerable distances to forage or rest. Will hop rather slowly along branches in search of insects; pecks pieces from large fruits, and pecks from areas already opened by other birds. Behaviour much like that of *T. episcopus*.
Breeding. Breeding reported during Feb–Jul from Mexico S to El Salvador. Nest built by both sexes, from small twigs, grass, dry leaves and moss, lined with finer material, placed mostly at middle level, c. 3–18 m up, on horizontal branch of tree with dense foliage, or at base of palm fronds; has been observed to take nesting material to tree cavity in Belize; one Apr nest in Guatemala was 4 m up under roof of metal building and c. 25 m from forest. Clutch 2–3 eggs, pale bluish-grey, thickly spotted with reddish-brown; some feeding of young may be by regurgitation. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to common. Range encompasses a number of protected areas, including Palenque, Cañon del Sumidero and Cascadas de Agua Azúl National Parks, and Selva del Ocote, Sian Ka'an and Calakmul Biosphere Reserves (all in Mexico), Tikal National Park (Guatemala), Cockscomb Basin National Park (Belize) and Capiro–Calentura National Park (Honduras); may occur also in one or more parks in Nicaragua. Adapted to a variety of second-growth and disturbed habitats and readily found in many localities outside protected areas. Has benefited from partial deforestation and human settlement and faces no serious near-term threats.
Bibliography. Berrett (1962), Binford (1989), Boyd (2001), Davis (1972), Dickey & van Rossem (1938), Edwards (1972), Edwards & Tashian (1959), Eisenmann (1955), Eisermann & Brooks (2006), Howell & Webb (1995), Isler & Isler (1999), Klaas (1968), Land (1970), Ogilvie-Grant (1912), Rainwater *et al.* (2001), Ridgely & Tudor (1989, 2009), Russell (1964), Sánchez & Campos Ramírez (1988), Sclater & Salvin (1859), Sedano & Burns (2010), Skutch (1954), Smithe (1966), Sutton & Burleigh (1940), Tashian (1953), Wetmore (1941, 1943), Zuñiga & Sandoval (2011).

71. Palm Tanager

Thraupis palmarum

French: Tangara des palmiers **German**: Palmentangare **Spanish**: Tangara Palmera
Other common names: Common Palm Tanager

Taxonomy. *Tanagra palmarum* Wied, 1821, Canavieras, Bahia, Brazil.
Recent molecular-genetic data do not support monophyly of genus as currently constituted: six (including present species) of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic. Four subspecies recognized.
Subspecies and Distribution.
T. p. atripennis Todd, 1922 – E Nicaragua S to Colombia W of Andes (including Santa Marta region) and NW Venezuela (Maracaibo region).
T. p. violilavata (Berlepsch & Taczanowski, 1884) – SW Colombia (from Cerro Munchique, in Cauca) S through W Ecuador almost to Peruvian border.
T. p. melanoptera (P. L. Sclater, 1857) – E Colombia, Venezuela (except Maracaibo region), including Margarita I and Patos I, Trinidad, Tobago, the Guianas, and N & C Brazil (N of R Amazon and, S of it, from R Tocantins, in E Pará) S to E Ecuador, E Peru, N Bolivia and C Mato Grosso.
T. p. palmarum (Wied, 1821) – E Brazil (E from R Tocantins, S to Mato Grosso, W Paraná, and NE Rio Grande do Sul), E Paraguay (one record in Alto Paraná) and N Argentina (sight records in Misiones and E Formosa).
Descriptive notes. 17 cm; 27–48 g. Generally drab-looking tanager with glossed plumage, in poor light sometimes appearing featureless. Male nominate race has head creamy olive, forecrown tinged yellowish, upperparts smoky brown, tail dusky brown with olive tinge; upperwing-coverts paler than back and with slight yellowish tinge; primary coverts mostly blackish, flight-feathers blackish (folded wing forms conspicuous dark triangular area on rear half of body), prominent pale olive-yellow wingband (most visible in flight) extending across outer flight-feathers as narrow pale yellowish edging; underparts shining smoky buff with yellowish tinge; iris dark brown; bill black; legs dusky. Female is similar to male, but may be on average slightly more olive. Immature is much like adult, but duller. Races differ mainly in depth of plumage coloration, nominate palest: *melanoptera* is darkest, mainly dark smoky greyish-olive with brownish to yellow tinge, forecrown to mid-crown



strongly tinged yellow, upperwing-coverts buffy yellow-olive (slightly paler than back), dark smoky olive-grey below, slightly paler on lower underparts; *atripennis* is very similar to previous, but yellowish tinge on head contrasts more strongly with hindneck, body plumage slightly paler, and wing blacker, occasional variant of this race is strongly tinged violet throughout, including entire body plumage and wing-coverts; *violilavata* is olive-grey to blue-grey, often with violaceous tinge on breast, lesser wing-coverts glossed bluish (usually concealed), greater coverts cerulean grey, often with buffy olive tinge, flight-feathers slightly duller and less contrasting. VOICE. Song, often from top of palm spike, a rapid unmusical stream of high squeaky, twittering and clear notes with lispy quality, all given at about same speed; overall much like that of *T. episcopus*, but somewhat less musical, and lacks strained "tsuee" notes characteristic of latter's song. Calls include a lispy "seeee?", a downslurred "seeeyou", and rising "wheerst", also various other thin notes and rattles.

Habitat. Wide variety of habitats. Widespread in shrubby clearings, second growth, gallery forest, forest edges, and canopy of humid forest; in fairly dry to humid regions and, as name suggests, often common where palms numerous. Generally more abundant than *T. episcopus* in regions of extensive humid forest and often less numerous in populated and cultivated areas with scattered trees. Also locally numerous in patches of scrubby woodland and gallery-forest borders. Lowlands to c. 1300 m, locally in Andean valleys to 2600 m.

Food and Feeding. About equal amounts of fruit and insect matter, also flower petals. In Trinidad ate 24 species of fruit, especially *Didymopanax* (29% of all records of fruit-eating), *Miconia* (21%) and *Cecropia* (11%), and fed at flowers (9% of records). Of 13 stomachs examined, twelve contained only vegetable matter and one contained both vegetable and animal matter; contents included fruit, pulp, seeds, and chitin fragments. Contents of other stomachs included mistletoe berries (Loranthaceae) and termites (Isoptera). Rather social, occurring in pairs, also often in small, noisy groups, and occasionally up to a dozen gather in bare treetops and at roost; often with mixed-species foraging flocks, and often with *T. episcopus*. Has been reported as roosting in groups of 10–75, presumably somewhat separated, in a tree. Generally forages fairly high up, e.g. in Colombia and Trinidad 80% of all foraging records were above 7·5 m; about half of observations in both areas were of insect-seeking. Foraging behaviour notably versatile. Readily clings to tips of palm fronds, hangs upside-down beneath frond tips, and gleans and sallies for insects. In all areas commonly hangs on to side or underside of large leaves, under palm fronds, beneath *Cecropia* leaves or catkins, and under banana leaves to search for insects. Behaviour much like that of *T. episcopus*, but less of an urban bird and often forages in treetops in forested regions.

Breeding. Breeding reported in Jan–Jun in Panama, Jul–Sept and Dec in Colombia, Jan in Guyana, Dec–Sept in Suriname, Jul in French Guiana, in all months in Trinidad, and Oct– Dec in Brazil (Pará, Rio de Janeiro and Rio Grande do Sul); sometimes multi-brooded, and in Trinidad pairs known to breed up to four times in a season. Nest built by both sexes, in Costa Rica a neat cup of grass, dry leaf strips, palm fibres and similar, placed 6–30 m above ground in palm, leaf cluster, epiphyte, or cavity or crevice, even in building. Clutch 2 eggs, pale bluish, heavily spotted brown and pale lilac; incubation by female alone, period c. 14 days; chicks fed by both adults, nestling period 17–21 days. Nests sometimes parasitized by Shiny Cowbird (*Molothrus bonariensis*).

Movements. Resident.

Status and Conservation. Not globally threatened. Common and widespread over much of ample range. Utilizes variety of undisturbed humid forest habitats, as well as second growth and disturbed environments. Readily adapts to human-altered environments, often occurring in close proximity to human settlement, although typically less numerous in settled areas than is *T. episcopus*. Has benefited from partial deforestation and activities of humans. In Colombia, not present on Sabana de Bogotá until some time in 1980s, but now locally common there. This species' ability to use disturbed and settled areas should buffer it against future threats.

Bibliography. Álvarez-Rebolledo *et al.* (2003), Anon. (2000), Belcher & Smooker (1937), Belton (1985), Cavalcanti & Pimentel (1988), Chubb (1921a), Collins (2006), Collins & Araya (1998), Davis (1972), Donegan & Dávalos (1999), ffrench (1991), Friedmann & Smith (1950), Garrigues & Dean (2007), Hartman (1955), Haverschmidt (1948), Haverschmidt & Mees (1994), Herklots (1961), Hilty (1997, 2003), Hilty & Brown (1986), Ingels (1978, 1983), Isler & Isler (1999), Jahn *et al.* (2002), Lamm (1948), Layard (1873), Leck (1975), McCarthy (2006), Meyer de Schauensee (1964, 1966, 1970a), Miller (1947, 1963), Mitchell (1957), Narosky & Di Giacomo (1993), Novaes & Pimentel (1973), Parker & Goerck (1997), Pearson (1971), de la Peña & Rumboll (1998), Phelps (1943), Pinto (1944a, 1944b), Ricklefs (1968, 1976), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sedano & Burns (2010), Sick (1993), Slud (1964), Snow, B.K. & Snow (1971), Snow, D.W. & Snow (1964), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Tostain *et al.* (1992), Voss (1977b), Walker (2001), Wetmore *et al.* (1984), Williams (1922), Willis (1980), Willis & Eisenmann (1979), Young (1929), Zimmer (1944).

72. Blue-capped Tanager

Thraupis cyanocephala

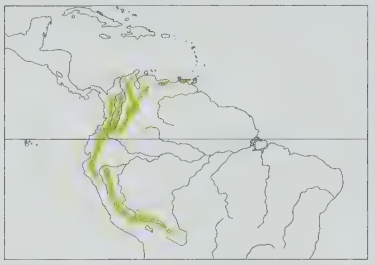
French: Tangara à tête bleue **German**: Gelbschenkeltangare **Spanish**: Tangara Coroniazul
Other common names: Aragua/Blue-bellied Tanager (*olivicyanea*)

Taxonomy. *A.[glaia] cyanocephala* d'Orbigny and Lafresnaye, 1837, Yungas, Bolivia.

Recent molecular-genetic data do not support monophyly of genus as currently constituted: six of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic; present species appears to be most closely related to *Anisognathus*, not *Tangara*. This species exhibits considerable geographical variation, especially in N of range; race *olivicyanea* has in the past been regarded as a separate species, but intergrades with others. Eight subspecies recognized.

Subspecies and Distribution.

T. c. margaritae (Chapman, 1912) – Santa Marta Mts, in N Colombia.
T. c. auricrissa (P. L. Sclater, 1856) – Andes of W Venezuela (Trujillo S to Táchira) and adjacent Colombia (Norte de Santander S to Cundinamarca), also Perijá Mts on Colombia–Venezuela border.
T. c. hypophaea (Todd, 1917) – Andes of NW Venezuela (in Lara).
T. c. olivicyanea (Lafresnaye, 1843) – coastal cordillera of N Venezuela (Aragua E to Miranda).
T. c. subcinerea (P. L. Sclater, 1861) – Sucre (except Paria Peninsula) and N Monagas, in NE Venezuela.
T. c. buesingi (Hellmayr & Seilern, 1913) – extreme NE Venezuela (Paria Peninsula); N Trinidad.
T. c. annectens J. T. Zimmer, 1944 – C & W Andes of Colombia.
T. c. cyanocephala (d'Orbigny & Lafresnaye, 1837) – Andes of Ecuador (both slopes) S through Peru (mainly E slope) to N Bolivia.



Descriptive notes. 16 cm; 27–47 g. Medium-sized blue-headed tanager. Nominate race has crown, nape and side of head shining cornflower-blue, lores black, becoming blackish around eye, forming a rather ill-defined small mask; upperparts, including uppertail-coverts, bright yellowish-olive, tail yellowish-olive, much like back; bend of wing bright yellow, upperwing-coverts uniformly yellowish-olive, flight-feathers dusky, broadly edged yellowish-olive, and from below outer web of most of primaries pale yellow (most of underwing yellow, conspicuous in flight), tertials mainly yellowish-olive; throat and underparts dull bluish-grey, thigh bright yellow, undertail-coverts yellow, underwing-coverts bright yellow; iris dark maroon-brown; upper mandible black, paler base, lower mandible blue-grey with dark tip; legs dark grey. Sexes similar. Immature is duller than adult, with less blue on head, and underparts mostly grey. Races differ mainly in tone of plumage coloration: *annectens* is much like nominate, but throat and breast more strongly tinged blue, merging into bluish-grey on lower underparts, flanks dull yellowish-olive; *auricrissa* is very like previous, but underparts slightly darker and more strongly bluish, centre of belly and undertail-coverts brighter yellow; *margaritae* differs from nominate in smaller size and in having blue-tinged throat and chest sharply separated from grey of lower underparts; *hypophaea* is much like nominate, but underparts strongly tinged blue; *olivicyanea* differs in having entire head, neck and almost all of underparts blue, with thigh and undertail-coverts yellowish to greenish-yellow; *buesingi* differs in having only top of head blue, with side of head dusky, and underparts darker grey with grey-flecked whitish malar stripe; *subcinerea* is similar to nominate, but has pale grey malar line much like that of last race. VOICE. Not especially vocal. Song may vary somewhat geographically. In Venezuela a twittery, unmusical jumble of notes somewhat resembling that of *T. episcopus*, e.g. a strained "tsuee-tsuee-tee-ee-ee-seet"; in Peru described as a series of phrases consisting of sharp, squeaky notes, e.g. "swick-it, swick-it-chéw-y...", or "swickity-chew, swickity-chew...", each phrase repeated up to five times; another song in Peru described as "tsee-tsee-tsee, cha cha cha cha..." (up to 10 "cha" notes), the last part like a coarse rattle. Call high insignificant "tsit" notes.

Habitat. Humid, montane forest borders, adjacent overgrown highland pastures with scattered taller trees, and variety of disturbed, even trashy habitats, including patches of second-growth woodland, tree-lined fence rows, and coffee plantations; in landslide areas often in alder (*Alnus*) trees. In most areas found from c. 1500 m to 3000 m, locally as high as 3300 m in Bolivia, and most numerous above c. 1800 m; as low as 800 m in Venezuela and 550 m in Trinidad.

Food and Feeding. Fruit and insects. Feed heavily on fruit; in Cundinamarca (Colombia) often eats berries of *Oreopanax*, *Miconia* and *Myrica*. Of 21 stomachs examined, 19 contained only vegetable matter and two contained both vegetable and animal matter; contents were berries, fruit pulp, seeds and insects. Pairs or groups of up to eight or more follow mixed-species flocks, especially those containing *Tangara* and other tanagers, along forest borders; also wander alone, and gather briefly with other species at fruiting trees. Mostly keeps fairly high in trees, where active, conspicuous and easy to see; sometimes descends low to fruiting shrubs. Also pecks or gleans insects from foliage, and occasionally sallies short distances to air for flying insects.

Breeding. Nest found in Jun in Trinidad; 23 breeding-condition birds during Apr–Sept in Colombia. Trinidad nest a deep cup built 8 m above ground in branch fork of tree at forest edge. Clutch 2 eggs, pale greenish-blue with sepia or blackish markings; in Colombia eggs reported also as cream-coloured with bold purplish-brown or grey markings, more numerous at large end, and in Bolivia as reddish-grey with red-brown markings. No other information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Common and widespread in disturbed and younger second-growth habitats throughout middle elevations in Andes. Occurs in many protected areas, but also thrives in unprotected areas wherever there is bushy regrowth vegetation. Scarce in canopy and at edges of mature montane forest, but common in partially deforested, degraded and settled areas, where it benefits from human activities.

Bibliography. Anon. (2000), Belcher & Smooker (1937), Clements & Shany (2001), Donegan & Dávalos (1999), ffrench (1991), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (1999), Nehrkorn (1899), Ogilvie-Grant (1912), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Schulenberg (2000b), Schulenberg *et al.* (2007), Taczanowski (1884), Walker (2001), Zimmer (1944).

73. Blue-and-yellow Tanager

Thraupis bonariensis

French: Tangara fourchu **German**: Furchentangare **Spanish**: Tangara Naranjera
Other common names: Darwin's Tanager (*darwinii*)

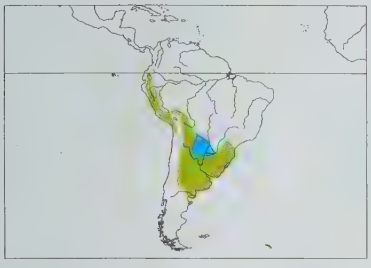
Taxonomy. *Loxia bonariensis* J. F. Gmelin, 1789, Buenos Aires, Argentina.

Recent molecular-genetic data do not support monophyly of genus as currently constituted: six of eight species sampled embedded with *Tangara*, a finding that makes genus *Tangara* paraphyletic; present species appears to be most closely related to *Pipraeidea and Iridosornis*, not *Tangara*. Geographical variation in plumage substantial; *darwinii* dullest race, sometimes considered a separate species, also differing somewhat in song from others; further study needed. Four subspecies recognized.

Subspecies and Distribution.

T. b. darwinii (Bonaparte, 1838) – Andes of Ecuador (from S Carchi, Imbabura and extreme W Napo S, mainly in C highlands, to Loja), and in Peru S on W slope to N Chile (Tarapacá) and on E slope to Bolivia (La Paz).
T. b. composita J. T. Zimmer, 1944 – C Bolivia (Cochabamba and Santa Cruz).
T. b. schulzei Brodkorb, 1938 – SE Bolivia, extreme W Paraguay and NW Argentina (S to Mendoza, La Pampa, and San Antonio Oeste, in N Río Negro).
T. b. bonariensis (J. F. Gmelin, 1789) – SE Brazil (S São Paulo to Rio Grande do Sul), Uruguay and E Argentina (S to Buenos Aires province).

Descriptive notes. 17 cm; 28–46·5 g. A mostly open-country tanager that becomes much brighter in plumage in S portion of range. Male nominate race has head, neck and throat bright cornflower-blue, narrow line over bill, lores, around eye and chin black (forming small, contrasting mask); mantle, back and scapulars blackish, extending to side of chest and forming partial black collar;



rump bright orange-yellow; upperwing-coverts dusky, all except lowest feather of greater coverts broadly edged blue; flight-feathers dusky, edged blue; tail black, heavily edged blue; chest to mid-breast rich deep yellow-orange, becoming bright yellow on lower underparts; eyes reddish-brown; bill blackish above, lower mandible mostly pale grey, frequently with yellowish-horn tinge; legs dark grey. Female is much duller than male, mainly greyish-brown above, greyer on throat and chest, lower underparts dull buff. Juvenile is mainly dull brownish-grey above and paler below, almost devoid of colour, or with hint of blue on wing. Races differ in size, but mainly in plumage of male: *composita* is similar in size to nominate, male with rich orange of breast extending slightly less onto lower underparts, female has more blue on head; *schulzei* is slightly smaller than previous, male has blue of head darker, is less richly coloured below, orange of breast less deep and less extensive; *darwinii* is distinctive, male head and throat dull blue, lores and ocular area black, back and side of chest olive, rump yellow, longest uppertail-coverts dull olive, wing feathers broadly edged and tipped blue, tail edged and tinged blue, central breast and rest of underparts yellow, duller on belly and undertail-coverts, female notably dull, dingy brownish-olive above, rump tinged buff, head somewhat bluish, all wing feathers edged greyish-blue, underparts buffy olive. Voice. Song (in Argentina) a loud, sweet and remarkably musical but rather repetitive "swéét-sur, swéét-sur, swéét-sur, swéét-sur", occasionally preceded by short trill or single note, and each phrase rising and than falling in pitch; unlike those of congeners (which are squeaky). Dawn song similarly rhythmic, but more complex. Apt to sing a few times, then move to another tree and repeat the performance. Songs far-carrying and generally louder, crisper and cleaner in S of range.

Habitat. Wide range of habitats, from humid and wet cloudforest borders and humid second-growth woodland to parks, gardens, orchards, arid semi-open highlands, dry scrubby hillsides, brushy borders of agricultural fields, and settled and cultivated areas in dry to moist regions; occurs in trees near water in arid areas, and in groves of *Celtis* in Argentine pampas. In general most numerous in dry, scrubby semi-open areas in Andes and in semi-open areas with patches of woodland in more humid areas, such as *pampas* in Argentina. Usually not inside humid forest, but does occur in disturbed woodland in humid areas (e.g. Urubamba Valley below Machu Picchu, in Peru). From sea-level to c. 2550 m; race *darwinii* mostly c. 2000–3000 m, locally higher (recorded to 3600 m), but down to 1000 m in dry inter-Andean valleys, and to sea-level on Pacific coast of Peru.

Food and Feeding. Takes both fruit and insects; most often seen in fruiting trees or shrubs, and at cactus fruits, and in settled areas eats a variety of cultivated fruits. Occurs alone, in pairs and, at least during some times of year, in small groups of three or four individuals; often seen at fruiting trees and in flowering trees (e.g. *Inga* in Peru) with other species, but usually not with mixed-species foraging flocks, occurring mainly in semi-open areas where few insectivorous flocks form. Forages at various heights, often rather low, but regularly sits higher, often on exposed perch. Generally conspicuous and familiar wherever it occurs.

Breeding. Breeding dates range from Apr in Peru to Nov–Dec in Bolivia; Mar and Apr in Chile, Dec and Jan in Argentina, and Nov–Jan in Uruguay and Brazil (Rio Grande do Sul); second broods may be attempted. Simple cup-nest in horizontal fork in crown of bush or small tree, often no more than 2 m up. Clutch 2–4 eggs, usually 3 (apparently larger clutches in S latitudes), variable in colour even within same clutch, may be dirty white, pale blue or pale green, thickly marked with dark grey, especially at larger end. No other information.

Movements. S breeders migratory, most moving N out of Argentina during austral winter; possibly migratory also in Uruguay and S Brazil. During non-breeding season, some birds occur farther N, in SE Bolivia, N Argentina and Paraguay.

Status and Conservation. Not globally threatened. Common and widespread over almost all of its extensive range. Has profited from deforestation, settlement and other human activities. In some areas is regarded as a pest, because it frequently damages fruit in orchards.

Bibliography. Alabarce & Lucero (1977), Aplin (1894), Belton (1985), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Chapman (1926), Descourtilz (1852), Di Giacomo (2009), Dinelli (1924), Dunning (1982), Eisentraut (1935), Fjeldså & Krabbe (1990), Friedmann (1927), Isler & Isler (1999), Jaramillo (2003), Johnson & Goodall (1967), Koepcke (1954, 1970), Mason (1985), Narosky & Yzurieta (1987), de la Peña & Rumboll (1998), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Short (1975), Sick (1985, 1993), Taczanowski (1884), Vigil (1973), Walker (2001), Wetmore (1926), Zapata (2000), Zimmer (1930, 1944).



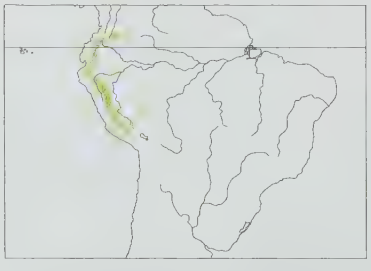
Genus *CALOCHAETES* P. L. Sclater, 1879

74. Vermilion Tanager

Calochaetes coccineus

French: Tangara carmin **German**: Mennigtangare **Spanish**: Tangara Bermellón

Taxonomy. *Euchaetes coccineus* P. L. Sclater, 1858, River Napo, Ecuador.
Monotypic.
Distribution. E slope of Andes from S Colombia (W Caquetá) S to S Peru (Ayacucho and Cordillera Vilcabamba, in N Cuzco).



Descriptive notes. 15 cm; 42–49 g. Chunky, short-tailed and strikingly patterned, with rather short, thick bill. Has loral area, ocular area, throat and uppermost chest black (forming large bib), also median and greater upperwing-coverts, flight-feathers and tail deep black; entire rest of plumage glistening intense red; iris dark brown; bill black, basal half of lower mandible blue-grey; legs dark horn-grey. Sexes alike. Juvenile apparently undescribed. VOICE. Rather quiet overall. Song (or possibly subsong) may be thin "chip" or "sit" notes followed by short soft rolling trills, e.g. "chip, sip, sit-t-t-t-t-t, chip, sit-t-t-t-t-t", etc. Calls include sharp, high "chip" and "zit" notes that often accelerate into twittering trills, e.g. "chip chip zit-t-t-t-t", which may represent a song; also, when foraging, high, sharp "seek!", and "tsee-seek!".
Habitat. Occupies pre-montane and montane wet forest (cloudforest) and wet forest edges. Found at c. 320–600 m in Colombia, but at 1100–1800 m in Ecuador and 900–1800 m (possibly higher) in Peru.
Food and Feeding. Insects, and fruit, especially *Cecropia* catkins and large fruits of melastomes. One stomach contained *Cecropia* seeds. Found mostly in small groups of 3–5 individuals, occasionally up to eight together; regularly with mixed-species flocks, especially those with *Tangara* and other tanagers. Forages well up in trees, by hopping along mossy branches from interior of tree outwards to foliage and peering from side to side, checking bark, moss and leaves; rarely sallies to air. Feeds also on fruit, but not often at trees (e.g. *Miconia*) with small berries; generally does not visit fruiting trees so often as do many other tanagers.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon in Ecuador and Peru. Status in Colombia uncertain, and few records; recorded above Churuyaco, on Nariño–Putumayo border, and probably also in W Caquetá. Range encompasses a number of protected areas, including, among others, Sangay, Llanganates and Podocarpus National Parks (Ecuador), El Condor Bi-national Park (Ecuador and Peru), and Cordillera de Colán, Tingo Maria and Cordillera Azul National Parks (Peru). No parks or reserves within its known distribution in Colombia, and deforestation there is ongoing and extensive. Range in Ecuador and Peru also includes much intact habitat that is not formally protected, but status of portions of this is unknown, and continuing deforestation is severe, at least locally. Overall, this species is not likely to become threatened in the near future so long as parks and reserves within its range are maintained, although populations in Colombia and locally elsewhere are almost certainly at risk.
Bibliography. Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Clements & Shany (2001), Hilty & Brown (1986), Lysinger *et al.* (2005), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Parker & Parker (1982), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010).

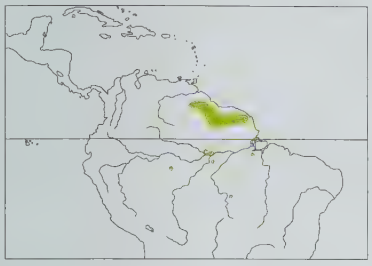
Genus *CYANICTERUS* Bonaparte, 1850

75. Blue-backed Tanager

Cyanicterus cyanicterus

French: Tangara cyanictère **German**: Ziertangare **Spanish**: Tangara Dorsiazul

Taxonomy. *Pyranga cyanicterus* Vieillot, 1819, probably Cayenne, French Guiana.
Monotypic.
Distribution. E Venezuela (R Yuruán; sight records also at San Isidro and foothills of Sierra de Lema) E across C Guyana and Suriname to French Guiana; also several tiny and presumably isolated populations in C Amazonian Brazil (one N of Manaus, the other S of R Amazon).
Descriptive notes. 17 cm; 33–36 g. Distinctive blue and yellow tanager with long, heavy bill with decurved culmen. Male has head, neck, upper breast, and upperparts, including upperwing-coverts



and tail, bright cadet-blue, more violet-blue on throat and chest; lores black; flight-feathers dusky, edged bright cobalt-blue; mid-breast to undertail-coverts golden-yellow, thigh dark blue; iris orange to red; upper mandible black, lower mandible grey; legs yellowish-orange. Female is similar to male, but duller, paler, more cerulean-blue, above with greenish tinge on back, rump and wing-coverts; lores, supercilium, side of head, throat and chest deep buffy yellow, becoming bright yellow on lower underparts. Juvenile apparently undescribed. Voice. Can be quite noisy. In SE Venezuela, both sexes, while perched or in flight, give high-pitched, loud and extremely penetrating calls (possibly song), mostly of 2 or 3 notes, e.g. "peeee, puuu" or "keeee, ksuuu-ksuuu", or various combinations, occasionally up to 5 notes in a series. In Alta Floresta, in Brazil, song, from high, often exposed perch, a slow series of single notes, pairs and triplets delivered in apparent random order, e.g. "pséép-pseep... peeps eep-eep, pee-eep, pséép-ee..." and so on for up to several minutes.

Habitat. Humid lowland forest, tall forest borders, and adjacent tall trees in small clearings close to forest; lowlands to c. 600 m.

Food and Feeding. Stomach contents in Suriname included beetles (Coleoptera) and bugs (Hemiptera, including homopterans). Reported as eating fruit of *Cupania* in French Guiana. Occurs in pairs and in little groups (possibly family parties) of up to about four individuals, high in forest canopy, in emergent trees, and may perch for short periods of time on bare branches protecting above canopy. Often with mixed-species flocks, but has habit of flying straight off to some distant high treetop, all the while calling loudly, and leaving flock behind, only to return again within 10–15 minutes. Forages by hopping in rather deliberate manner along open branches in canopy, where it peers downwards. Foraging territory apparently quite large, as pairs wander widely and their movements appear erratic and difficult to predict.

Breeding. No information.

Movements. Almost certainly resident; pairs or groups found year after year at certain localities in E Venezuela and in C Suriname.

Status and Conservation. Not globally threatened. Rare to uncommon, and possibly local; apparently absent from some seemingly suitable sites. Seems to occur normally at very low density. Confined largely to Guianan forests from extreme E Venezuela E to French Guiana, a region that has not yet suffered extensive deforestation. Because this species stays very high in forest, where difficult to detect except by voice, it could perhaps be somewhat more numerous than low frequency of sightings would suggest. Status of isolated C Brazil populations not known.

Bibliography. Davis (1980), Grantsau (1985), Haverschmidt (1968), Haverschmidt & Mees (1994), Hilty (2003), Ingels (1981), Marantz & Zimmer (2006), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Parkes (1969a), Phelps & Phelps (1950, 1963), Ridgely & Tudor (1989, 2009), da Silva & O'Neill (1986), Snyder (1966), Souza (2002), Tostain *et al.* (1992).

Genus *BANGSIA* T. E. Penard, 1919

76. Blue-and-gold Tanager

Bangsia arcaei

French: Tangara jaune et bleu **German**: Bangstangare **Spanish**: Tangara de Arcé

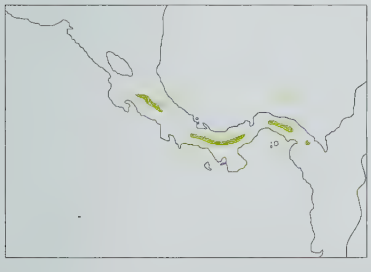
Taxonomy. *Buthraupis arcaei* P. L. Sclater and Salvin, 1869, Cordillera del Chucú, Veraguas, Panama.

In the past, genus sometimes subsumed in *Buthraupis*, but this treatment not supported by recent molecular-genetic studies, which place it in a separate clade, with *Wetmorethraupis* as sister to it; in addition, members of present genus are smaller in size and shorter-tailed than *Buthraupis*, relatively uniform in plumage, behaviourally less social and occur mostly at lower elevations. Recent specimens apparently of this species from Colombia may represent an undescribed form; study required. Two subspecies currently recognized.

Subspecies and Distribution.

B. a. caeruleigularis (Ridgway, 1893) – Caribbean slope of Costa Rica from extreme SE Guanacaste S to Cartago (including slopes of volcanoes Turrialba, Irazú, Barba and Poas).

B. a. arcaei (P. L. Sclater & Salvin, 1869) – W & E Panama (locally in C Bocas del Toro, Chiriquí and both slopes in Veraguas E to Coclé; vicinity of Cerro Jefe, also Cerro Brewster, in W San Blas). Also, race unknown, extreme NW Colombia (E side of Cerro Tacarcuna, in Acandí).



Descriptive notes. 15 cm; two birds 34·6 g and 39·9 g. Colourful tanager with bill strong and heavy for size of bird. Nominate race has crown and side of head cobalt-blue, lores black, upperparts dark navy-blue, tail dark dull navy-blue; lesser and median upperwing-coverts dusky blue, greater coverts dusky, rather broadly edged dark navy-blue; flight-feathers and tertials dusky, edged dull navy-blue; throat and upper chest dark navy-blue, breast, sides, flanks, thigh and lower underparts, including undertail-coverts, bright golden-yellow; iris dark red; bill black; legs blackish. Sexes similar. Immature is similar to adult, but duller; iris brown. Race *caeruleigularis* differs from nominate in having sides, flanks and thigh dark navy-blue (not bright golden-yellow). Voice. Song a halting series of high, thin notes and lispy, tinny whistles, "tip-sére, tip-séere, tip-tséere..."; described also as "ti-sicke, ti-sicke, ti-sicke" and so on. Calls include high, piercing "zeek" or "keep" and squeaky "spit" or "chit"; also a high, thin "tseeee-eeeet", sometimes shortened to "tseeee".

Habitat. Humid and wet foothill forest and pre-montane forest, and shrubs along forest borders; infrequently in trees in clearings adjacent to forest. At 300–1200 m.

Food and Feeding. Mostly arthropods and fruit. Takes variety of small fruits, and seen also to pluck flowers of epiphytes (e.g. *Satyria*) and squeeze out nectar; also observed to take cockroaches (*Blattaria*), an ant queen (Formicidae), and spiders (Araneae). Usually in pairs, although may be encountered singly, and occasionally in loose groups of three or four individuals when not breeding; regularly forages with mixed-species flocks that contain other tanagers, especially *Tangara* and *Chlorospingus*. Alternates periods of sluggishness or inactivity with abrupt buzzy, heavy flights, also rapid hopping along mossy branches and epiphytes, where it searches for food items. May pause to peer and peck at moss tufts or other epiphytes in deliberate manner for some moments before moving on. Sometimes reaches well below perch to take small fruit, a manoeuvre facilitated by its strong tarsi.

Breeding. Two nests recorded, one with young in Jul in Panama and one under construction in Apr in Costa Rica. Covered nest 10–12 m above ground, in hole in moss, one on side of branchless trunk, the other on large limb heavily covered with epiphytes and moss; in Costa Rica, presumed female brought matted rootlets to cavity while male sang. At Panama nest, an adult brought food, twice apparently mashed pulpy red fruit. No other information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA and Darién Highlands EBA. Locally common to rare; declining. Has small range, with four geographically isolated populations, all of which believed to be declining as a result of deforestation, human settlement and degradation of forest habitat. Is, however, regarded as locally common along lower Caribbean slope of Cordillera Central and Cordillera de Tilarán, in Costa Rica, and also in adjacent W Panama. Few, if any, recent reports from Cerro Jefe area E of Canal Zone, but seen and photographed on Cerro Brewster, in W San Blas, in Apr 1985. A recently discovered population on Colombian side of Cerro Tacarcuna may be under greater threat than other populations because of ongoing deforestation in this region.

Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Davis (1972), Garrigues & Dean (2007), Isler & Isler (1999), Monroe *et al.* (1993), Remsen *et al.* (2010), Ridgely & Gwynne (1989), Robbins & Glenn (1988), Ross & Whitney (1995), Sedano & Burns (2010), Slud (1964), Stattersfield & Capper (2000), Stiles & Skutch (1989), Wetmore *et al.* (1984).

77. Black-and-gold Tanager

Bangsia melanochlamys

French: Tangara à cape noire **German**: Blauschultertangare **Spanish**: Tangara Negrigualda

Taxonomy. *Buthraupis melanochlamys* Hellmayr, 1910, La Selva, River Jamaraya, 4800 feet [c. 1460 m], Chocó, Colombia.

In the past, genus sometimes subsumed in *Buthraupis*, but this treatment not supported by recent molecular-genetic studies, which place it in a separate clade, with *Wetmorethraupis* as sister to it; in addition, members of present genus are smaller in size and shorter-tailed than *Buthraupis*, relatively uniform in plumage, behaviourally less social and occur mostly at lower elevations. Monotypic.

Distribution. Colombia: NW end of C Andes in Antioquia, and W slope of W Andes on Cerro Tatamá and Mistrató (including Alto de Pisones), on Chocó–Risaralda–Valle del Cauca border.



Descriptive notes. 15 cm; five males 35–44·5 g, three females 35–36·3 g. Robust, short-tailed tanager with thick, heavy bill and bicoloured appearance. Has entire head, mantle, back and rump dull black, uppertail-coverts contrastingly blue (usually hidden); tail dull black; bend of wing and lesser and median upperwing-coverts shining cerulean-blue (usually hidden), greater coverts black often with blue fringes; primary coverts black, flight-feathers and tertials dull black; throat, chest, sides, flanks and thighs dull black, patch on upper breast bright golden-yellow (in certain light appears as golden-orange stain), rest of breast (broad median area) down to belly and undertail-coverts bright yellow; iris dark red to dark maroon; bill black; legs blackish. Sexes similar. Immature undescribed. Voice. Song a very high-pitched, penetrating and thin "pit-séeya", repeated three or more times in quick succession. Contact call a sharp "tsit!"; when with mixed-species flocks, gives emphatic "pit-pit-pit!" and "spit-spit!"; single birds reported as occasionally giving a "pseee" or "pseeyee", longer than previous calls.

Habitat. Humid and wet pre-montane and montane forest (cloudforest) doubtless its primary habitat. Has been found also in trees adjacent to forest and in some regrowth and disturbed habitats, forest fragments and borders, where it probably ranges occasionally in search of food. Originally recorded at 1000–2285 m; recent records at 1400–1750 m.

Food and Feeding. Feeds heavily on fruit, including *Miconia* and *Cavendishia*; also arthropods. Stomach contents variously 75–100% fruit. Singles and pairs occur alone, also regularly with mixed-species flocks, and forage mostly at middle levels of forest. At least when with mixed flocks, regularly searches in moss and epiphytic growth on limbs for arthropod prey.

Breeding. Nest-building observed in Apr and juvenile seen in Jun. No other information.

Movements. Seasonal differences in relative abundance suggest possibility of post-breeding (e.g. after Jun or Jul) movement to higher elevations; further documentation needed.

Status and Conservation. VULNERABLE. Restricted-range species: present in Colombian Inter-Andean Slopes EBA and Chocó EBA. Fairly common to very locally common. Estimated population within small global range 1000–2499 individuals. Known from small area on N & W slopes of C Andes in Antioquia, where unrecorded from 1948 until rediscovered in 1999, on W side of R Nechí; found also on W slope of W Andes on Chocó–Risaralda–Valle border. Populations almost certainly declining. Both areas have undergone deforestation and human settlement, and continue to do so. In Antioquia, occurs at Reserva La Serrana (where may be locally fairly common) and in Reserva de Arrierito Antioqueño (Chestnut-capped Piha Reserve); a third, nearby population may be included within the proposed Caramanta National Park. In W Andes, the species is regarded as common in Tatamá National Park, but this area has been severely deforested and most forest below c. 1500 m has already disappeared; it occurs in intact forest above 1500 m on Cerro Mistrató (near Cerro Tatamá) and in another large block of intact forest around Alto de Pisones. Threats in these

On following pages: 78. Golden-chested Tanager (*Bangsia rothschildi*); 79. Moss-backed Tanager (*Bangsia edwardsi*); 80. Gold-ringed Tanager (*Bangsia aureocincta*).

areas include deforestation, mining, small-scale agriculture and new and proposed roads, which will only add to colonization pressure on remaining forest; despite the fact that region is inhabited by native Embera Indians, further colonization will lead to escalation of deforestation. Other complications include paramilitary activity, which has prevented survey work.

Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Butchart & Stattersfield (2004), Collar *et al.* (1992), Hilty (1985), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000), Stiles (1998b).

78. Golden-chested Tanager

Bangsia rothschildi

French: Tangara de Rothschild **German**: Rothschildtangare **Spanish**: Tangara de Rothschild

Taxonomy. *Buthraupis rothschildi* Berlepsch, 1897, Cachabí, 500 feet [c. 150 m], Esmeraldas, Ecuador.

In the past, genus sometimes subsumed in *Buthraupis*, but this treatment not supported by recent molecular-genetic studies, which place it in a separate clade, with *Wetmorethraupis* as sister to it; in addition, members of present genus are smaller in size and shorter-tailed than *Buthraupis*, relatively uniform in plumage, behaviourally less social and occur mostly at lower elevations. Monotypic.

Distribution. W Colombia (from C Chocó) S on Pacific slope to Ecuador (N Esmeraldas and SW Imbabura).



Descriptive notes. 15 cm; one male 48·5 g. Chunky, short-tailed tanager with relatively heavy bill. Plumage is almost entirely dark navy-blue; rump and uppertail-coverts slightly bluer, tail dusky, edged dark blue; upperwing-coverts blackish, narrowly edged dark blue, primary coverts blackish, flight-feathers blackish, narrowly edged pale blue; tertials dusky, broadly edged dull dark blue (darker blue than flight-feather edging); below, mostly dark navy-blue to blackish with shiny lustre, large contrasting golden-yellow patch in form of broad crescent across upper breast, plain yellow centre of belly to undertail-coverts; iris dark reddish-brown; bill and legs black. Sexes similar. Immature undescribed. Voice. Song, infrequently heard, a high, buzzy, insect-like "tiz-ez-ez-ez-ez-ez", given up to ten times per minute; one was once observed to sing more or less uninterruptedly for several minutes from exposed perch above canopy. Infrequently heard call a shrill, high-pitched "kjeee".

Habitat. Wet and pluvial foothill forest and pre-montane forest and forest borders. Mostly 250–1100 m; recorded as low as c. 150 m in Ecuador.

Food and Feeding. Fruit, some nectar; also arthropods. Recorded as eating more than ten species of fruit, including those from melastomes, *Cecropia*, figs (*Ficus*) and several epiphytes, including mistletoe (Loranthaceae). Pairs and single birds regularly associated with mixed-species flocks that contain other tanagers and frugivores. Like congeners, alternates bouts of sluggishness with more active periods of heavy hopping and peering along branches and in foliage, where it regularly cocks tail and executes "about-face" movements on open branches; flight from tree to tree heavy and direct, with rather buzzy wingbeats, reminiscent of flight of a barbet (Capitonidae). In W Valle (Colombia), foraged mainly inside outer foliage in middle levels and crowns of medium-sized trees (10·5–17 m tall), occasionally moving lower. Takes most fruit while perched, but occasionally hovers in front of fruits that are difficult to reach. Berries may be swallowed whole or mashed, and seeds and fruit removed from arils and capsules. Observed to forage for insects on both bare and mossy branches and leaf petioles, and sallies short distances to air. Seen to remove petals from flowers and squeeze centres for nectar.

Breeding. One with nesting material on 24th Jun in upper Anchicayá Valley (W Valle), in Colombia. No other information.

Movements. Occasional local or seasonal upslope movements on Pacific slope in Colombia, with birds present as high as 1050 m only in Nov and Mar.

Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Uncommon to locally fairly common. Regarded as "Near-threatened" in Ecuador because of its limited distribution and small amount of remaining suitable habitat. Like many foothill species, is in decline as a result of deforestation, which continues to reduce available habitat throughout its range. Occurs in a few protected areas, among them Farallones de Cali National Park, in Valle del Cauca, and the privately operated El Pangan, in W Nariño, but coca-growing and other illegal activities nearby threaten the integrity of latter reserve.

Bibliography. Collar *et al.* (1992), Dunning (1982), Haffer (1967b), Hartert (1898), Hilty (1977), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010).

79. Moss-backed Tanager

Bangsia edwardsi

French: Tangara d'Edwards **German**: Edwardstangare **Spanish**: Tangara de Edwards

Taxonomy. *Buthraupis edwardsi* Elliot, 1865, Colombia.

In the past, genus sometimes subsumed in *Buthraupis*, but this treatment not supported by recent molecular-genetic studies, which place it in a separate clade, with *Wetmorethraupis* as sister to it; in addition, members of present genus are smaller in size and shorter-tailed than *Buthraupis*, relatively uniform in plumage, behaviourally less social and occur mostly at lower elevations. Monotypic.

Distribution. W slope of W Andes in SW Colombia (from Dagua Valley, in Valle del Cauca) S to NW Ecuador (Esmeraldas and Pichincha).

Descriptive notes. 15 cm; 33·5–39·4 g. Chunky tanager with blue face and thick stubby bill. Has entire crown, lores, ocular area and throat black, supercilium (from above eye) and side of head pale shining blue; upperparts, including uppertail-coverts, uniformly dark moss-green, tail feathers dusky, outer webs dull dark green; lesser and median upperwing-coverts dark green, tinged dark blue, greater coverts dusky, tinged dark blue and very narrowly edged pale blue (inconspicuous); flight-feathers dusky, secondaries inconspicuously edged bluish, tertials dusky, outer half of each feather obscurely tinged dark green; golden-yellow patch on chest flanked by dark olive or even blackish smudging on sides of chest; rest of underparts, including undertail-coverts, dark dull green, rather ill-defined yellow band extending down centre of underparts from chest to belly; iris



dark brown; bill dusky above, pale pinkish-yellow below; legs blackish. Sexes similar. Immature is much like adult, but considerably duller, especially on upperparts, has throat and chest dusky olive, weakly defined yellowish patch on central chest, rest of underparts dull yellowish-olive. Voice. Dawn song, from prominent perch, a chippy, rattling trill, "tr'e'e'é' é'e'e'r tr'e'e'é'é'e'e'r...", rising and falling in pitch, continuing for up to a minute more or less without interruption.

Habitat. Wet and pluvial pre-montane and montane forest (cloudforest) and forest borders; infrequently ventures out into scattered trees in small gaps and clearings adjacent to wet forest. Recorded at 400–2100 m; in Colombia, most records above 900 m in Nariño and above 1200 m in W Valle del Cauca; c. 500–1700 m in Ecuador.

Food and Feeding. Fruit and arthropods. In W Colombia ate mostly fruit, including several species of melastome, epiphytes, and parasitic plants. Encountered most often in pairs; a regular associate of mixed-species flocks containing other tanagers, but also forages away from flocks. Rather lethargic, often alternating active foraging bouts with periods of perching quietly, sometimes on a rather open stub or branch overlooking forest; flies in direct and heavy manner, with rather buzzy flight, from tree to tree. Forages mainly in middle and upper strata of forest. Seen to pick berries from a perched position and to peck soft parts from larger fruits; hopped slowly along branches, where peered at moss and foliage, also took insects off foliage and flutter-pursued escaping prey or sallied short distances to air. Has been observed also to take fruit from Araceae spikes by clinging to sides of the fruit. In W Andes of Colombia, once seen to forage for 12 minutes at a swarm of *Labidus praedator* army ants, where it took fruit and captured insects 0·4–2 m above the ants, mostly by sallying and lunging for prey disturbed by the ants.

Breeding. Nest with eggs found at end Jul in Ecuador; stub-tailed young with adult in Jan in Colombia (upper Anchicayá Valley, in W Valle). Ecuador nest a cup 65 mm in width, 30 mm deep, composed of three species of fern (including *Dryopteris*) and moss, with lining of fine wavy vines, placed 2 m above ground at fork of two small branches and near base of understorey tree (forest height c. 20 m), at 670 m on wet-forest ridge; contained 2 eggs, white, finely speckled reddish-brown at small end, more heavily at large end, dimensions 26·5 × 18·2 mm and 25·5 × 18·8 mm. No other information.

Movements. Possibly some local movement; wandering individuals reported in Mar and Nov at 1050 m elevation in upper Anchicayá Valley, at a site where species not resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Locally fairly common in both Colombia and Ecuador. Although this species is generally found at higher elevation and is more numerous than *B. rothschildi*, it has a similarly small global distribution and faces similar threats, including extensive and ongoing deforestation almost throughout its range. In Colombia, occurs within lower portions of Farallones de Cali National Park, in Valle, El Pangan Reserve, in Nariño, and probably Munchique National Park, in Cauca. May utilize older second growth and forest edge, and probably tolerates, to some extent, some disturbance within its habitat.

Bibliography. Dunning (1982), Haffer (1967b), Hilty (1974, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Moore *et al.* (1999), Orejuela & Cantillo (1990), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Robbins & Glenn (1988), Salaman *et al.* (2008), Sedano & Burns (2010).

80. Gold-ringed Tanager

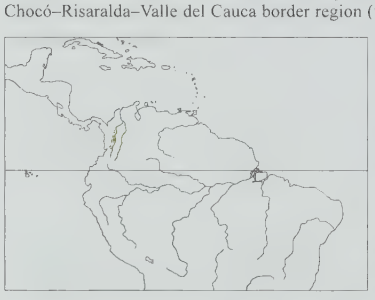
Bangsia aureocincta

French: Tangara à boucles d'or **German**: Goldringtangare **Spanish**: Tangara del Tatamá

Taxonomy. *Buthraupis aureocincta* Hellmayr, 1910, Cerro Tatamá, 6700 feet [c. 2040 m], Chocó, Colombia.

In the past, genus sometimes subsumed in *Buthraupis*, but this treatment not supported by recent molecular-genetic studies, which place it in a separate clade, with *Wetmorethraupis* as sister to it; in addition, members of present genus are smaller in size and shorter-tailed than *Buthraupis*, relatively uniform in plumage, behaviourally less social and occur mostly at lower elevations. Monotypic.

Distribution. W Andes of Colombia: Las Orquideas National Park (W Antioquia), and four sites in Chocó–Risaralda–Valle del Cauca border region (vicinity of Cerro Tatamá).



Descriptive notes. 16 cm; male 39·5–46·6 g, female 44·6–46·5 g. Small and rather dark, with distinctive facial pattern. Male has lores, entire crown and side of head deep black, with conspicuous horseshoe-shaped golden-yellow ring formed by post-ocular supercilium extending rearwards, then down around ear-coverts, and then forwards as broad golden-yellow malar; upperparts, including uppertail-coverts, dark moss-green, tail dusky, tinged dark moss-green; upperwing-coverts dull dark blue, primary coverts blackish, narrowly and obscurely edged dark blue; primaries plain dusky (no edging), secondaries dusky, narrowly edged dull dark blue, tertials dusky, outer half of each feather obscurely tinged dull dark blue (inconspicuous); throat black, black spreading out onto side of chest, large, conspicuous bright golden-yellow patch on chest; entire rest of underparts dark dull green; iris deep reddish-brown; bill dusky above, dull yellowish-orange below; legs blackish. Female has same golden-yellow head markings as male, but head dark moss-green (not black) like rest of upperparts; throat and side of chest dark dusky moss-green (not black). Immature undescribed. Voice. Song a sharp, high-pitched "tseeeeuuur" in groups of c. 3–6 notes. Call a sharp "chit" and "chip"; short low trill in alarm.

Habitat. Occupies wet mossy montane forest (cloudforest), especially along ridges, at elevations of c. 1600–2200 m. Habitat similar to that of *B. melanochlamys*, but present species generally at higher elevations.

Food and Feeding. Few data. Diet fruit and arthropods; stomachs examained contained 70–90% fruit; takes insects when foraging in mixed-species flocks. Found in pairs, sometimes joining mixed-species flocks. Forages more in lower part of forest than does *B. melanochlamys*; behaviour otherwise similar to that of latter.

Breeding. Season Feb–Jul; nests found in Mar and Jul, female feeding fledglings in Jun and stub-tailed juveniles seen in Jul, also male carrying nest material in Dec. Two nests recently found, one completely hidden underneath a bromeliad on horizontal branch 6 m above ground; the other a large domed ball 23·6 cm wide, 16·2 cm deep, and 14·5 cm tall (domed roof comprising 5·8 cm of total height), entrance 8·2 cm wide and 6·8 cm tall, constructed from moss, lined with rootlets, supported by triple fork 2·3 m above ground in thin shrub 2·7 m tall, and supported also by stems of two similar nearby shrubs bent down into the fork. Second nest attended by three adults (two males and one female), indicating possible co-operative breeding. No other information.
Movements. No information. Presumably resident.
Status and Conservation. ENDANGERED. Restricted-range species: present in Chocó EBA. Rare to uncommon; locally common. Estimated global population fewer than 2500 individuals within total range of c. 670 km². Four specimens taken near Cerro Tatamá, on Chocó–Risaralda–Valle del Cauca border, between 1909 and 1946; not found in surveys in 1990s, and possibly now extinct there. Currently known from five sites in W Andes: Alto de los Galápagos (at 1750–2100 m), W of Tuluá, on Valle del Cauca–Chocó border; Cerro Tatamá, on Chocó–Valle del Cauca border; Mistrató, in Risaralda; Alto de Pisones (at 1600–1800 m), on Cerro Caramanta, on Antioquia–Risaralda border, where common to very common; and Las Orquídeas National Park, NW of Medellín, in Antioquia. Deforestation has been widespread throughout this species' presumed former range, and has been particularly severe on Cerro Tatamá, where type locality lies within Tatamá National Park; recently discovered nearby populations are unprotected. Cerro Caramanta may hold the largest block of intact forest (from c. 800 m up to 2000 m) where this species could occur. Mining, logging, small-scale agriculture and human settlement threaten all of these areas, including Tatamá National Park. Effective protection of forest an urgent conservation priority for this and other species in the region.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Calvo *et al.* (2003), Collar *et al.* (1992), Farthing (2001), Freeman & Arango (2010), Hilty (1985), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Renjifo *et al.* (2002), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000), Stiles (1998b), Wege & Long (1995).


81
82
ssp montana
ssp cucullata
ssp saturata
ssp eximia
83
ssp chloronota
84
85
86
ssp lacrymosus
ssp palpebrosus
87
ssp intensus
88
ssp erythrotus
ssp igniventris
ssp pallididorsalis
ssp somptuosus
89
ssp baezae
ssp victorini
90
ssp cyanopterus
91
PLATE 9
inches 3
cm 8

Genus *WETMORETHRAUPIS*

Lowery & O'Neill, 1964

81. Orange-throated Tanager

Wetmorethraupis sterrhopteron

French: Tangara à gorge orangée **Spanish**: Tangara Golinaranja
German: Veilchenschultertangare
Other common names: Wetmore's Tanager

Taxonomy. *Wetmorethraupis sterrhopteron* Lowery and O'Neill, 1964, Chávez Valdivia, Amazonas, Peru.
Molecular studies place present species as sister to *Bangsia*; differs from other genera in family in stiff, bristly throat feathers, although this condition is approached in *Spindalis*. Monotypic.
Distribution. Extreme S Ecuador (SE Zamora-Chinchipe) and adjacent N Peru (NC Amazonas).



Descriptive notes. 17 cm; 43·6–56 g. Strikingly plumaged, thick-billed tanager with relatively long wing, but short tail and tarsus; feathers of malar region, lower chin and throat stiff, almost bristly, and with waxy appearance. Has top and side of head, lores, chin, side of neck and upperparts, including uppertail-coverts, velvety black, tail matt black; bend of wing greyish-blue, marginal coverts, lesser upperwing-coverts and lower half of median coverts deep blue, upper half of medians black, edged and tipped same blue colour, greater coverts blackish, broadly edged and tipped light violet-blue; alula and primary coverts black, narrowly edged blue; primaries black, secondaries and tertials black, edged pale violet-blue; throat and upper chest deep cadmium-orange, feathers of chest with burnished quality, rest of underparts buff-yellow, thigh black; underwing-coverts blackish-slate, a few feathers edged blue; iris dark brown; bill and legs black. Sexes similar. Juvenile apparently undescribed. VOICE. Dawn song, in Peru, a thick, heavy "jasuu, jasuu, jasuu...", up to a half-dozen notes, repeated over and over with scarcely a pause; also (possibly also day song), from high perch, a much higher-pitched, squeaky, slurred series of 3-note phrases, e.g. "we-tsí-tsoo, we-tsí-tsoo", described also as "in-chúé-tooch", first note high (often inaudible at distance), second syllable loudest. Call a soft, penetrating "seet".
Habitat. Mainly mature humid and wet pre-montane forest in relatively gentle foothills, and *terra firme* forest in adjacent lowlands; reported also in disturbed mature forest. Recorded at c. 450–800 m in Peru; 600–1000 m in Ecuador.
Food and Feeding. Fruit and insects. One stomach contained seeds, fruit pulp and a beetle (Coleoptera). Found in pairs and in small groups of up to about six individuals, foraging in middle storey to canopy; sometimes with mixed-species flocks, but more often away from them. Fairly conspicuous. Scans leaves, and searches mosses and small bromeliads as it hops along branches; has been seen while foraging in *Cecropia* trees, and hovering, presumably to take fruit, at tips of branches. Apparently ranges over large areas.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Andean Ridge-top Forests EBA. Notably local; fairly common in suitable habitat at a few sites. First described in 1964 in Peru, and more recently (1990) found in Ecuador. This species was first brought to the attention of scientists by indigenous hunters living in vicinity of type locality. In extreme S Ecuador, recorded above R Nangaritza on W slope of S Cordillera del Cóndor, in SE Zamora-Chinchipe. In adjacent Peru, recorded in NC Amazonas S to Urakusa on lower E slopes and foothills above R Cenepa, and from regions S of R Marañón opposite mouth of R Cenepa; reported by native Aguaruna tribe as occurring also at headwaters of R Nieva (also in Amazonas), a locality some distance SE of the species' known range. In S Ecuador, seen regularly on Shaur indigenous land (near village of Shaime, on R Nangaritza) in Cordillera del Cóndor. Widespread forest destruction has taken place within its very small known global range in S Ecuador and N Peru, and none of the land within its range is protected as yet. The loss of some forest has occurred within the last 20 years (since 1990) within its tiny range in Ecuador, where recent authors regard the species as "Endangered"; it appears that it is in decline in all areas. Further field surveys required in order to determine the species' precise distribution.
Bibliography. Anon. (2010a), Begazo *et al.* (2001), Butchart & Stattersfield (2004), Capper & Pereira (2007), Clements & Shany (2001), Isler & Isler (1999), Lowery & O'Neill (1964), Lysinger *et al.* (2005), Marin *et al.* (1992), O'Neill (1969), van Oosten *et al.* (2007), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Stattersfield & Capper (2000).

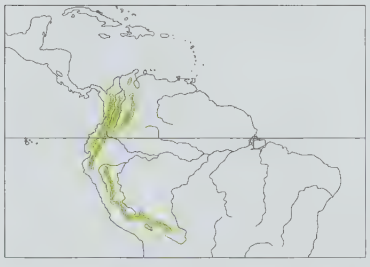
Genus *BUTHRAUPIS* Cabanis, 1851

82. Hooded Mountain-tanager

Buthraupis montana

French: Tangara montagnard **German**: Blaurücken-Bergtangare **Spanish**: Tangara Montana

Taxonomy. *A.[glaia] montana* d'Orbigny and Lafresnaye, 1837, Yungas, Bolivia.
Birds from Venezuela proposed as a separate race, *venezuelana*, but validity of this requires confirmation. Five subspecies currently recognized.
Subspecies and Distribution.
B. m. gigas (Bonaparte, 1851) – Venezuela (Sierra de Perijá, and Andes of S Táchira) and adjacent E Andes of Colombia (S to Cundinamarca).
B. m. cucullata (Jardine & Selby, 1842) – W & C Andes of Colombia S to Ecuador.
B. m. cyanonota Berlepsch & Stolzmann, 1896 – Andes of N & C Peru (Amazonas S to Junín).
B. m. saturata Berlepsch & Stolzmann, 1906 – Andes of SE Peru (Cuzco and Puno).
B. m. montana (d'Orbigny & Lafresnaye, 1837) – Andes of N Bolivia (La Paz, Cochabamba and W Santa Cruz).



Descriptive notes. 21 cm, 69–91 g (nominate); 23 cm, 72–116 g (other races). Largest mountain-tanager; distinctive rotund shape and conspicuous red eyes, short and thick bill. Nominate race has head and throat black, small amount of black extending down onto side of chest and breast (often concealed), hindcrown and nape (nuchal collar) shining pale milky blue, contrasting sharply with dark shining blue back and rest of upperparts; lesser upperwing-coverts blue, median and greater coverts black, edged blue, primary coverts black, flight-feathers blackish, inner primaries and all of secondaries edged blue, tertials black, broadly edged blue; tail feathers black, edged blue; breast and lower underparts golden-yellow, narrow blue-and-black band from flank extending onto thigh (like dark garter); iris bright red; bill blackish above and below, basal half of lower mandible often paler bluish-grey; legs blackish. Sexes similar. Immature is paler and duller, especially below, than adult. Races differ in size, nominate smallest, others lack obvious pale nuchal collar, have base of lower mandible pale blue-grey (not pinkish), and differ slightly in tone of upperparts: *cyanonota* is closest to nominate, but larger; *cucullata* is shining windsor-blue above, paler than nominate; *saturata* is shining violaceous blue above; *gigas* is dull purplish-blue above. VOICE. During flight display, presumed male sings rapid, exuberant "chip'ut-chip'ut-chip-ut..." as he flies out high in large 100-m circle above forest, before diving back into forest. Apparent dawn song a single "weeck!" or "too-weeck" repeated monotonously over and over at rate of about once per second. Also gives repeated "tsee-tsee-tseét?". Group-members, sometimes stimulated by extraneous noises, simultaneously give loud bursts of squealing notes; also, during foraging, "weeck" and "too" notes, or "too-weeck" phrases, often rapidly; also weak "ti" notes singly or in rapid series.
Habitat. Mainly humid and wet montane forest and forest borders; also tall second-growth woodland, scattered trees in clearings adjacent to forest, and stunted or elfin forest and scrub woodland near tree-line. Mostly at 1900–3500 m; 1800–3000 m in Venezuela, and once (possibly a vagrant) as low as 1100 m on Pacific slope of Colombia.
Food and Feeding. Arthropods, also many small berries and fruit. Of 35 stomachs examined, 34 contained only vegetable matter and one contained both animal and vegetable matter; items included fruit pulp, berries, seeds, including grass seeds (Poaceae), leaves and beetles (Coleoptera). Social, often seen in conspicuous groups of 3–10 individuals, occasionally more, that roam over large areas, and sometimes rather confiding. Flocks move along steep forested slopes or canyons, often crossing considerable gaps with each flight, stragglers hurrying along to keep up with faster-moving members. Regularly occurs in loosely associated mixed flocks with Southern Mountain (*Cacicus chrysonotus*) and Northern Mountain Caciques (*Cacicus leucoramphus*) and jays (Corvidae), when forages rapidly, but only infrequently with mixed flocks of smaller species. Away from mixed-flock associations, forages in slower methodical manner on bare or mossy branches c. 25 mm or more in diameter. Forages mainly in middle and upper strata of trees, occasionally lower. Hops up through outer-canopy limbs, leans down to inspect sides of branches, especially to examine lichens on branch surfaces; also noted as taking prey from foliage, and may examine flowers, seedpods and even dead-leaf clusters.
Breeding. No information.
Movements. Resident. A few scattered records, probably of wandering or vagrant birds, at elevations lower than usual.
Status and Conservation. Not globally threatened. Fairly common throughout its wide latitudinal distribution in Andes. Generally occurs at rather low density, perhaps because groups wander over large areas of forest. Deforestation has fragmented this species' range in many areas, but it occurs in many protected areas, from Venezuelan Andes S to Bolivia; among them are Guaramacal and Sierra Nevada National Parks (Venezuela), Chingaza and Puracé National Parks and Tambito Nature Reserve (Colombia), Sangay and Las Cajas National Parks (Ecuador), Tingo Maria and Manu National Parks (Peru) and Isiboro-Sécure and Amboró National Parks (Bolivia). This species is found also in many areas of unprotected montane forest in Andes.
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Aveledo Hostos & Pérez Chinchilla (1989), Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Donegan & Dávalos (1999), Dunning (1982), Fjeldsa & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Jacobs & Walker (1999), Krabbe *et al.* (2001), Remsen & Parker (1984), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Weske (1972), Yuri & Mindell (2002), Zimmer (1944).

83. Black-chested Mountain-tanager

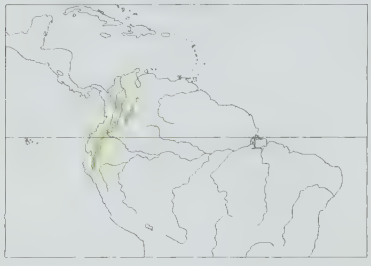
Buthraupis eximia

French: Tangara à poitrine noire **Spanish**: Tangara Dorsiverde
German: Schwarzbrust-Bergtangare
Other common names: Blue-rumped Mountain-tanager

Taxonomy. *Tanagra eximia* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
May form a superspecies with *B. aureodorsalis*. Four subspecies recognized.
Subspecies and Distribution.
B. e. eximia (Boissonneau, 1840) – Andes of SW Venezuela (S Táchira) and adjacent Colombia (Norte de Santander and Cundinamarca).

On following pages: 84. Golden-backed Mountain-tanager (*Buthraupis aureodorsalis*); 85. Masked Mountain-tanager (*Buthraupis wetmorei*); 86. Santa Marta Mountain-tanager (*Anisognathus melanogenys*); 87. Lacrimose Mountain-tanager (*Anisognathus lacrymosus*); 88. Scarlet-bellied Mountain-tanager (*Anisognathus igniventris*); 89. Blue-winged Mountain-tanager (*Anisognathus somptuosus*); 90. Bolivian Mountain-tanager (*Anisognathus flavinucha*); 91. Black-chinned Mountain-tanager (*Anisognathus notabilis*).

B. e. zimmeri R. T. Moore, 1934 – Colombia at N end of W Andes (*páramos* of Frontino and Paramillo) and in C Andes (Caldas–Antioquia border S to Tolima).
B. e. chloronota P. L. Sclater, 1855 – S Colombia on both slopes of Andes (from Huila and Cauca) S to NW Ecuador.
B. e. cyanocalyptra R. T. Moore, 1934 – Andes of S Ecuador S to N Peru (S to E Piura and N Cajamarca, mostly N of R Marañón).



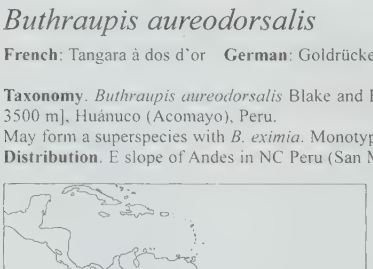
Descriptive notes. 18–22 cm; 50–70 g. Dark-plumaged, quiet tanager with short, thick bill, usually a few stiff bristles on chin. Nominate race has crown and nape silky cornflower-blue, mantle and back moss-green, rump and long uppertail-coverts silky blue (like crown); lesser and median upperwing-coverts blue (often partly concealed), greater coverts leaf-green with dark bases, flight-feathers black, secondaries edged green, tertials mostly dull green with dusky inner webs; tail black; lores, ocular area, and side of head to throat and chest black, rest of underparts golden-yellow, sometimes with sides narrowly dark mossy green (usually hidden); undertail-coverts duller; iris dark reddish-brown; bill black; legs dark grey. Sexes similar. Juvenile apparently undescribed. Race *zimmeri* differs from nominate in having rump mixed blue and dark green; *cyanocalyptra* differs in having rump and uppertail-coverts all dark moss-green, like back, and central throat with small concealed white patch; *chloronota* is larger than others, has duller blue head, black of mask less sharply separated from adjoining blue, rump and tail-coverts all dark green (like previous), lacks bristles on chin. Voice. Dawn song a simple series of alternating notes, the first lower, e.g. "tchew syéeuw, tchew syéeuw, tchew syéeuw"; also a more complex song lasting up to 30 seconds, e.g. "tititi-turri-tititi-tee-ter-turry..."; neither song heard frequently. Variety of soft "seep" notes, "chip" notes and forced "piz-weet" and soft "weeur", etc. during foraging.
Habitat. Wet mossy montane forest, along forest borders and in elfin woodland near tree-line. Recorded at 2000–3800 m, mostly c. 2750–3400 in Colombia and Ecuador, and mainly 2850–3300 m in N Peru. Largely replaces *B. montana* at higher elevations.
Food and Feeding. Mostly fruit; also insects. In Colombia recorded as taking fruit from Ericaceae, *Miconia* (Melastomataceae), and *Hedyosmum* (Chloranthaceae). Seven stomachs all contained vegetable matter, including seeds and fruit pulp. Found singly, in pairs and sometimes in small groups of 3–6 individuals, most often alone, but sometimes with mixed-species flocks. Quiet; moves rather heavily and methodically along mossy branches, mostly within dense foliage of trees and shrubs, and sometimes sits quietly, without moving, for several minutes in crown of small to large tree. In general much less conspicuous than *B. montana*. Searches for insects in moss and other canopy epiphytes.
Breeding. No information.
Movements. Presumed resident; little information.
Status and Conservation. Not globally threatened. Generally uncommon to rare. Uncommon in Venezuela. Rare to uncommon and somewhat local in Ecuador and Colombia, where most numerous at higher elevations; often found in elfin woodland at tree-line. In Peru, race *cyanocalyptra* confined to a narrow corridor of upper montane forest in extreme N, generally N of R Marañón, but two records S of Marañón Valley. Occurs at rather low density, and deforestation has fragmented this species' range in many areas; in Peru, deforestation and human settlement have been expanding since c. 1980. Present in numerous protected areas, among them Chingaza and Puracé National Parks (Colombia) and Cayambe, Sangay, Las Cajas and Podocarpus National Parks (Ecuador).
Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2000), Barnes *et al.* (1997), Botero *et al.* (2005), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe, Flórez *et al.* (2006), Krabbe, Moore *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Moore (1934a), Olivares (1969), Parker *et al.* (1985), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990).

84. Golden-backed Mountain-tanager

Buthraupis aureodorsalis

French: Tangara à dos d'or **German**: Goldrücken-Bergtangare **Spanish**: Tangara Dorsidorada

Taxonomy. *Buthraupis aureodorsalis* Blake and Hocking, 1974, Quilluacocha, c. 11,500 feet [c. 3500 m], Huánuco (Acomayo), Peru.
May form a superspecies with *B. eximia*. Monotypic.
Distribution. E slope of Andes in NC Peru (San Martín, La Libertad and Huánuco).



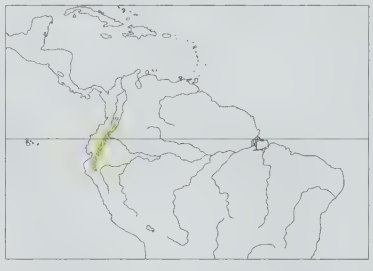
Descriptive notes. 23 cm; 75–94 g. Large, spectacular but hard-to-find tanager; bill short and thick. Has crown dull blue, rest of head down to upper mantle and mid-breast black; rest of mantle, scapulars, rump and uppertail-coverts bright orange-yellow with sparse and rather obscure dusky and brownish markings; lesser upperwing-coverts blue, like crown (but often hidden), median and greater coverts, flight-feathers, tertials and tail deep black; lower breast, belly, sides and flanks bright orange-yellow (like back), belly and sides also with sprinkling of arrow-like bright chestnut spots and streaks (markings decreasing in size rearwards), undertail-coverts and lower belly chestnut, thigh commonly yellow at front but chestnut behind or on inside; axillaries bright yellow, undersurface of wing black, except for small patch of yellow on outer edge of bend of wing; iris dark brown; bill blackish above, paler below; legs dark grey. Sexes similar. Immature is similar to adult, but duller and with little blue on lesser wing-coverts. Voice. Song a series of wheedles, squeals and churrs; typically, repeats one note 4–6 times and then switches to another in rather staccato series given hurriedly and rhythmically. Variety of sharp, metallic and sometimes squeaky notes, including "chit", "wheet" and "heet", singly or repeated, and thin chittering "sweet" or "sweee" notes, all of them surprisingly weak for so relatively large a bird, and frequently given by foraging groups, sometimes for lengthy periods of time; sharp "steet-steet" in flight.
Habitat. Elfin forest at tree-line; especially in large islands and patches of *Escallonia* and *Clusia* woodland surrounded by grass at tree-line, and frequently along ridges enveloped in clouds. Occasionally in scattered low trees and scrub in more open areas near elfin forest. At 3150–3500 m.
Food and Feeding. Fruits and insects. Of seven stomachs examined, five contained only vegetable matter and two contained both vegetable and animal matter; contents included fruit pulp, seeds, and a beetle (Coleoptera) 8 mm long. Usually seen in inconspicuous pairs, less often in small parties of 3–5 (occasionally up to 7) individuals, which forage alone or sometimes join small mixed-species flocks. Regularly flies off some distance in undulating flight to new patch of woodland; typically, first bird calls as it takes flight, is quickly followed by others in rapid succession, and, once they arrive, they rest or forage. Forages from ground to treetops, mostly at middle heights in small trees and shrubs, often c. 3 m up. Moves quietly and slowly, hanging or leaning downwards to peck items from moss and lichens on branches, or occasionally from leaves. Most prey items believed to be taken from moss.
Breeding. Brooding females in Sept, and juveniles and immatures found in Jul, Oct and Nov. No other information.
Movements. Presumed resident; no evidence of any movements.
Status and Conservation. ENDANGERED. Restricted-range species: present in North-east Peruvian Cordilleras EBA. Uncommon to locally fairly common. Estimated global population very small, and declining as a result of loss of habitat, especially of tree-line *Polylepis* and other trees and shrubs of elfin woodland. Currently known from five sites within restricted area of Cordillera Central in Peruvian departments of San Martín, La Libertad and Huánuco; may occur in other, unexplored regions nearby, but to date has not been found farther N (in Cordillera de Colán). Occurs at low density in Río Abiseo National Park (San Martín), where noted only three times in 27 days of field survey; possibly easiest to find in Carpish Ridge region at Quilluacocha and Bosque Unchog, in Huánuco. Continued destruction of tree-line woodlands represents a major threat to this species; spread of fires from adjacent grassland also a cause of serious concern.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Clements & Shany (2001), Fjeldså & Krabbe (1990), Isler & Isler (1999), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990), Stattersfield & Capper (2000).

85. Masked Mountain-tanager

Buthraupis wetmorei

French: Tangara de Wetmore **German**: Wetmorebergtangare **Spanish**: Tangara de Wetmore

Taxonomy. *Tephrophilus wetmorei* R. T. Moore, 1934, south-east end of Culebrillas Valley, Ecuador.
Originally described in a monotypic genus, *Tephrophilus*; molecular-genetic studies indicate that this species is only distantly related to other members of present genus, and that it should probably either be returned to original genus or placed in enlarged genus containing numerous other mountain-tanagers. Monotypic.
Distribution. C Andes of SW Colombia (Quindío, and S on both slopes in Cauca and Huila to Nariño), S through Ecuador (mostly on E slope, from Carchi, W Napo and W Morona-Santiago S to E Loja and S Zamora-Chinchipe) and adjacent NW Peru (along Piura–Cajamarca border).



Descriptive notes. 20 cm; two birds 62 g and 63 g. Large, stubby-billed tanager with rather odd plumage pattern. Male has crown and nape yellowish-olive, becoming plain olive-green on back and contrasting yellow on rump; side of head down to foreneck black, forming rather broad, "drooping", roundish mask, forehead and narrow band more or less surrounding mask yellow (much brighter than crown); lesser and median upperwing-coverts dark violet-blue (often hidden), greater coverts black, edged and more broadly tipped dark violet-blue; flight-feathers black, outer feathers narrowly edged dark green, secondaries and tertials more broadly edged and tinged dark green; tail blackish; underparts bright mustard-yellow, usually forming a peak over central foreneck or even to lower throat, sides, flanks and sometimes belly mixed and stained with dusky and olive; iris dark brown; bill blackish, loewr mandible often grey except for blackish tip; legs dark grey. Female is similar to male, but slightly duller. Juvenile apparently undescribed. Voice. Notably quiet. Infrequently heard song a rather long series of high-pitched "tsee" notes, variable in intensity, and remarkably weak for such a large bird; reminiscent of a hummingbird (Trochilidae). Rather low, husky "juur-juur-juur-jur", possibly as alarm or contact, on taking flight.
Habitat. Low mossy forest and very humid elfin woodland, bamboo, and giant grasses at or near tree-line, and in islands of mossy scrub woodland surrounded by grass; at 2900–3650 m.
Food and Feeding. Fruit and apparently some insects. Contents of one stomach a large number of seeds. Found singly, in pairs and in little groups up to four individuals, usually seen when accompanying mixed-species flocks containing other tanagers, *Buarremon* brush-finches etc. Tends to forage mostly within cover, and apt to be seen first as it perches up to fly across small opening. Hops sluggishly as it searches for fruit and other items; once seen to sally clumsily after a flying insect.
Breeding. No information.
Movements. No information.
Status and Conservation. VULNERABLE. Restricted-range species: present in Central Andean Páramo EBA. Generally rare to uncommon; localized. Estimated global population not exceeding 5000 individuals, and probably declining. In Colombia, found at S end of C Andes on both slopes in Cauca and Huila, and recently reported farther N in department of Quindío, also recent sight records in Nariño at Volcán Galeras (SW of Pasto, at 3450 m); present in Puracé National Park and its environs, in Cauca. In Ecuador, found locally near tree-line, mostly on E slope, in Carchi, W Napo, W Morona-Santiago, Azuay, E Loja and S Zamora-Chinchipe; fairly common in Cajanuma sector of Podocarpus National Park, in Loja. In adjacent part of N Peru, recorded from Cerro Chionguela, in E Piura, S along Piura–Cajamarca border. The scatter of records suggests that this species' distribution is local, although much of the habitat within its range either is not readily accessible to investigators or, where it is accessible, has been subject to extensive deforestation from firewood-cutting, potato cultivation and human settlement. In recent years, it has been found at a number of additional sites in Ecuador but, as yet, at only few sites in Colombia. In both of those countries one of main threats is continued burning of *páramo* grasslands, which ultimately damages and reduces tree-line and ecotone shrubbery favoured by this tanager; in severely damaged areas tree-line has been burnt back and lowered by several hundred metres in elevation. Habitat loss in its SW Colombian range particularly severe, with estimates of no more than 10% of original tree-line habitat remaining; upper montane forest being replaced by exotic pine (*Pinus*) plantations near recently discovered site in Nariño. In addition to Podocarpus National Park, which possibly holds a major proportion of the total population, and Puracé National Park, which is regularly burnt, this species has been recorded in at least five other protected areas, most in Ecuador.

Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Arbeláez-Cortés & Baena-Tovar (2006), Butchart & Stattersfield (2004), Clements & Shany (2001), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty (1985), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Moore (1934b), Parker *et al.* (1985), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Stattersfield & Capper (2000), Strewe & Kreft (1999).

Genus *ANISOGNATHUS* Reichenbach, 1850

86. Santa Marta Mountain-tanager

Anisognathus melanogenys

French: Tangara des Santa Marta **Spanish**: Tangara de Santa Marta
German: Schwarzwangen-Bergtangare
Other common names: Black-cheeked Mountain-tanager

Taxonomy. *Poecilothraupis melanogenys* Salvin and Godman, 1880, near San Sebastian, 8000 feet [c. 2440 m], Santa Marta Mountains, Colombia.
Formerly placed with *A. lacrymosus* and *A. igniventris* in a separate genus, *Poecilothraupis*. May form a superspecies with *A. lacrymosus*, and in the past treated as conspecific. Monotypic.
Distribution. Santa Marta Mts, in N Colombia.



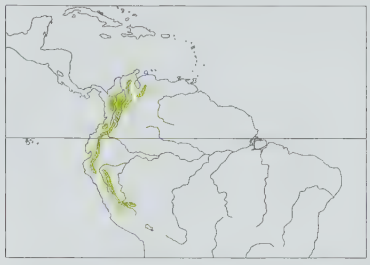
Descriptive notes. 18 cm; 41 g (1 male). Strong-billed tanager with mainly blue-and-yellow plumage. Has crown and nape shining blue, lores, side of head and neck black (not sharply set off from adjacent grey-blue on side of neck), small yellow spot immediately below eye; upperparts dull dark grey-blue, tail dusky, tinged and edged dark blue; lesser and median upperwing-coverts dull dusky blue, greater coverts dusky, obscurely edged and tipped greenish-blue, flight-feathers and tertials dusky, obscurely edged greenish-blue; throat and entire underparts to undertail-coverts golden-yellow, usually with small amount of black mottling visible on sides and flanks; thigh black; iris dark reddish-brown; bill and legs blackish. Differs from similar *A. lacrymosus* in having crown blue and underparts bright yellow. Sexes similar. Juvenile apparently undescribed. Voice. Calls very high-pitched, thin "tic" and "ti" and "ee" notes, sometimes accelerating into trills or rapid bursts of notes.
Habitat. Mossy wet-forest borders, second-growth woodland, and regenerating second growth in pastures; less numerous inside wet montane forest. Found over wider range of habitats than is *A. lacrymosus*. At 1500–3200 m, seasonally as low as 1200 m.
Food and Feeding. Known to take a variety of small fruits, and probably also some insects; no other details of diet available. Occurs in pairs and in varyingly sized groups of up to about six individuals, often at fruiting trees and shrubs; often joins mixed-species flocks. Forages from eye level up to canopy, but most foraging in subcanopy or below. Generally conspicuous; runs and hops along mossy branches and into foliage.
Breeding. Ten breeding-condition birds in Jan–Jun and Sept; one individual seen while building open cup-nest 14 m up in tree. No other information.
Movements. Part of population may shift to lower elevation during peak of rainy season, from Jun through Sept.
Status and Conservation. Not globally threatened. Restricted-range species: present in Santa Marta Mountains EBA. Common within its very small global range. Entire population of this species is limited to montane regions in Santa Marta Mts of N Colombia. Deforestation widespread in much of its range, even within Sierra Nevada de Santa Marta National Park, where it occurs. Readily utilizes various types of second growth and edge habitat, however, and is therefore buffered to some extent from forest losses. Numbers may have declined because of deforestation and human settlement, but at present this species unlikely to face serious risk.
Bibliography. Donegan & Avendaño (2010), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty & Brown (1986), Isler & Isler (1999), Krabbe (2008), Meyer de Schauensee (1964, 1966, 1970a), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Sibley & Monroe (1990), Strewe & Navarro (2004), Todd & Carriker (1922).

87. Lacrimose Mountain-tanager

Anisognathus lacrymosus

French: Tangara larmoyant **German**: Tränenbergtangare **Spanish**: Tangara Lacrimosa

Taxonomy. *Tachyphonus lacrymosus* du Bus de Gisignies, 1846, Maraynioc, Peru.
Formerly placed with *A. melanogenys* and *A. igniventris* in a separate genus, *Poecilothraupis*. May form a superspecies with *A. melanogenys*, and in the past treated as conspecific. Nine subspecies recognized.
Subspecies and Distribution.
A. l. pallididorsalis Phelps, Sr & Phelps, Jr, 1952 – Perijá Mts on N Colombia–W Venezuela border.
A. l. melanops (Berlepsch, 1893) – Andes of W Venezuela (in Trujillo, Mérida and N Táchira).
A. l. tamae (Phelps, Sr & Gilliard, 1941) – Andes of W Venezuela (S Táchira) and adjacent E Andes of Colombia (Norte de Santander and Boyacá).
A. l. olivaceiceps (Berlepsch, 1912) – Colombia at N end of W Andes (Antioquia) and in C Andes (S to Quindío and Tolima).
A. l. yariguierum Donegan & Avendaño, 2010 – Colombia on W slope of E Andes in Santander (Serranía de Yaraguíes).
A. l. intensus Meyer de Schauensee, 1951 – SW Colombia on E slope of W Andes (Valle and Cauca).
A. l. palpebrosus (Lafresnaye, 1847) – S Colombia (on both slopes in S Cauca and Nariño) and E slope of Ecuador (S to at least Morona-Santiago).
A. l. caerulescens (Taczanowski & Berlepsch, 1885) – E slope of Andes in Ecuador (from Loja, or possibly farther N) and N Peru (S to Cajamarca and N Amazonas).
A. l. lacrymosus (du Bus de Gisignies, 1846) – E slope in Peru from Amazonas (S of R Marañón) S to Junín, Ayacucho and N Cuzco).



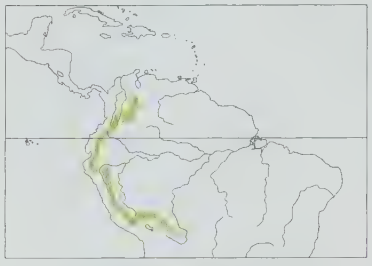
Descriptive notes. 16–17 cm; 25–38 g. Fairly distinctive tanager with rather short and thick bill. Nominate race has crown and upperparts slaty blue, rump slightly more bluish, tail dusky, obscurely edged blue; side of head down to throat and neck dusky, small but prominent pale yellow spot beneath eye (like teardrop); bend of wing and lesser upperwing-coverts shining cornflower-blue (usually concealed), median and greater coverts dusky, edged blue, flight-feathers dusky, narrowly and obscurely edged greenish-blue, tertials dusky, obscurely edged blue; throat and underparts to undertail-coverts ochre-yellow, thigh olive-yellow, sides of chest and upper breast sometimes with some dusky mottling; iris dark brown; bill blackish; legs slate-grey to black. Sexes similar. Juvenile is duller and paler above and duller yellow below than adult, has olive wash on sides. Races differ mainly in colour or tone of upperparts and underparts, also in head pattern, nominate lacking postauricular spot: *intensus* is darker above than nominate, deeper ochre below, has both small yellow spot beneath eye and larger yellow spot on rear ear-coverts; *palpebrosus* is very similar to previous, differs in having flight-feathers edged with bluish (not bluish-green), side of head paler, more greenish-slate, and underparts bright warm yellow; *caerulescens* is intermediate between preceding two, and sometimes lacks yellow spot below eye; *olivaceiceps* differs from *intensus* in slightly paler upperparts, and in distinct olive tinge on side of head, side of neck and side of chest; *pallididorsalis* is distinctive, has forecrown and side of head smoky yellow-olive, crown to back dull bluish-grey (paler than other races), greater wing-coverts slightly paler blue, flight-feathers and tertials narrowly edged paler blue, underparts ochre-yellow, olive mottling on sides and flanks, often lacks yellow spot below eye; *tamae* is like last, but with darker back, olive mottling continuing down sides and flanks, and normally has yellow spot below eye; recently described *yariguierum* differs from preceding two in having darker and bluer crown, darker mantle, darker blue rump and shoulder, and darker face with less strong yellowish tones, also darker tail with less extensive blue; *melanops* is bluer above and golden-yellow to tawny-yellow below, yellower on belly. Voice. Dawn song in Peru, from exposed perch in top of shrub or small tree, 2–6 phrases composed of high, sharp squeaky notes, e.g. "chuck-zit zit, swick-ee-dee-it-it", or "swickee-deee-deee", and so on, frequently the same phrase repeated one to several times; resembles song of *Thraupis cyanocephala*. Possible short song in S Colombia described as an excited "ee-chut-chut-ee", over and over. High thin "see" or "seeek" notes during foraging; also short bursts of staccato chipping (2–8 notes) over and over.
Habitat. Humid and wet montane forest, shrubby forest borders and, at high elevations, stunted mossy forest up to tree-line and locally in patches of woodland and *Polylepis* above tree-line. At c. 2100–3300 m in most areas, 1800–3500 m in Peru, and as high as 3800 m in Colombia; also recorded down to 1800 m in Venezuela.
Food and Feeding. Mostly fruit and insects. Noted as eating berries from melastomes and from *Schefflera* in Peru. Of 17 stomachs examined, 15 contained only vegetable matter and one only animal matter, and one contained both; contents were fruit pulp, seeds and insects. A conspicuous tanager, often notably confiding; regularly pauses to rest quietly in open or semi-open on low or high branch, sometimes remaining there for several minutes. Pairs or small groups habitually associate with fast-moving mixed flocks containing tyrant-flycatchers (Tyrannidae), emberizid finches and other tanagers; also forage away from them, peering around in leisurely manner. Often forages in large bushes and small trees, and also ascends into subcanopy; ranges over large area. Hops rather heavily in foliage, leaning forward to take fruits, and may glean some insects from leaves, petioles, lichen and bark; occasionally sallies awkwardly for flying insects.
Breeding. In Colombia, one nest found in May and begging juvenile in Jul in Cauca (Puracé National Park), and twelve birds in breeding condition in Feb–Aug in Andes. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common to common; widely distributed in Andes from Venezuela S to S Peru. While deforestation in montane regions has fragmented and reduced the amount of habitat available to it, this species appears not to be faced with any immediate threats. In addition, it is found in many protected areas, including Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), Los Nevados, Nevado del Huila, Puracé, Paramillo, Las Orquídeas and Farallones de Cali National Parks and Tambito Nature Reserve (Colombia), Cayambe-Coca, Antisana, Podocarpus and Sumaco-Galeras National Parks (Ecuador), and Tingo Maria National Park and Cordillera de Colán Reserve (Peru).
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Donegan & Avendaño (2010), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990), Taczanowski (1884), Walker (2001), Weske (1972), Zimmer (1944).

88. Scarlet-bellied Mountain-tanager

Anisognathus igniventris

French: Tangara à ventre rouge **Spanish**: Tangara Ventriescarlata
German: Mennigohr-Bergtangare
Other common names: Black-bellied Mountain-tanager (*lunulatus*)

Taxonomy. *A.[glaia] igniventris* d'Orbigny and Lafresnaye, 1837, Apolobamba, Bolivia.
Formerly placed with *A. melanogenys* and *A. lacrymosus* in a separate genus, *Poecilothraupis*. Four subspecies recognized.
Subspecies and Distribution.
A. i. lunulatus (du Bus de Gisignies, 1839) – Andes of W Venezuela (S Táchira) and adjacent Colombia (Norte de Santander S in E Andes to Cundinamarca).
A. i. erythrotus (Jardine & Selby, 1840) – C Andes of Colombia (Caldas, Cauca, Huila, and both slopes in Nariño) S through Ecuador to N Peru (N of R Marañón, S to R Chamaya).
A. i. ignicrissa (Cabanis, 1873) – E slope of Andes of Peru S of R Marañón (C Cajamarca S of R Chamaya, and from Amazonas S to Junín).
A. i. igniventris (d'Orbigny & Lafresnaye, 1837) – E slope of Peru (from Junín) S to Bolivia (Santa Cruz).
Descriptive notes. 16 cm; 21·5–41 g. Boldly marked tanager with unmistakable colour pattern; bill short and thick. Nominate race has head, throat, chest and upperparts slaty black, mantle and upper



back slightly glossed blue-black, lower back and rump shining blue (conspicuous in flight); tail slaty black; orange-red triangular patch just behind rear ear-coverts; bend of wing and lesser and median upperwing-coverts shining cornflower-blue, rest of wing blackish; breast, sides and upper belly orange-red, band stretching from upper rear flanks down to thighs and vent black, with variable bluish sheen; iris dark brown; bill and legs black. Sexes similar. Juvenile has black of plumage duller and red replaced by dull brownish-orange to dull orange-rufous; older stages have the orange-rufous stained with red. Races differ mainly in coloration or tone of plumage: *erythrotus* differs from nominate in having head to back and down to chest deep black (not slaty), triangular neck patch, breast, sides and upper belly bright red (not orange-red), vent area and undertail-coverts solid black; *lunulatus* differs little from previous, although on average slightly more orange-red, and vent area mixed red and black; *ignicrissa* is intermediate in colour of red areas, with auricular spot, breast, sides and upper belly brighter than nominate but duller than *erythrotus*, and lower underparts mixed red and black. Voice. Sings more than congeners. Song geographically variable; in Venezuela and Colombia frequently at dawn, or at long intervals during the day, a tinkling (like little bells) jumble of rapid, complex, rising and falling notes mixed with lower-pitched nasal notes, somewhat comparable to sound made by cranking of an old engine. Songs of S two races (*ignicrissa* and nominate) differ from those of N birds but also are variable; typically include numerous squeaky, nasal and mechanical-sounding warbles, with many repeated phrases. Sings mostly from exposed perches at dawn, more from concealment during day.

Habitat. Occurs both inside and along borders of montane forest and elfin woodland, also in thick hedgerows, shrubby hillsides, second growth and disturbed or agricultural areas and remnant patches of woodland up to edge of *páramo* and *puna*; occasionally in parks and gardens and green belts in settled areas. All races utilize wide range of habitats, but S ones seem more closely associated with forest, those in N of range more often at forest borders or in semi-open areas, woodlots, and lines of trees and shrubs along fencerows. Mostly at 2600–3500 m; rarely down to 2250 m and up to as high as 3900 m.

Food and Feeding. Eats mostly fruit, also petals or centres from flowers, and nectar; also insects. Of 44 stomachs examined, 41 contained only vegetable matter, one held only animal matter and two contained both; contents were fruit pulp, seeds, leaves, buds, and insects. Occurs in pairs or in loosely associated groups of up to about eight, occasionally more, which forage alone or join mixed flocks of other tanagers and finches in forest or along forest borders. Often seen as it moves in somewhat undulating and usually low flight across openings between hedgerows or forest patches, but once in forest can be difficult to see. Forages from low to high levels, e.g. average foraging height in Bolivia was c. 6 m (mostly in upper third of trees); may sit relatively immobile near top of or in inner part of a tree for a moment, and then hop through foliage. Fruit generally taken by reaching outwards or downwards, without acrobatics. Gulps or mashes fruit; may mash flowers for nectar. In Bolivia, observed obtaining insects by reaching under, hanging down, or sallying 2 m out to air.

Breeding. Fledglings in Feb, Apr and Jun in Colombia, Jan and Jun–Sept in Ecuador, Dec in Peru and Mar in Bolivia; in Colombia, one bird in breeding condition in Nov, three in late Dec, six in Feb and two in Jul. Strongly territorial in Peru. Nest found in trees and thickets in Colombia. Eggs presumed of this species were pale greenish-white with small reddish-brown and violet-grey spots, especially at large end. No other information.

Movements. No local or seasonal movements verified, but wanders widely and regularly appears in parks and other green areas in cities (e.g. on Sabana de Bogotá, in Colombia) if these close to forest. Individuals seen well above or below normal altitudinal range may be wanderers or represent elevational movements.

Status and Conservation. Not globally threatened. Uncommon to locally common. Despite extensive deforestation within parts of its range, this species is able to utilize a broad spectrum of natural and disturbed or man-altered habitats, preventing it from suffering severe impacts from loss of primary forest. Occurs also in numerous parks and other protected areas, as well as unprotected ones, and thrives locally in many heavily intervened areas so long as some woodlots, patches of forest and shrubby fencerows remain. Occurs in Tamá National Park (Venezuela), Sierra Nevada del Cocuy, Chingaza and Puracé National Parks and many others (Colombia), Cayambe-Coca, Sangay and Podocarpus National Parks (Ecuador), Cordillera Azul, Tingo Maria and Manu National Parks (Peru), and Isiboro Sécure and Amboró National Parks (Bolivia).

Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (2000), Barat (1980), David & Gosselin (2002a), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Moynihan (1979), Ogilvie-Grant (1912), Olivares (1969), Peters & Griswold (1943), Remsen *et al.* (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Zimmer (1944).

89. **Blue-winged Mountain-tanager**

Anisognathus somptuosus

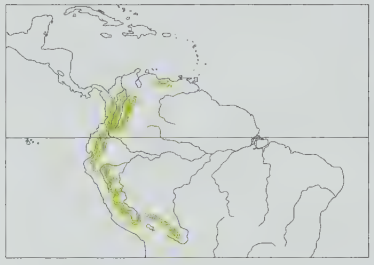
French: Tangara somptueux **German**: Blauflügel-Bergtangare **Spanish**: Tangara Aliazul
Other common names: Blue-shouldered/Blue-rumped Mountain-tanager

Taxonomy. *Tachyphonus somptuosus* Lesson, 1831, no locality = Peru.

This species, *A. flavinucha* and *A. notabilis* were formerly placed in a separate genus, *Compsocoma*. Usually treated as conspecific with *A. flavinucha*, but the two differ markedly in voice and to lesser degree also in plumage; their ranges are believed to be geographically isolated, although approaching each other closely. Present treatment as separate species provisional, pending genetic and further vocal analysis of the various taxa. Race *alamoris* extremely similar to nominate and possibly better synonymized with it; provisionally retained pending thorough review of all races. Eight subspecies currently recognized.

Subspecies and Distribution.

A. s. venezuelanus (Hellmayr, 1913) – N Venezuela (coastal cordillera from Yaracuy E to Miranda).
A. s. viridiidorsalis (Phelps, Sr & Phelps, Jr, 1949) – Aragua (Cerro Golfo Triste), in N Venezuela.
A. s. antioquiae (Berlepsch, 1912) – N end of W Andes, both slopes of C Andes (in Antioquia) and E slope (in Tolima), in N Colombia.
A. s. victorini (Lafresnaye, 1842) – Andes of W Venezuela (S Táchira) and W slope of E Andes of Colombia (from Santander S to head of Magdalena Valley, in Huila).
A. s. cyanopterus (Cabanis, 1866) – Andes of S Colombia (W slope of C range S from Quindío) and W Ecuador (S to Chimborazo and NE Azuay).
A. s. alamoris (Chapman, 1925) – S Ecuador (W slope in S Azuay, El Oro and W Loja).
A. s. baezae (Chapman, 1925) – E slope of Andes in SW Colombia (Nariño) and Ecuador (S to Morona-Santiago).
A. s. somptuosus (Lesson, 1831) – E slope of Andes in extreme S Ecuador (Zamora–Chinchipe) S to C Bolivia (La Paz, Cochabamba).



Descriptive notes. 16–17 cm; 33–56 g (combined weight data from when lumped with *A. flavinucha*). Distinctive strong-billed tanager with mostly blue wings and bold plumage pattern. Nominate race has forehead and side of head to well below eye black, fairly broad yellow stripe from centre of crown to nape (stripe sometimes partly concealed); mantle and back deep black, rump dark brownish-olive becoming greener on uppertail-coverts; tail blackish, at least several outer pairs of feathers edged bright blue; marginal coverts and lesser and median upperwing-coverts shining cobalt-blue, greater coverts black; primary coverts black, flight-feathers black, broadly edged bright turquoise-blue, tertials deep black; throat and entire underparts bright yellow except for black rear thigh, underwing-coverts bright yellow; iris dark reddish-brown; upper mandible blackish, lower mandible bluish-grey with blackish tip and base; legs dark horn-grey. Differs from similar *A. notabilis* mainly in much darker, black mantle and back. Sexes similar. Juvenile has yellow in plumage duller. Races vary mainly in colour and pattern of upperparts: *baezae* differs from nominate in having back and rump mixed black and olive; *alamoris* is very like nominate (with same turquoise-blue flight-feather edging), but perhaps slightly smaller and with upperparts slightly tinged green; *cyanopterus* is much like nominate, but rump dark olive-green (not dark brownish-olive) and wing edgings darker cobalt-blue (not bright turquoise-blue); *victorini* is slightly larger, and has mantle to uppertail-coverts moss-green; *antioquiae* has centre of mantle and back tinged greenish, rump green, wing and tail edged medium blue; *viridiidorsalis* differs in having back greenish-black, flight-feathers edged cobalt-blue like shoulder (not bright turquoise-blue), and tail feathers edged cobalt-blue; *venezuelanus* differs from nominate in slightly smaller size, back sooty black (duller than nominate), and lower rump and uppertail-coverts sooty black with yellowish-green tinge. Voice. Generally rather quiet. Song a weak, rapid, very high-pitched, almost twittering "ti-ti-ti-ti ti'ti'ti'ti'ti'titi'ti'ti'ti'ti'ti ti ti", a little louder and faster in middle, in N & C Peru described as a high, weak wheedling "si-titi-si-titi tsu-ti-su-ti-tsu-ti-tsu-ti"; very unlike song of *A. flavinucha*. When foraging, gives soft "tic" and "teep" notes, or short bursts of "tic" notes, sometimes extended into little trills.

Habitat. Humid and wet forest, forest borders, and tall second-growth woodland. At 900–2100 m in Venezuela, mostly 1400–2600 m in Colombia, and 1200–2500 m in Ecuador.

Food and Feeding. Insects, and small fruits and berries. Conspicuous pairs or groups of 3–10 individuals forage alone or join mixed-species flocks typically containing other tanagers as well as New World warblers (Parulidae), but frequently strike out on their own in unpredictable or erratic little forays. Forages at various heights, from below eye level to (occasionally) high in canopy, and inside or at edge of forest; median foraging height in Valle (Colombia) was c. 12 m. Energetic, foraging actively in distinctive, stereotyped manner, nimbly run-hopping along slender, mostly bare branches, working out fairly quickly to terminal foliage clusters, where it pauses or hops deliberately and spends up to 30 seconds in peering around carefully, stretching up, leaning down, and occasionally pecking or lunging short distance for prey, sometimes sallying or hovering; then flies to another branch and repeats process. Also regularly checks hanging dead leaves for insects. Takes *Miconia* berries mostly without acrobatics.

Breeding. In Colombia, nests in Apr–Jun in SW (La Planada Nature Reserve), nestlings in Jun and fledglings in Nov in Valle del Cauca, and juveniles in Mar and Sept–Oct, and three breeding-condition birds in Mar and 17 more May–Sept in N; in Ecuador, juveniles in Jan in S and adult carrying nest material in early Mar in SW (Tambo Negro, in Loja, 600–1000 m); juveniles in Mar in Peru. Co-operative breeding, with four adult helpers, recorded in Colombia. At La Planada (Colombia), nest an open cup 12·4 cm in diameter and 8·6 cm high, made from soft plant material including rootlets, green moss, fern leaves and fine vegetable fibres, lined with finer moss and dry bamboo leaves, one placed 3·5 m up on horizontal limb of pepper (*Piper*) covered with tree-fern leaves and bamboo at disturbed forest border, another 6·5 m up on horizontal branch of *Clusia*, and a third 7·5 m up; in captivity, cup-nest of coarse grass and lined with finer grass. Following details taken from S Colombia (La Planada): at one nest one dominant individual (possibly female) and four adult helpers were present, helpers fed dominant bird, which in turn fed the two nestlings, as also did helpers, two fledglings subsequently seen with the five adults c. 50 m from nest tree and all seven remained together for c. 7 months or possibly more; at a second nest, one bird incubated and four helpers present; a third nest was attended by only two adults, which were seen to carry food to nest.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Fairly common, and widespread across most of its large Andean range. Locally may occur at low density. Present in many protected areas, e.g. Henri Pittier, Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), Chingaza, Cueva de los Guácharos, Nevado del Huila, Puracé, Las Orquídeas, Farallones de Cali and Munchique National Parks anmd La Planada and Tambito Nature Reserves (Colombia), Sangay, Cayambe-Coca and Podocarpus National Parks (Ecuador), and Cordillera Azul and Tingo Maria National Parks (Peru). Occurs also in many unprotected areas with suitable habitat. Andean deforestation has resulted in local range contraction and fragmentation.

Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Best *et al.* (1996), Burns (1997a), Burns & Racicot (2009), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe & Nilsson (2003), Mee *et al.* (2002), Meyer de Schauensee (1966), Meyer de Schauensee & Phelps (1978), Miller (1963), Moore *et al.* (1999), Norgaard-Olesen (1973), Phelps & Phelps (1950), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg (2000b), Schulenberg & Plenge (1980), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990), Strewe (2001a, 2001b), Walker (2001), Zimmer (1944).

90. **Bolivian Mountain-tanager**

Anisognathus flavinucha

French: Tangara à nuque jaune **Spanish**: Tangara Boliviana
German: Blauschwingen-Bergtangare

Taxonomy. *T.*[*achyphonus*] *flavinucha* d'Orbigny and Lafresnaye, 1837, Yungas, Bolivia.
This species, *A. somptuosus* and *A. notabilis* were formerly placed in a separate genus, *Compsocoma*. Usually treated as conspecific with *A. somptuosus*, but the two differ markedly in voice and to lesser degree in plumage; their ranges are believed to be geographically isolated, although approaching each other closely. Present treatment as separate species provisional, pending genetic and further vocal analysis of the various taxa. Monotypic.
Distribution. E slope of Andes in Peru (from Puno) S to S Bolivia (Chuquisaca).



Descriptive notes. 16–17 cm; 33–56 g (combined weight data from when lumped with *A. somptuosus*). Has head, throat, mantle and back deep black, prominent bright yellow median crownstripe on hindcrown and nape; lower back and rump bright cobalt-blue; lesser and median upperwing-coverts purplish-blue, greater coverts black, primary coverts, flight-feathers and tail black, feathers sharply edged pale turquoise-blue, tertials mostly black; underparts bright golden yellow; iris dark brown; bill black, base of lower mandible blue-grey; legs dark grey. Differs from very similar *A. somptuosus* mainly in having more restricted yellow crownstripe, and cobalt-blue (not olive) rump. Sexes similar. Juvenile is much like adult, but duller yellow below, with yellow feathers of rear crown and nape mixed or tipped with black. Voice. Frequently heard song, at dawn and in morning hours, while perched or in flight display as bird climbs 30–45 m on shallowly beating wings, a series of musical whistles, soft but gradually increasing in volume and pitch, e.g. "too-too tyoo-towoo-towoo too-wít too-wít too-wít", rather loud at end; in S Peru described as a rising series of wiry, quavering notes, "tchu-tchu-twéé-aww twéé-awéé wéé-wéé wéé-wéé"; dramatically different from song of *A. somptuosus*. Calls are high "tic" notes.
Habitat. Humid and wet montane forest, forest borders and older second growth, generally not away from taller forest. At c. 1500–2500 m.
Food and Feeding. Insects and fruit; takes large melastome fruits. Forages mainly in middle levels up to canopy; sometimes descends into shrubbery in undergrowth of forest or along forest edges. Hops along mossy epiphyte-covered branches away from leaves, and searches moss and bark. Behaviour much like that of *A. somptuosus*.
Breeding. In Bolivia, bird in breeding condition reported in Aug and eggs in Oct in La Paz, and fledglings in Apr in Cochabamba. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Range much smaller than that of allied *A. somptuosus*, but montane habitat in S Peru and adjacent Bolivia remains in relatively good shape. Occurs in several large protected areas, including Manu National Park, in Peru, and Madidi, Isiboro Sécure and Amboró National Parks, in Bolivia.
Bibliography. Bleiweiss (2004), Clements & Shany (2001), Fjeldså & Krabbe (1990), Hesse (1980a), Isler & Isler (1999), Krabbe & Nilsson (2003), Mayer (2000), Norgaard-Olesen (1973), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Weske (1972), Zimmer (1944).

91. Black-chinned Mountain-tanager

Anisognathus notabilis

French: Tangara à menton noir **Spanish**: Tangara Barbinegra
German: Schwarzkinn-Bergtangare

Taxonomy. *Tanagra notabilis* P. L. Sclater, 1855, eastern range of cordilleras north of Quito, Ecuador.
This species, *A. somptuosus* and *A. flavinucha* were formerly placed in a separate genus, *Compsocoma*. Monotypic.
Distribution. W Andes of Colombia (Pacific slope from headwaters of R San Juan, in Risaralda) S to W Ecuador (El Oro and W Loja).



Descriptive notes. 18 cm; one male 44·1 g, one female 68·5 g. Quiet tanager with svelte plumage and fairly strong and rather pointed bill. Has forecrown, side of head, nape and chin black, broad median stripe on rear crown bright yellow; upperparts bright yellow-olive, becoming olive-yellow on rump; tail entirely black (or feathers very obscurely edged dark violet-blue); lesser and median upperwing-coverts plain olive, greater coverts blackish, broadly edged violet-blue, flight-feathers black, narrowly edged dark violet-blue, tertials black, narrowly edged violet-blue; central throat and underparts, including undertail-coverts, rich orange-yellow, underwing-coverts bright yellow; iris dark red; bill black, bluish-grey on base of lower mandible; legs black. Distinguished from *A. somptuosus* mainly by olive (not black) back, less conspicuous wing edgings and richer orange (not yellow) underparts. Sexes similar. Juvenile apparently undescribed. Voice. Not particularly vocal, even when foraging. Infrequently heard song a series of high-pitched notes, "tsit-tsit-tseeéu-tsit-tseeu-tsit", repeated over and over; calls high thin "tic" notes.
Habitat. Humid and wet mossy forest and forest borders. At 900–2200 m (once to 300 m) in Colombia; mostly 1400–2200 m in Ecuador, but in El Oro as low as 800–1100 m.
Food and Feeding. Fruit; presumably also insects. Nestlings in Colombia were fed with relatively large flying insects, including beetles (*Coleoptera*), hymenopterans and lepidopterans, and fruits (*Alchornea*, *Clusia* and *Miconia* identified). Usually seen singly or in pairs, much less often in groups up to six individuals; singles, pairs or groups often forage with mixed-species flocks. May sit more or less still and rather erect, then briskly run-hop along branches and peer at foliage or fruit at various heights, from fairly low along wooded borders to much higher in taller forest. During brood-feeding period, captures many insects in air in short hawking manoeuvres, 5–20 m from branches. Generally less conspicuous than *A. somptuosus*, although the two are sometimes found together.
Breeding. In SW Colombia, three nests found during 10th Apr and 5th May at La Planada Nature Reserve (in Nariño); following details refer to these. Nest constructed within clump of moss and epiphytes 13·4–16·5 m above ground on tree limb in undisturbed wet, epiphyte-laden montane forest on ridge (at 1740–1780 m). First nest attended by three adults, all carrying food to nestlings (insects captured generally within c. 50 m of nest tree); after this nest failed, one observed carrying moss and dry leaves to new site, and by end May all three were again feeding young; seven days later, three fledglings seen near nest-site; inferred incubation period c. 12–14 days and nestling period c. 13–15 days. No breeding-territory overlap with *A. somptuosus*, which favoured forest-edge sites.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Uncommon to locally fairly common in Ecuador; generally less numerous and more local in Colombia. In general less numerous and less conspicuous than *A. somptuosus*. Deforestation, various farming activities and illegal cultivation of coca and marijuana within this species' range (especially in SW Colombia) are ongoing threats within the rather narrow elevational band of Pacific-slope montane forest where it occurs. Present in several protected areas, including Farallones de Cali and Munchique National Parks and La Planada, Tambito and El Pangan Nature Reserves (Colombia), and El Angel and Cotocachi-Cayapas Ecological Reserves and Maquipucuna Reserve (W Ecuador). Although populations trends for this species have not been quantified, it is almost certainly declining.
Bibliography. Bleiweiss (2004), Donegan & Dávalos (1999), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Moore *et al.* (1999), Orejuela & Cantillo (1990), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Strewe (2001a, 2001b).



PLATE 10

inches 3

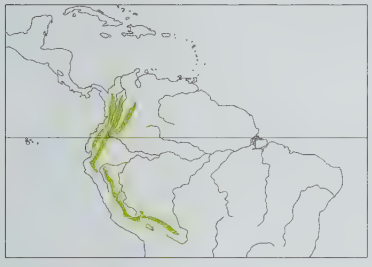
Genus *CHLORORNIS* Reichenbach, 1850

92. Grass-green Tanager

Chlorornis riefferii

French: Tangara de Rieffer **German**: Papageitangare **Spanish**: Tangara Lorito

Taxonomy. *Tanagra Riefferii* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
Molecular-genetic studies place present species within *Buthraupis*, most closely related to *B. eximia* and *B. aureodorsalis*. Five subspecies recognized.
Subspecies and Distribution.
C. r. riefferii (Boissonneau, 1840) – Andes of Colombia and Ecuador.
C. r. dilutus J. T. Zimmer, 1947 – Andes of N Peru S of Chachapoyas.
C. r. elegans (Tschudi, 1844) – Andes of C Peru (Junín).
C. r. celatus J. T. Zimmer, 1947 – Andes of S Peru below Limbani.
C. r. bolivianus (Berlepsch, 1912) – Andes of Bolivia (La Paz).



Descriptive notes. 20 cm; 42–59 g. Large, unmistakable tanager with grass-green plumage, robust proportions and orange bare parts; bill thick and somewhat conical. Nominate race is bright shining green, with narrow area of chestnut on base of forehead, lores, ocular area, cheek and chin (forming conspicuous mask); bend of wing and marginal coverts pale blue (almost always hidden), otherwise upperwing-coverts green, primary coverts dusky, edged green, flight-feathers dusky, heavily edged green, tertials dusky, broadly edged green; undertail-coverts chestnut; iris chestnut-brown; bill bright orange; legs bright orange, claws dusky orange. Sexes similar. Juvenile is much like adult, but duller green and with bill dusky. Races differ relatively little: *boliviamus* is lighter and brighter green than nominate, has larger chestnut mask extending across entire forehead, side of head and most of throat; *dilutus* has blue forehead (inconspicuous) and paler chestnut on face; *celatus* has chestnut of forehead narrowly edged pale blue above; *elegans* is like last, but with chestnut of chin extending to upper throat. Voice. Dawn song 1–2 "enk" notes followed by bursts of 1–5 harsh, squeaky, doubled notes like sound of squeaky gate being rapidly moved. Possible day song a heavy "chink-zheet", second note higher, repeated once every 2 seconds. Most frequently heard vocalization is contact call during foraging, a rather low-pitched, nasal, strained "eenk" or "eek", not loud, notes given singly, paired or sometimes several times in irregular series; infrequently in long stuttering and louder series, especially just prior to or during flight, e.g. "t-e-e-e-e-e-k".
Habitat. Wet, mossy and often rather low-stature or stunted upper montane forest and forest borders almost to tree-line; occasionally dense, mossy second growth. Recorded at c. 1500–3500 m; 1700–3300 m (mostly 2400–2700 m) in Colombia, mostly 2000–2900 m in Ecuador, and at 2000–3500 m in Peru.
Food and Feeding. Of seven stomachs examined, three contained only vegetable matter and two only animal matter, and two held both; contents included fruit pulp, berries, seeds, a 40-mm worm, insect remains and caterpillars. Usually seen in pairs or in small groups of 3–6 individuals, less frequently up to ten; in Bolivia (where apparently less numerous), more often seen singly or in pairs. Regularly forages with mixed-species flocks, then moving sluggishly from branch to branch. Inspects moss and epiphytes with peering movements and, especially, by bending or leaning down to look at mossy sides or undersurfaces of branches 3–6 cm in diameter; may hang head downwards or flutter heavily in foliage.
Breeding. Nests found in Jul and Sept in Ecuador. One nest in Colombia was relatively large, constructed from green moss and decorated with ferns; contained 1 egg, grey, freckled lilac-grey. In Ecuador, two nests in consecutive years in Pichincha (near Tandayapa, at 2250 m), second one only 2 m away from first, believed built by same pair, made from moss, ferns and fine rootlets, lined with tree-fern scales, placed beneath moss on steep roadside bank; 1 egg. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common throughout most of range; rather uncommon in Bolivia. Present in a number of protected areas, including Las Orquideas, Farallones de Cali, Munchique, Puracé, Cueva de los Guácharos and Chingaza National Parks and Tambito Nature Reserve (Colombia), Sangay and Podocarpus National Parks (Ecuador), Manu National Park (Peru) and Madidi National Park (Bolivia). Considerable intact but unprotected forest remains within this species' high-elevation range, but in many areas it is subject to firewood-cutting, and to deforestation for expanding pastureland for cattle, various agricultural crops, and human settlement.
Bibliography. Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), David & Gosselin (2002b), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Goodfellow (1901), Greeney & Gelis (2006b), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Mitsch (1978), Moore *et al.* (1999), Niethammer (1956), Remsen (1985), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sedano & Burns (2010), Taczanowski (1884), Vuilleumier (1970), Walker (2001), Weske (1972), Zimmer (1947b).

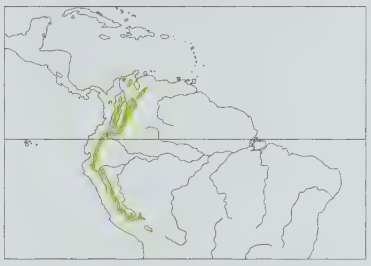
Genus *DUBUSIA* Bonaparte, 1850

93. Buff-breasted Mountain-tanager

Dubusia taeniata

French: Tangara à poitrine fauve **German**: Silberbrauen-Bergtangare **Spanish**: Tangara Pechifulva
Other common names: Carriker's Mountain-tanager (*carrikeri*)

Taxonomy. *Tanagra* (*Tachyphonus*) *taeniata* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
Molecular-genetic data indicate that this genus and *Delothraupis* are sister-taxa, with *Calochaetes* sister to both. Races have in the past been treated as three separate species. It was recently proposed that S race *stictocephala* be regarded as a separate species (*carrikeri* retained with nominate race), on grounds of known vocal and morphological evidence; this merits further examination. Three subspecies currently recognized.
Subspecies and Distribution.
D. t. carrikeri Wetmore, 1946 – Santa Marta Mts, in N Colombia.
D. t. taeniata (Boissonneau, 1840) – Andes of Venezuela (Trujillo S to Táchira), all three ranges in Colombia (in W Andes mainly N & S ends, in Antioquia and Cauca), and both slopes in Ecuador and NW Peru (S to Piura and N Cajamarca N of Marañón Valley).
D. t. stictocephala Berlepsch & Stolzmann, 1894 – E slope of Andes in Peru (from S side of Marañón Valley, in Amazonas, S to N end of Cordillera Vilcanota, in Cuzco).



Descriptive notes. 20 cm; 31–45 g. Colourful, sturdy-billed, somewhat retiring tanager often noted first through its distinctive voice. Nominate race has head to nape, upper mantle and foreneck black, feathers of forecrown and superciliary area tipped silvery blue, forming long, broad and rather loosely defined frosty supercilium extending almost to nape and often partly down side of neck; most of mantle to rump dark dusky blue, tail blackish, tinged dark blue; lesser upperwing-coverts broadly edged silvery blue, median and greater coverts dusky, broadly tipped slightly darker blue, greater coverts also broadly edged pale greyish violet-blue; flight-feathers and tertials dusky, broadly edged dull blue, flight-feathers narrowly edged dull blue, tertials more broadly edged dull blue; broad pectoral band buff, varying in intensity from whitish-buff to greyish-buff, lower breast and belly bright yellow, thigh dusky blue, undertail-coverts buff; iris dark reddish-brown; bill black; legs blackish. Sexes similar. Juvenile has dull olive-green back and chest, vent area duller and more ochraceous rather than buff. Race *carrikeri* is much like nominate, but forecrown and eyebrow more densely streaked, chin mixed and streaked black and buff, darker buff colour on chest and extending up to centre of throat, and breastband slightly darker, more cinnamon-buff; *stictocephala* has entire crown and nape somewhat streaked and frosted with silvery blue-white, mantle dark blue (like back), buff breastband narrower, and vent and undertail-coverts yellow (not buff). Voice. Song of nominate race and *carrikeri*, repeated over and over at short intervals early in morning, a loud, whistled "phéééé-baay" delivered slowly, second note lower, or downslurred, occasionally expanded to 3 notes, e.g. "téééé teeee tyyyy". In S Peru (*stictocephala*) a thin, high-pitched, single-note whistle sharply slurred downwards, reminiscent of song of a *Pipreola* fruiteater; this single-note song also may be continually repeated at dawn, and sometimes later in morning. May sing from exposed medium-height perch, but more often when partly concealed in vegetation, or at edge of concealing vegetation.
Habitat. Thick, mossy, wet montane forest and broken forest with dense lower vegetation, especially with *Chusquea* bamboo thickets, and dense tangles inside forest and in gaps and edges; locally up to elfin woodland at tree-line and in patches of *Polylepis* and shrubs slightly above tree-line. At 2000–3000 m in Venezuela, 2400–3600 m in Colombia, 2500–3500 m in Ecuador, and 1900–3500 m in Peru; in all areas except Venezuela, most numerous above c. 2500 m.
Food and Feeding. Small fruits and berries, including mistletoe (Loranthaceae), and insects. Three stomachs contained both vegetable and animal matter, including fruit, seeds and insects. Single individuals or pairs, usually heard before they are seen, follow mixed-species flocks or wander alone over large areas. Rather slow-moving; forages from eye level to treetops, but more often fairly low, and often in dense vegetation, where it keeps out of sight. Usually remains at least partially concealed in foliage, but occasionally sits up in the open on top of bush for a few moments. Searches mossy branches for insects. Hops along large limbs, scans upper surfaces, and bends down to look under limbs or in moss, bark and especially lichens; also observed when searching moss on steep banks.
Breeding. Juveniles and immatures in Jan and Sept in NW Ecuador; in Colombia, two breeding-condition birds in late Dec in Boyacá, and a further eight in Feb–Sept in Santa Marta Mts and E & C Andes. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common almost throughout its range, and widespread. Appears to require fairly large tracts of humid montane forest; has declined or disappeared locally in the face of deforestation, firewood-cutting and human settlement. Can be found in many national parks and other protected areas throughout its range. In addition, extensive unprotected but intact habitat exists within its range, and most of this appears secure at present.
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2003), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Krabbe, Flórez *et al.* (2006), Krabbe, Moore *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Olivares (1963), Parker & O'Neill (1980), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Weske (1972), Zimmer (1944).

Genus *DELOTHRAUPIS* P. L. Sclater, 1886

94. Chestnut-bellied Mountain-tanager

Delothraupis castaneoventris

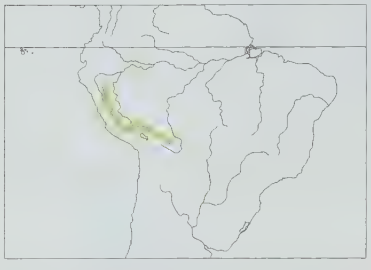
French: Tangara à ventre marron **Spanish**: Tangara Ventricastaña
German: Braunbauch-Bergtangare

Taxonomy. *Calliste castaneoventris* P. L. Sclater, 1851, Bolivia.

On following pages: 95. Diademed Tanager (*Stephanophorus diadematus*); 96. Purplish-mantled Tanager (*Iridosornis porphyrocephalus*); 97. Yellow-throated Tanager (*Iridosornis analis*); 98. Golden-collared Tanager (*Iridosornis jelskii*); 99. Golden-crowned Tanager (*Iridosornis rufivertex*); 100. Yellow-scarfed Tanager (*Iridosornis reinhardti*); 101. Fawn-breasted Tanager (*Pipraeidea melanonota*); 102. Glistening-green Tanager (*Chlorochrysa phoenicotis*); 103. Orange-eared Tanager (*Chlorochrysa calliparaea*); 104. Multicolored Tanager (*Chlorochrysa nitidissima*).

Molecular-genetic data indicate that this genus and *Dubusia* are sister-taxa. Species is sometimes placed in latter genus, in part because their songs are somewhat similar to each other. Birds from Auquimarca (Junin), in Peru, described as a geographical race, *peruviana*, but appear to differ little, if at all, from those in rest of species' range. Treated as monotypic.

Distribution. E slope of Andes in Peru (from SE La Libertad) S to Bolivia (La Paz and Cochabamba).



Descriptive notes. 15 cm; 25–33 g. A small tanager, mainly dull blue above and rufous below, with small bill. Has crown medium sky-blue with slight frosty sheen (pale feather edges), bordered below by narrow black mask from base of forehead and lores back through eye, mask separated from narrow black submalar line by pale malar line mixed rufous and white; upperparts, including uppertail-coverts, rich dark blue, upperwing-coverts dusky, broadly edged and tipped medium blue, flight-feathers, tertials and tail black, edged medium blue; chin whitish, throat and underparts, including undertail-coverts, rufous; iris red to dark red; bill black, basal portion of lower mandible blue-grey; legs blackish. Sexes similar. Juvenile apparently undescribed. Voice. In general not a persistent singer. Song in Peru a clear, whistled "peee paay"; in Bolivia (possibly also Peru) extended to 3 notes, "peeee pee pay" or "pee pee pay", first note highest, and song may be repeated at short intervals early in morning. Both 2-note and 3-note songs recall those of *Dubusia taeniata*, but not so loud or forceful. Also a sharp, high-pitched and slightly descending "tzeeeeee", possibly also song. Call a brief "zee zee", like that of many other tanagers.

Habitat. Dense humid and wet montane forest, elfin woodland, thickets, and gaps and borders in broken montane forest, and patches of scrubby vegetation at tree-line. Recorded mainly at 2000–3500 m in Peru, seasonally down to at least 1650 m in Cuzco (S Peru) and in Bolivia.

Food and Feeding. Arthropods and berries. Normally found singly or in pairs, infrequently three or occasionally more individuals, alone or, more often, with large mixed-species flocks containing tyrant-flycatchers (Tyrannidae), New World warblers (Parulidae) and other tanagers. Stays mostly in canopy or upper levels, occasionally descending to eye level, even near ground along dense forest borders; median foraging height in Bolivia was c. 10 m, or 2·5 m below top of canopy. Takes berries from a perched position. Searches for insects while hopping in rather deliberate manner along large, moss-covered branches. Takes most insect prey from moss; leans head downwards and occasionally hangs upside-down to probe mossy undersides of branches; also picks prey from both surfaces of leaves and from petioles, and has been noted as sallying to air for small flying insects.

Breeding. No information.

Movements. Local or seasonal movements believed likely, although none reported.

Status and Conservation. Not globally threatened. Uncommon. Distributed along montane and tree-line Andean habitats from N Peru S to C Bolivia. Occurs in various protected areas, including Tingo Maria and Manu National Parks (Peru) and Madidi and Amboró National Parks (Bolivia). Main threats to its habitat are deforestation and firewood-cutting, similar to threats faced by many other montane species. Its range also includes considerable intact, unprotected habitat which appears to be at relatively little short-term risk.

Bibliography. Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Fjeldså & Krabbe (1990), George (1964), Hilty (2009b), Isler & Isler (1999), Klicka *et al.* (2007), Meyer de Schauensee (1966, 1970a), Parker & O'Neill (1980), de la Peña & Rumboll (1998), Remsen (1984), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Zimmer (1944).

Genus *STEPHANOPHORUS* Strickland, 1841

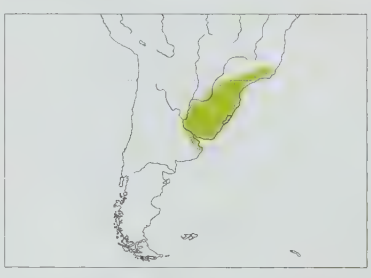
95. Diademed Tanager

Stephanophorus diadematus

French: Tangara à diadème **German**: Diademtangare **Spanish**: Tangara Diademada
Other common names: White-capped Tanager!

Taxonomy. *Tanagra diademata* Temminck, 1823, Curitiba, Paraná, Brazil.
Monotypic.

Distribution. SE Brazil (Paraná and São Paulo E to S Minas Gerais and Rio de Janeiro, S to Rio Grande do Sul), adjacent E Paraguay, Uruguay and NE Argentina (E from extreme E Santa Fe, S to N Buenos Aires).



Descriptive notes. 19 cm; two males 35 g and 41·5 g. Rather robust tanager, colourful in good light but most often appearing blackish, with pale crown patch, feathers of forecrown short, dense and plushy; bill short and thick. Has forecrown, lores, ocular area and chin black, forming small mask; large white crown patch surmounted by small but fairly conspicuous red tuft at front (both white and red feathers can be erected); rest of plumage mostly shining dark blue, upperwing-coverts, flight-feathers and tail feathers blackish with heavy dark blue edges (blue edging inconspicuous); iris dark brown; bill blackish; legs dusky grey. Sexes similar. Immature is much duller and duskier than adult, with features of crown obscure. Voice. Dawn song, from high tree limb or treetop, a short, warbled "tio turri, weri tweee", second and third notes lower in pitch, repeated over and over every 3–4 seconds. Day song a loud, rich series of musical notes, like that of a *Pheucticus* grosbeak but with emphatic upslurred note at end and with longer pauses between songs. A countersong, perhaps by female, a sliding whistle followed by two softer short low whistles. Calls include soft, high "chewp", singly or doubled.

Habitat. Variety of wooded to semi-open habitats, including *Araucaria* forest, dense low forest (*monte*), patches of shrubbery around marshes, riverine woodland (especially *Celtis* in Argentine coastal areas), and trees and bushes in parks and gardens. Restricted to mountainous regions in Rio de Janeiro, where most numerous at uppermost elevations, and to tree-line at 2400 m on Mt Itatiaia; otherwise mainly in lowlands.

Food and Feeding. Much fruit, also flowers, buds and some insects; consumes sweet secretions of plant lice. In Rio Grande do Sul (Brazil) reported as eating nine species of fruit, including figs (*Ficus*), Japanese persimmons (*Diospyros kaki*) and papaya (*Carica papaya*). One stomach contained moyé berries (probably *Schinus* species). Found in pairs and in small groups, individuals often perched rather prominently in the open atop shrubbery, but quick to dive into cover when alarmed. In wooded areas regularly occurs with mixed-species flocks and will forage at almost any height, from low down to fairly high in vegetation. In Brazil appeared to glean from leaf surfaces.

Breeding. Breeding reported in Oct in Rio Grande do Sul (Brazil). Builds a shallow nest 3–4 m up in tree or shrubs. Clutch 4 eggs, white or bluish-white, spotted deep red or purplish-grey, some eggs having black scrawls. No other information.

Movements. Reported as rather sedentary. Possibly migratory in S Uruguay and Argentina.

Status and Conservation. Not globally threatened. Fairly common in SE Brazil (from Itatiaia National Park S to Rio Grande do Sul); fairly common in Uruguay; decidedly local within most of its Argentine range. In coastal mountains of SE Brazil, where deforestation extensive, this species is largely confined to the numerous parks and reserves, among them Itatiaia, Serra dos Órgãos and Aparados da Serra National Parks. In Argentina found in Iguazú, El Palmar and Mar del Plata National Parks, as well as locally in gardens and small reserves along coast to S of city of Buenos Aires.

Bibliography. Aplin (1894), Belton (1985), Burns & Racicot (2009), Descourtilz (1852), Di Giacomo (2009), Diamond & Lovejoy (1985), Frisch & Frisch (1964), Holt (1928), Hudson (1870), Isler & Isler (1999), Meyer de Schauensee (1966), Narosky & Yzurieta (1987), Ogilvie-Grant (1912), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Santos (1948), Sclater & Hudson (1888), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Straneck (1990), Vigil (1973), Voss & Sander (1980, 1981), Wetmore (1926).

Genus *IRIDOSORNIS* Lesson, 1844

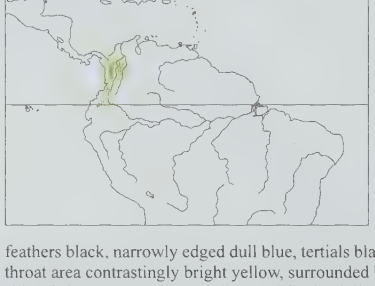
96. Purplish-mantled Tanager

Iridosornis porphyrocephalus

French: Tangara à cape bleue **German**: Purpurmanteltangare **Spanish**: Tangara Capiazul

Taxonomy. *Iridornis porphyrocephala* P. L. Sclater, 1856, neighbourhood of Quito, Ecuador.
Has been considered to form a superspecies with *I. analis*, and sometimes treated as conspecific; evidence for treatment as two separate species is weak, and sympatry not proven. Monotypic.

Distribution. Colombia (entire W slope and very locally on E slope of W Andes, also W slope of C Andes in Antioquia) S to NW Ecuador (Carchi, Imbabura and NW Pichincha).



Descriptive notes. 14 cm; three males 20·3–23 g, one female 21·5 g. Unmistakable tanager, mostly dark blue with yellow throat, and short thick bill. Has base of forehead, lores and ocular area deep black and ear-coverts blackish, somewhat glossed dark purple, forming mask (looks blackish in most lights and does not contrast strongly with rest of plumage); crown, side of head, mantle and back intense dark purplish-blue, becoming slightly paler bluish-green on rump (can look greenish in some lights); tail mainly dusky, rather obscurely edged and tinged dark blue; upperwing-coverts black, broadly and sharply edged dull blue, flight-feathers black, narrowly edged dull blue, tertials black, broadly edged all around with dull blue; wide throat area contrastingly bright yellow, surrounded by dusky purplish-blue that extends to breast and side of chest; central breast, sides and flanks duller and paler blue, sometimes with brownish tinge, centre of lower breast and belly buff, becoming chestnut on undertail-coverts; iris reddish-brown; upper mandible black, lower mandible bluish-grey; legs dark brownish-grey. Sexes similar. Juvenile undescribed. Voice. Calls (in Colombia) include high, slightly raspy "tsit", sometimes accelerating into trill. Possible song a lisping, buzzy "seeeeéeu", c. 1 second long, rising and, at end, falling. Also gives longer "ts-ts-tseéeuit" tseeuwee", which may be a song or a song variation.

Habitat. Very wet mossy forest, tall second growth, and along openings or borders in forest; a few records from less humid areas. Mostly at 1500–2200 m; locally down to 750 m in Cauca and up to 2700 m in Antioquia (above Medellin), in Colombia; in Ecuador mostly c. 1200 m or somewhat higher, but few records.

Food and Feeding. Berries and insects. Single individuals, pairs or families follow mixed tanager flocks or forage alone, 2–10 m up inside or at edge of forest; usually keep mostly out of sight in shrubbery. Does not gather at fruiting trees with other frugivores. Moves more slowly and forages more methodically than do *Tangara* tanagers, often sitting quietly for a few moments or spending 30 seconds to a minute at a location before moving. Hops and peers in dense foliage.

Breeding. In Colombia, begging young with two adults in Jul in Cauca (Cerro Munchique) and nine breeding-condition birds in May–Jun at N end of W & C Andes. No other information.

Movements. Presumed resident. The records at unusually high and low elevations in Cauca and Antioquia, in Colombia, may involve wandering individuals.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Chocó EBA. Rare to locally fairly common in Colombia; very rare in Ecuador. In Colombia, may be rare or locally extirpated from portions of its range at N end of C Andes and N portion of W Andes; no recent records from Antioquia. In Ecuador, only a few scattered records in N; in addition, a specimen apparently from S Ecuador but of uncertain locality, possibly from Cañar, along Guayaquil–Quito railway. Deforestation, farming activities and illegal cultivation of coca and marijuana within this species' range (especially in SW Colombia) are ongoing threats within the narrow elevational band on Pacific-slope montane forest where it lives. Occurs in several protected areas, including Tatamá, Farallones de Cali and Munchique National Parks and Tambito and El Pangan Nature Reserves, in Colombia; not known to occur in any reserves or protected areas in Ecuador.

Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Butchart & Stattersfield (2004), Chapman (1926), David & Gosselin (2002b), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Moore *et al.* (1999), Orcés (1944), Orejuela & Cantillo (1990), Remsen *et al.* (2010), Renjifo *et al.* (2002), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000).

97. Yellow-throated Tanager

Iridosornis analis

French: Tangara à bavette jaune **German**: Gelbkehltangare **Spanish**: Tangara Goliamarilla

Taxonomy. *T.[anagra] analis* Tschudi, 1844, Valley of Vitoc, Junín, Peru.
Has been considered to form a superspecies with *I. porphyrocephalus*, and sometimes treated as conspecific; evidence for treatment as two separate species is weak, and sympatry not proven. Monotypic.
Distribution. E slope of E Andes in S Colombia (Serrania de los Churumbelos in E Cauca–W Caquetá, and E Nariño–W Putumayo border), E slope in Ecuador (Sucumbíos S to Zamora-Chinchipe) and almost entire E slope in Peru (S to Puno).



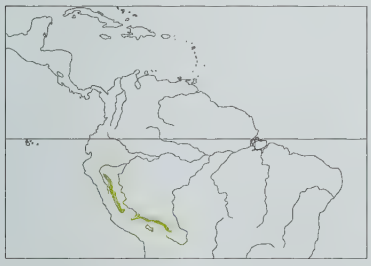
Descriptive notes. 15 cm; 20–29 g. Unmistakable tanager, dark blue above, with yellow throat, and short thick bill. Plumage is mostly dull blue above, darker on crown (especially forecrown) and nape and more greenish-blue on lower back and rump; lores, ocular area and side of head black, forming inconspicuous and weakly defined small mask; upperwing-coverts blackish, edged blue, primary coverts black, flight-feathers and tertials black, edged blue (more broadly on tertials), wingtips black; tail feathers dusky, edged blue; large area on throat rich deep yellow; underparts dull tawny-buff, bluish tinge on chest, sides and flanks; undertail-coverts chestnut; iris reddish-brown; upper mandible black with bluish-grey lower edges, lower mandible bluish-grey; legs dark brownish-grey. Sexes similar. Distinguished from similar *I. porphyrocephalus* mainly by markedly duller appearance, especially below. Immature is like adult, but duller. Voice. Call a thick "euu" and thinner, squeezed "tseeeer", both dropping in pitch. Song a thin, high, somewhat buzzy "ezéétseeu", the notes slurred together, similar to abbreviated song of Sooty Grassquit (*Tiaris fuliginosus*), at intervals of 10 seconds or more; song also reminiscent of that of *I. porphyrocephalus*.
Habitat. Humid and wet montane forest, especially where thick shrubby undergrowth present; regularly along dense forest borders. At c. 1450–2000 m in Colombia (few records) and 1400–2300 m in Ecuador; 1000–2350, rarely to 2600 m, in Peru.
Food and Feeding. Insects and small fruits. Of 13 stomachs examined, three contained only vegetable matter and six only animal matter and four contained both; contents included fruit, seeds, and insects. Seen singly, in loosely associated pairs or in small family parties, which regularly follow mixed-species flocks containing other tanagers; may join feeding aggregations briefly at fruiting trees. Not so active or restless as *Tangara* tanagers; often tends to remain somewhat hidden in vegetation when foraging, although occasionally perches briefly on open branch. Most often observed on mossy limbs or in thick vegetation, where it maintains a rather horizontal body position when foraging. Forages from about eye level to canopy height, more often at middle levels or lower. Hops on lower branches and peers at mossy substrates, where it takes food items.
Breeding. No information.
Movements. Resident. Minor seasonal elevational movements believed to occur in SE Peru.
Status and Conservation. Not globally threatened. Fairly common within middle-elevation montane forest; as yet unrecorded in Bolivia, although likely to be present in that country. Deforestation a cause for concern within parts of this species' range, but it occurs in several protected areas on E slope of Andes, including Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador) and Cordillera de Colán, Tingo Maria and Manu National Parks (Peru). Present also widely in unprotected areas.
Bibliography. Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Orcés (1944), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg (2000b), Schulenberg *et al.* (2007), Sedano & Burns (2010), Taczanowski (1884), Terborgh & Weske (1975), Walker (2001), Weske (1972), Zimmer (1944).

98. Golden-collared Tanager

Iridosornis jelskii

French: Tangara à col d'or **German**: Jelskitangare **Spanish**: Tangara de Jelski

Taxonomy. *Iridornis Jelskii* Cabanis, 1873, Maraynioc, Junín, Peru.
Two subspecies recognized.
Subspecies and Distribution.
I. j. jelskii (Cabanis, 1873) – E slope of Peruvian Andes from E La Libertad and San Martín S to Junín.
I. j. bolivianus Berlepsch, 1912 – E slope of Andes from S Peru (Cuzco) S to Bolivia (La Paz).



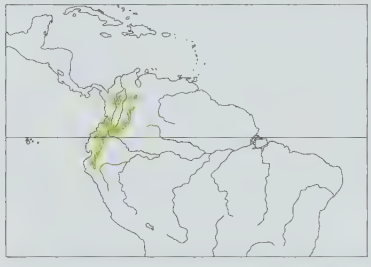
Descriptive notes. 14 cm; 16–26 g. Distinctive colourful tanager with thick and stubby bill. Nominate race has black face and throat surrounded by broad golden-yellow area that circles rearwards from forecrown and then downwards to side of neck; crown somewhat streaked and flecked with black, nape and hindneck black; upperparts dark blue, becoming slightly paler and duller on rump; lesser and median upperwing-coverts dark blue, greater coverts dusky, edged and tipped turquoise-blue, flight-feathers blackish, narrowly edged bluish; tail blackish, tinged dark blue and edged brighter blue; black of throat bordered by band of dull greenish-chestnut on chest, this becoming rufous-chestnut on breast, belly and undertail-coverts; sides sometimes weakly smudged blue; iris reddish-brown; upper mandible black, lower mandible blue-grey; legs dusky grey. Sexes similar. Juvenile much duller than adult, with rufous wash on belly. Race *bolivianus* slightly smaller, forehead tinged blackish. Voice. Soft high "seep" and "cheep" calls, sometimes two or more in a series, and thin "ti-ti-ti-ti" (of 2–5 notes), similar to those of congeners. Foraging individuals (excited) in mixed-species flock utter sharper, more forceful "tsuk!-eek" and "tsuk!-eek-ee-ee".
Habitat. Humid-forest borders, elfin woodland and dry scrubby hillside vegetation up to tree-line, also dense woody shrubs in *páramo*; sometimes found in bamboo. In most areas at c. 2900 m to 3700 m; regularly (Cuzco) down to 2200 m, occasionally to 2000 m.
Food and Feeding. Of 33 stomachs examined, 24 contained only vegetable matter and four only animal matter and five contained both; contents included berries, seeds, fruit, and insects. Seen alone or in pairs, less often in family groups, individuals perching in fairly upright, alert posture as they forage or move; occurs with mixed-species flocks and also forages independently of them. Forages from below eye level to the tops of small to medium-sized trees. Hops along small branches, and leans down or flutters to take small fruits. Searches for insects along slender, bare or moss-covered branches less than 1·5 cm in diameter. Also takes some prey by gleaning or picking from foliage.
Breeding. Juveniles with adult in Jun and Jul and breeding-condition birds in Nov in Huánuco (Peru). No other information.
Movements. Resident; minor elevational movements may occur in response to changing food resources.
Status and Conservation. Not globally threatened. Restricted-range species: present in Northeast Peruvian Cordilleras EBA and Bolivian and Peruvian Upper Yungas EBA. Uncommon to fairly common. Possibly more numerous than it appears, but inconspicuous, despite bold pattern. Deforestation, especially firewood-cutting of elfin forest and *Polylepis* at or near tree-line, an ongoing problem. No population trends quantified, although likely that the species has declined significantly in areas where habitat damage is severe. Occurs in a few protected areas, e.g. Tingo Maria and Manu National Parks (Peru) and Madidi National Park (Bolivia). Its distributional range includes considerable intact montane woodland and montane scrub that is unprotected, but thought to be at low risk, at least in the near future.
Bibliography. David & Gosselin (2002b), Fjeldså & Krabbe (1990), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Parker & O'Neill (1980), Remsen (1984), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Tallman (1974), Walker (2001), Zimmer (1944).

99. Golden-crowned Tanager

Iridosornis rufivertex

French: Tangara auréolé **German**: Goldscheiteltangare **Spanish**: Tangara Coronidorada
Other common names: Blue-bellied Tanager (*caeruleoventris*)

Taxonomy. *Arremon rufi-vertex* Lafresnaye, 1842, Bolivia; error = Bogotá region of east Andes, Colombia.
May form a superspecies with *I. reinhardti*, and sometimes considered conspecific, although there are significant morphological differences. Race *caeruleoventris* may be a separate species; conversely, *ignicapillus* and *subsimilis* differ little from nominate and possibly better synonymized with latter. Four subspecies tentatively recognized.
Subspecies and Distribution.
I. r. caeruleoventris Chapman, 1915 – N end of W Andes (Paramillo) and N part of C Andes (Antioquia S to Tolima), in NW Colombia.
I. r. ignicapillus Chapman, 1915 – SW Colombia (spottily at S end of W & C Andes).
I. r. subsimilis J. T. Zimmer, 1944 – W slope of Andes in Ecuador (S to upper Chiriboga road, in Pichincha).
I. r. rufivertex (Lafresnaye, 1842) – Andes of SW Venezuela (S Táchira), both slopes of adjacent E Andes of Colombia (S to Cundinamarca and on E slope in Nariño), and entire E slope of Andes in Ecuador S to N Peru (near Piura–Cajamarca border and N of Marañón Valley).



Descriptive notes. 15 cm; 18–28 g. Dark but richly coloured tanager with short and thick bill. Nominate race has large circular crown patch of rich golden-orange surrounded by deep velvety black of rest of head, neck and throat; upperparts mainly deep, intense, shining purplish-blue; tail blackish, outer feathers edged dark blue; lesser upperwing-coverts deep purplish-blue (like back), median and greater coverts paler blue, flight-feathers black, inner primaries and secondaries broadly edged blue (like greater coverts), tertials black, outer half of feathers edged blue; black of throat bordered below by shining dark purplish-blue on chest, breast, belly, sides and flanks; centre of belly and undertail-coverts chestnut; iris dark reddish-brown; bill black above, pale greyish below; legs black. Sexes similar. Juvenile is dusky, has wing and tail as on adult but duller, and crown patch duller and smaller. Race *subsimilis* is very like nominate, but coronal patch paler and duller orange-yellow; *caeruleoventris* differs in having crown patch brighter orange-yellow, and vent and undertail-coverts purplish-blue; *ignicapillus* is similar to previous, but undertail-coverts chestnut (as on nominate). Voice. A notably quiet species. Calls include high, thin "seeep", also short "tsit" notes.
Habitat. Dense montane forest, mossy elfin woodland and patches of stunted mossy shrubbery at or slightly above normal tree-line. At c. 2600 m to 3400 m (occasional records down to 2300 m and up to 3800 m) in Colombia; mainly 2500–3300 m (locally 2100–3550 m) in Ecuador; mostly 2900–3700 m (locally down to 2500 m) in Peru.
Food and Feeding. Of three stomachs examined, one contained only vegetable matter and one only animal matter, and one contained both; contents included seeds and insects. Found generally in pairs or in small groups of up to about four individuals, most often associated with mixed-species flocks. Forages usually c. 0·5–5 m up; tends to remain out of sight as it hops and peers in dense foliage, pops out into open briefly, or flies low across small gaps and dives quickly into cover.
Breeding. In Colombia, juveniles in May in Cundinamarca and Cauca, begging juvenile in Jul in Puracé National Park, and juvenile with adult in May in Nariño, and 12 breeding-condition birds in Feb–Aug in C & N end of E Andes; in Ecuador, juveniles in Mar and Jul in NW and juvenile with adult in Aug in N; in Peru, juveniles in Jun in N Cajamarca, Sept in La Libertad and Oct in Amazonas. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common throughout range. As with most upper-montane and tree-line species, firewood-cutting, land clearance and human settlement have reduced and fragmented populations to varying degrees; this species appears not, however, to be facing immediate threats. Occurs in a number of protected areas, including Paramillo, Farallones de Cali and Puracé National Parks (Colombia), Uangantes, Sangay, Cajas and Podocarpus National Parks (Ecuador) and Cordillera de Colán Reserved Zone (Peru).

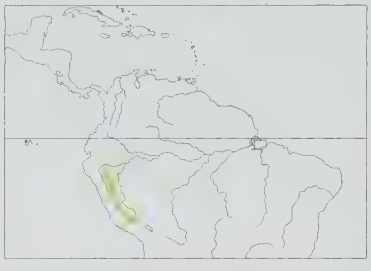
Bibliography. Bangs & Penard (1919), Best *et al.* (1993), David & Gosselin (2002b), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Goodfellow (1901), Hilty & Brown (1983, 1986), Isler & Isler (1999), Krabbe *et al.* (2001), Lloyd (2009), Mazar Barnett *et al.* (2006), Meyer de Schauensee (1966, 1970a), Moynihan (1979), Olivares (1969), Parker *et al.* (1985), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sedano & Burns (2010), Sibley & Monroe (1990), Zimmer (1944).

100. **Yellow-scarfed Tanager**

Iridosornis reinhardti

French: Tangara de Reinhardt **German**: Goldbandtangare **Spanish**: Tangara de Reinhardt

Taxonomy. *Iridornis reinhardti* P. L. Sclater, 1865, no locality = east slope of Peruvian Cordilleras.
May form a superspecies with *I. rufivertex*, and sometimes considered conspecific, although there are significant morphological differences. Monotypic.
Distribution. E slope of Andes S of Marañón Valley (from Amazonas to Ayacucho) and Cordillera Vilcabamba (in Cuzco), in Peru.



Descriptive notes. 14 cm; 19·5–28 g. Distinctive dark tanager with yellow band over head; bill stubby and thick. Has head, neck, mantle and throat black, broad golden band extending across hindcrown and downwards on each side of head to ear-coverts (resembling earmuffs or scarf across rear of head); back, rump, uppertail-coverts and breast and lower underparts, including undertail-coverts, intense purplish-blue, occasionally a small amount of chestnut in undertail-coverts; upperwing-coverts, flight-feathers and tertials black, broadly edged greenish-blue (edging not in strong contrast to rest of plumage), tail dark blue; iris dark reddish brown; upper mandible blackish, lower mandible pale grey with black tip; legs blackish. Sexes similar. Juvenile apparently undescribed. Voice. Call a sharp, high-pitched "tzit"; also "tzizi" and "tip" and "ti". A possible song described as a clear (high-pitched) "tsee tsee-dee".
Habitat. Humid montane forest and forest borders, elfin woodland at tree-line, and scrubby low vegetation on hillsides. At 2050–3500 m; most records at 2600–3050 m.
Food and Feeding. Mostly berries and small fruits, supplemented by a few insects. Of ten stomachs examined, six contained only vegetable matter and one only animal matter, and three held both; contents included fruit, seeds and insects. Found in pairs or, more often, parties of 3–5 individuals, and about equally with mixed-species flocks and away from them. Forages from near ground to tops of smaller trees, and occasionally hops on ground; in general inconspicuous, keeps mostly within cover or appears only briefly before retreating again. Obtains food items by hopping quickly through interior of trees, especially on mossy branches, where it probes and picks at moss, including hanging tufts of moss, and sometimes drops down to ground to inspect moss-covered surfaces of roots, rocks, etc. May hang downwards to glean prey from small leaves or bare branches; has been seen moving upwards or downwards in trees rapidly, in a series of short rapid hops.
Breeding. Juvenile with adult in Jun in Huánuco. No other information.
Movements. Presumed resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Northeast Peruvian Cordilleras EBA and Bolivian and Peruvian Upper Yungas EBA. Fairly common within narrow band of high-elevation forest which its inhabits. Forest destruction, firewood-cutting and other human activities affect the species locally, but long-term populations trends unknown. Occurs in several protected areas, including Cordillera Azul and Tingo Maria National Parks.
Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Parker & O'Neill (1980), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990), Terborgh (1971), Vuilleumier (1970), Walker (2001), Weske (1972).

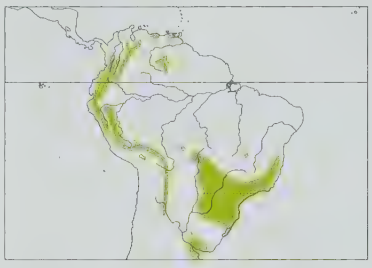
Genus *PIPRAEIDEA* Swainson, 1827

101. **Fawn-breasted Tanager**

Pipraeidea melanonota

French: Tangara à dos noir **German**: Schwarzrückentangare **Spanish**: Tangara de Antifaz

Taxonomy. *Tanagra melanonota* Vieillot, 1819, Rio de Janeiro, Brazil.
Systematic position of present species has been much debated; recent DNA evidence suggests that it is properly placed in present family and is closely related, and probably sister, to *Thraupis bonariensis*. Taxonomic status of SE populations may be worthy of investigation. Two subspecies recognized.
Subspecies and Distribution.
P. m. venezuelensis (P. L. Sclater, 1857) – mountains of N, NE, SW & S Venezuela (coastal range from Carabobo E to Distrito Federal and Miranda; Sucre and Monagas; locally in Andes from NW & S Lara S to Táchira; Cerro Yaví and Cerro Taracuniña, in N & S Amazonas; probably also mountains of SE Bolívar), and W, C & E Andes of Colombia S on both slopes to Ecuador, Peru (S on W slope to Lima, on E slope throughout), Bolivia and NW Argentina (S to Tucumán and Catamarca).
P. m. melanonota (Vieillot, 1819) – S & SE Brazil (locally SW Mato Grosso; and S Bahia and E Minas Gerais S to C Rio Grande do Sul), E Paraguay, NE Argentina (Misiones and N Corrientes; NE Buenos Aires S to Punta Indio) and S Uruguay.
Descriptive notes. 14 cm; 18–25 g. Unusual tanager with short, wide, hirundinid-like bill with small hook, rather short legs, long wings and short tail, and sky-blue crown. Male nominate race has crown and nape medium blue, forehead, lores, ocular area and ear-coverts deep black, forming broad mask; mantle and back dull blue, lower back and rump contrasting turquoise-blue, uppertail-coverts dark blue, tail dusky blue; upperwing-coverts blackish, rather obscurely edged dark blue, primary coverts and flight-feathers dusky, narrowly edged blue, tertials blackish, more broadly edged dull dark blue; throat and entire underparts buffy cinnamon, variable, from dark buff-cinnamon to buff and to whitish-buff; iris dark red to reddish-brown; bill dusky, with lower mandible usually grey; legs slaty. Female is similar to male, but considerably duller, especially crown, which varies from dull turquoise to dull dusky blue; back tinged brownish, rump dull turquoise (duller than male), uppertail-coverts and tail dull dusky blue, wings duller; underparts generally paler than on male, but amount of buff to buffy whitish likewise variable. Juvenile is dingy brownish-grey above and almost without pattern; immature like female, but duller. Race *venezuelensis* is similar to nominate, but slightly darker above, paler below, and with iris brighter red. Voice. Infrequently heard song a series of high "see" or "sweee" notes, varying from 4 or 5 notes given slowly to a dozen or more uttered very fast like pulsating trill; does not sing regularly, but an individual may occasionally sing over and over for several minutes. In Brazil, a second song type described, more varied and possibly with mimicry.



Habitat. Bushy pastures, cultivated and small semi-open areas with large trees, along forest borders and in clearings with scattered trees; mostly humid areas. Essentially a bird of forest edge and lighter woodland over most of its range. Elevational range varies geographically; in Andes mostly c. 1500–2500 m, occasionally to 3000 m, but as low as 400 m in N Venezuela, and in Colombia down to 900 m on Pacific slope and irregularly up to 2600 m on Sabana de Bogotá; in Ecuador mostly 1000–2800 m, but as low as 400 m on W slope in NW Azuay, and once to 3100 m; in Peru down to 700 m on Pacific slope S to Lima, mainly 1100–2900 m on E slope (a few S Peru records as low as 600 m may represent austral migrants or wandering young); in Bolivia 350–3250 m; in Argentina occurs to 500 m in Tucumán. Nominate race found from sea-level to 2050 m (on Mt Itatiaia) in SE Brazil.
Food and Feeding. Of ten stomachs examined, six contained only vegetable matter and four contained vegetable and animal matter; contents included berries, fruit pulp, seeds, and larvae. Observed also to take moths and ithominid butterflies (Lepidoptera), buds and flowers. Something of a "loner", although sometimes associates with mixed-species flocks, and may appear at fruiting trees with other species. Behaviour may recall that of both *Tersina* and *Tangara*. Seems curiously detached, flighty at times; apt to fly off some distance, flight swift and fluid, before alighting. Forages mostly in canopy or upper levels of trees when in woodlands, but at almost all levels in more open areas, especially when feeding at fruiting trees and shrubs. Often hops along large limbs and perch-gleans; occasionally sallies up and hovers briefly beneath a leaf, or sallies to air for flying insects. Has been seen to search bromeliads and undersides of branches.
Breeding. Fledgling in Jul in W Venezuela (Mérida); nest-building in Mar (Huila) and birds in breeding condition in Mar (Huila) and Jul (Valle) in Colombia; adult carrying nest material in early Mar in SW Ecuador (Tambo Negro, in Loja); and juvenile or immature in Aug in C Peru (Junín). Pair in Peru observed when carrying moss to nest-site 15 m up in clump of epiphytes on tree branch at edge of clearing; nest in Brazil was 20 m up in ferns and epiphytes on horizontal branch. No other information.
Movements. Nomadic or seasonal migratory movements known, but poorly documented. In N Venezuela (coastal cordillera) present mainly Jan–Jun (presumed breeding period); in Pacific Colombia, present Nov–Mar in Anchicayá Valley at 1050 m. Populations in S of range (Argentina) may undertake some seasonal movements N during coolest months.
Status and Conservation. Not globally threatened. Rare to fairly common (periodically or seasonally), and widespread. Occurs in wide range of forest-border and semi-open habitats, and may be expanding its range locally with partial opening of forest in Andes, and perhaps elsewhere. No short-term risks known. Occurs in numerous protected areas over its vast range, which encompasses large amounts of suitable unprotected habitat.
Bibliography. Alvarez-Rebolledo *et al.* (2003), Anon. (2000), Belton (1985), Best *et al.* (1996), Brown & Neto (1976), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Collins & Watson (1983), Contreras & Contreras (1993), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Goodfellow (1901), Hilty (1977, 1997, 1994, 2003), Hilty & Brown (1986), Isler & Isler (1999), Koepcke (1970), Krabbe *et al.* (2001), Meyer de Schauensee (1966, 1970a), Miller (1963), Mitchell (1957), Moore *et al.* (1999), Narosky & Di Giacomo (1993), Olivares (1969), Parker & Goerck (1997), Remsen *et al.* (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Sick & Pabst (1968), Souza (2002), Taczanowski (1884), Walker (2001), Weske (1972), Zimmer (1943a).

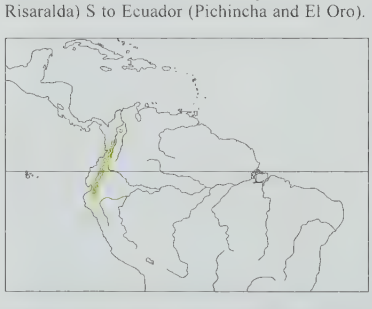
Genus *CHLOROCHRYSA* Bonaparte, 1851

102. **Glistening-green Tanager**

Chlorochrysa phoenicotis

French: Calliste étincelant **German**: Rotohr-Bunttangare **Spanish**: Tangara Verde

Taxonomy. *Calliste phoenicotis* Bonaparte, 1851, Nanegal, Ecuador.
Although genus traditionally placed next to *Tangara* in linear taxonomic sequences, genetic data, together with glistening plumage, leg morphology, and voice, indicate that the two genera are not closely related. Monotypic.
Distribution. Colombia on W slope of C Andes (Antioquia) and Pacific slope of W Andes (from Risaralda) S to Ecuador (Pichincha and El Oro).



Descriptive notes. 13 cm; 20–24·5 g. Small, brilliant green, strong-legged tanager with bill thinner and longer than that of *Tangara*. Male is glistening emerald-green above and below (black feather bases concealed), slightly darker green on back, paler on rump; small inconspicuous tuft of shining greyish-olive feathers behind eye, immediately behind this another small (more conspicuous) tuft of bright orange feathers thickened and club-like at tips; tail blackish, central feathers greenish with bright green edges, outer rectrices edged bright green; lesser and median upperwing-coverts glistening greyish-olive (usually concealed), greater coverts black (mainly inner webs), outer webs broadly edged and tipped bright green; flight-feathers blackish, basal half of outermost primaries very narrowly edged bright green, inner primaries and all secondaries much more broadly edged bright green, tertials mostly bright green, outer half

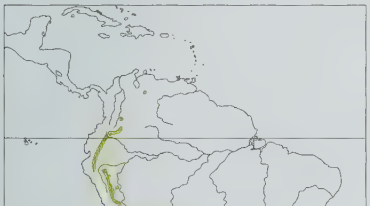
of inner web blackish; iris dark brown; bill black; legs blackish-grey. Female is similar to male, but slightly duller (although still highly glistening). Juvenile apparently undescribed. Voice. All vocalizations have wheezy or lispy sound. Commonest call during foraging a high, lisping and weak 3-note to 4-note "czee, czee, czee" or more buzzy "ee-see-seez-seez". Song in Ecuador a similar series of notes, more prolonged, "czee-czee-czeet czeet, czee czee czee", last notes slower, this series sometimes followed by extremely rapid series of ticking notes that may accelerate, then slow or end in rapid high-pitched jumble of notes.
Habitat. Canopy and borders of wet mossy forest (cloudforest) and older second growth. Recorded at c. 700–2200 m in Colombia (most records above 1000 m); in Ecuador mostly 600–1700 m, occasionally to 2000 m.
Food and Feeding. Small arthropods, including larvae; also fruit. In Colombian study, insect captures accounted for 62% of foraging records and included many caterpillars, and fruit comprised remaining 38% of records; Melastomataceae berries (especially *Miconia*) accounted for 91% of all fruit eaten. Berries usually swallowed whole. Single individuals, pairs and family groups usually forage with mixed-species flocks containing other tanagers, and regularly visit fruiting trees. In Colombia foraged from higher part of understorey upwards to canopy of small to large trees; median foraging height (63 observations) was 9 m. Notably active and acrobatic, often hangs upside-down from twigs or leaves, or stretches upwards to reach undersides of overhead leaves; also hops or runs rapidly over mossy branches and on epiphytes, and gleans from clumps of moss, bromeliads, vine tangles, hanging dead leaves and, especially, outer foliage. Often searches for insects by hopping rapidly up through palm frond leaflets. Takes small arthropods and larvae especially from undersides of leaves; unlike many species of *Tangara*, does not forage by peering with head downwards.
Breeding. Season evidently May–Sept in Colombia, including two breeding-condition birds in Jun at N end of C Andes, nesting evidence Apr–Jun in Valle, and begging juvenile on 6th Sept in Nariño. One nest in Colombia was a small cup hollowed in moss at medium height on side of limb. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Uncommon. Confined to narrow band of pre-montane and montane wet forest on W slope of Andes in Colombia and Ecuador, an area under intense pressure from deforestation, mining, legal and illegal farming operations, and an expanding human population. Occurs in a few protected areas, most notably Tatamá, Farallones de Cali and Munchique National Parks and Tambito and El Pangan Nature Reserves (Colombia), and probably Maquipucuna Reserve (W Ecuador). Near-term risks to the species are probably low, but the longer-term outlook is less certain.
Bibliography. Burns & Naoki (2004), Chapman (1926), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Isler & Isler (1999), Hilty (1997, 2009a), Hilty & Brown (1986), Innes (1979), Meyer de Schauensee (1964, 1966, 1970a), Moore *et al.* (1999), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010).

103. Orange-eared Tanager

Chlorochrysa calliparaea

French: Calliste oreillard **German**: Braunohr-Bunttangare **Spanish**: Tangara Orejinaranja

Taxonomy. *C.*[*allospiza*] *calliparaea* Tschudi, 1844, "Chinchon forests", Junín, Peru.
Although genus traditionally placed next to *Tangara* in linear taxonomic sequences, genetic data, together with glistening plumage, leg morphology, and voice, indicate that the two genera are not closely related. Sight records of this species in W Venezuela may refer to race *bourcieri* or to an undescribed race. Three subspecies recognized.
Subspecies and Distribution.
C. c. bourcieri (Bonaparte, 1851) – S Colombia (W slope of E Andes in Cundinamarca S to head of Magdalena Valley, in Huila; E slope of E Andes S from Caquetá) S to E Ecuador and E slope in N Peru (Huánuco S to Huallaga Valley).
C. c. calliparaea (Tschudi, 1844) – E slope of Andes of Peru (Pasco S to N Ayacucho).
C. c. fulgentissima Chapman, 1901 – E slope of Andes of S Peru (from Cuzco) S to Bolivia (S to NW Cochabamba).
Also recorded (race uncertain) on E slope of Andes in W Venezuela (on Mérida–Barinas border).



Descriptive notes. 12 cm; 14·9–21·5 g. Small, strong-legged green tanager with dark throat and narrow orange rump; bill longer and thinner than that of *Tangara*. Male nominate race has body plumage mainly glistening emerald-green, feathers with black bases; small golden-orange patch on centre of crown, prominent bright orange band across lower rump; three central pairs of tail feathers dark green, sharply edged bright green, rest mainly black, narrowly edged bright green; upperwing-coverts black, edged bright green, outer half of feathers tinged green; primary coverts black, flight-feathers black, basal half of outermost primaries edged bright green, rest of primaries and all secondaries almost entirely edged bright green, tertials edged bright green and outer web of each feather greenish, inner web blackish; throat black, joining with conspicuous, triangular-shaped, small burnt-orange patch on side of neck, otherwise glistening green below, lower breast and belly intense glistening dark blue-green; iris dark brown; bill black; legs dark grey. Female is like male, but somewhat duller green, with less bluish on belly, smaller neck patch. Immature is mainly dull green. Race *bourcieri* is similar to nominate, but blue of lower underparts less dark and less intense, female much duller, with grey throat, smaller orange neck patch, only hint of blue on belly; *fulgentissima* has crown patch yellowish, neck patch bright red, and throat and entire central area of breast and belly deep violet-blue, female extensively violet-blue on throat and breast, like male but duller, retains red neck patch. Voice. Dawn song a slow series of 4–8 or so notes, "pseet pseet pseet pseet pseet", rather high-pitched, wheezy and lisping. Song, in Peru, described as a complex, long series of high, wiry warbles, with certain phrases repeated many times. Call a high, wheezy "seeep".
Habitat. Favours humid and wet middle-elevation mossy forest (cloudforest), forest borders, and taller second growth. At 900–2000 m, but most records c. 1000–1700 m; 1600–1800 m in upper Magdalena Valley, in Colombia. Reported in Venezuela at c. 1450 m.
Food and Feeding. Small arthropods; also fruit, especially small berries, such as those of *Miconia* and other melastomes. Of nine stomachs examined, seven contained only vegetable matter, one only animal matter and one both; contents included fruit, seeds, and six caterpillars (five larger than 20 mm). Usually found singly or in pairs, and usually foraging with mixed-species flocks containing other tanagers, especially *Tangara*. Forages mostly between middle heights and canopy. Moves in speedy fashion, running out along mossy branches and into terminal foliage, often hanging upside-down from twigs, petioles and leaves; spending more time searching for small arthropod prey than seeking fruit.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon in N of range, locally more numerous towards S. Inhabits narrow band of wet E slope pre-montane and montane forest that is under pressure in many areas from human settlement and deforestation. Occurs in some protected areas, among them Cordillera Los Picachos National Park (Colombia), Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador), Manu National Park (Peru) and Madidi National Park (Bolivia). Within its range there also is extensive intact habitat that is unprotected, but secure in at the short term.
Bibliography. Burns (1997a), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Goodfellow (1901), Hilty (1999, 2003), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Mee *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Terborgh & Weske (1975), Walker (2001), Zimmer (1930, 1943a).

104. Multicolored Tanager

Chlorochrysa nitidissima

French: Calliste multicolore **German**: Schwarzohr-Bunttangare **Spanish**: Tangara Multicolor

Taxonomy. *Chlorochrysa nitidissima* P. L. Sclater, 1874, Antioquia, Colombia.
Although genus traditionally placed next to *Tangara* in linear taxonomic sequences, genetic data, together with glistening plumage, leg morphology, and voice, indicate that the two genera are not closely related. Monotypic.
Distribution. Colombia: locally on both slopes of W Andes from Risaralda and extreme S Antioquia S to W Cauca (Munchique area); and C Andes at N end (Antioquia), on W slope (Quindío, and reported from Ucumarí Regional Park, in Risaralda) and on E slope (Caldas).



Descriptive notes. 12 cm; 17·3–21·6 g. Small, strong-legged tanager with mostly yellow head and glistening harlequin-patterned plumage; bill longer and thinner than that of *Tangara*. Male has forehead to mid-crown, side of head to behind eye, and throat bright golden-yellow, centre of throat golden-orange, oval black patch on ear-coverts bordered behind and below by chestnut; rear crown and nape glistening golden-green; large, triangular glistening lemon-yellow patch on mantle and upper back, lower back to uppertail-coverts glistening turquoise-blue; tail dusky, central feathers tinged green and edged bright green, outer feathers mainly edged bright green; upperwing-coverts dusky, prominently edged and tipped bright green; flight-feathers dusky, basal half of outermost primaries and entire length of rest of primaries edged bright green, secondaries and tertials with outer half of each feather green and also edged brighter green; breast and lower underparts mostly glistening turquoise-blue, sides and flanks mixed glistening green and blue, centre of lower breast and belly black, undertail-coverts glistening blue-green; iris dark brown; bill black; legs dark grey. Female is similar to male, but considerably duller, head mostly dull yellow with blackish-chestnut ear patch, golden-yellow of throat somewhat stained brownish along sides, entire mantle and back bright greenish (no yellow patch on mantle), rump glistening bluish-green, tail and wings as on male but slightly duller green; glistening green below, somewhat duller on lower underparts. Immature is like female, but even duller. Voice. Call one to several wheezy "ceeet" or "swee" notes, similar to those of *C. calliparaea*. Possible song may consist of a brisk series of c. 4 wheezy "swee-see-see-see" notes.
Habitat. Humid and wet mossy forest, tall older second-growth woodland and forested borders, at c. 1300–2200 m in C Andes and E slope of W Andes; very locally on Pacific slope down to 900 m.
Food and Feeding. Few data. Reported food items include insects, mainly taken when foraging with mixed-species flocks in forest interior. Also fruit.
Breeding. Stub-tailed juvenile with two adults on 1st Nov and grown juvenile on 8th Jan in W Andes above Cali (Valle del Cauca). No other information.
Movements. Evidently resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Colombian Inter-Andean Slopes EBA and Chocó EBA. Uncommon, local and declining. Since 1951 recorded at only two sites in C Andes, Ucumarí Regional Park (Risaralda) in early 1990s and, farther N, near Anorí (Antioquia) in 1999; in W Andes, almost all modern records are from localities in Valle del Cauca where access by ornithologists is possible. This species was formerly common, but has declined throughout range and is now recorded only infrequently and very locally, primarily in remnant forest fragments. Perhaps greatest number of recent sightings in W Andes in vicinity of Cali and N of there, including Pichindé Valley (unprotected), private forests near El 18 (Bosque de San Antonio, above Cali), Yotoco Forest Reserve, Tambito Nature Reserve and Farallones de Cali, as well as to S in Munchique National Park; also in C Andes at Otún-Quimbaya Sanctuary, in Ucumari section of Los Nevados National Park (Risaralda), and in Reserva Arrierito Antioquena (Piha Reserve) and adjacent Anorí area (N Antioquia). Other sites include Cañon del Río Barbas y Bremen (Risaralda), La Finca la Betulia–Reserva la Patasola (Quindío), La Forzosa–Santa-Gertrudis, and La Victoria. A few large tracts of intact habitat remain within its range (Farallones de Cali and Los Nevados National Parks; and Caramanta massif, near Cerro Tatamá, including Alto de Pisones area), but deforestation has been severe and continues. Furthermore, within its range an expanding network of roads is opening up ever more remote areas to logging, mining, agriculture and human occupation, all of which lead to more deforestation. This species' range is now highly fragmented, and populations are in critical need of baseline monitoring data.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Butchart & Stattersfield (2004), Chapman (1917), Donegan & Dávalos (1999), Dunning (1982), Hilty (1985), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Miller (1963), Remsen *et al.* (2010), Renjifo *et al.* (2002), Ridgely & Tudor (1989), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000), Wege & Long (1995).



PLATE 11

inches 3
cm 8

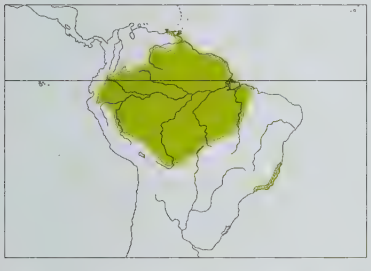
Genus *TANGARA* Brisson, 1760

105. Turquoise Tanager

Tangara mexicana

French: Calliste diable-enrhumé **German**: Türkistangare **Spanish**: Tangara Turquesa
Other common names: White-bellied Tanager (*brasiliensis*)

Taxonomy. *Tanagra mexicana* Linnaeus, 1766, Cayenne, French Guiana.
Based on genetic data this species is sister to *T. inornata*. Race *brasiliensis*, long regarded as a separate species because of its larger size, paler plumage and geographical isolation, has more recently been treated as a race of present species, but status merits further consideration. Proposed race *lateralis* (described from Apacy, on R Tapajós) is now generally considered an intergrade between nominate and *boliviana*; further study required. Five subspecies currently recognized.
Subspecies and Distribution.
T. m. vieilloti (P. L. Sclater, 1857) – Trinidad.
T. m. media (Berlepsch & E. J. O. Hartert, 1902) – E Colombia (Vichada) and NE & S Venezuela (Monagas, Sucre Delta Amacuro and, S of R Orinoco, Amazonas and Bolívar).
T. m. mexicana (Linnaeus, 1766) – the Guianas and Brazil (E to E Pará and S to C Mato Grosso).
T. m. boliviana (Bonaparte, 1851) – E Colombia (from W Meta and R Guaviare) E through Amazonian Brazil to Pará, W Goiás and C Mato Grosso, S through E Ecuador and E Peru to N & NE Bolivia (Santa Cruz).
T. m. brasiliensis (Linnaeus, 1766) – coastal SE Brazil (S Bahia S to Rio de Janeiro).



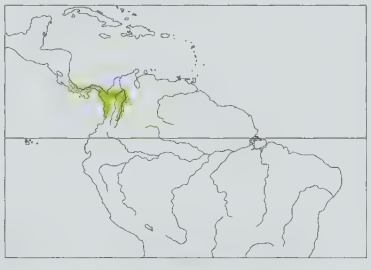
Descriptive notes. 14 cm, 26 g (*brasiliensis*); 12 cm, 17–23·5 g (other races). Small tanager with dark, mottled appearance and contrasting yellow belly. Nominate race has mid-crown to nape and most of upperparts deep velvety black, glistening pale blue rump and uppertail-coverts somewhat mottled with black; tail black, all feathers except central pair edged dark blue; small black area encircling bill, narrow black orbital ring, faint blue supercilium, otherwise forecrown, side of head and throat to upper breast glistening cobalt-blue to purplish-blue, some black feather bases showing as mottling and spangling (especially on lower throat, and continuing to side of neck and to central breast); lesser upperwing-coverts turquoise-blue, median coverts black, broadly tipped shining blue, greater coverts black, narrowly edged blue, primary coverts black, edged blue; flight-feathers black, basal half of outer feathers edged pale blue; lower breast, belly and undertail-coverts pale yellow, sides and flanks blue to purplish-blue with heavy black scalloping and spotting; iris dark brown; bill and legs black. Sexes similar. Juvenile is mainly dull dusky blue above and dull pale yellowish-white below, with dusky on chest; immature plumage pattern more like that of adult, but duller above and below. Race *boliviana* differs from nominate in having lower breast to undertail-coverts richer-coloured, bright creamy yellow; *media* differs in more well-defined blue eyebrow (but still inconspicuous), sides and flanks heavily spotted, and with little violet-blue; *vieilloti* has blue of head and breast darker than previous, and yellow lower underparts richer and brighter; *brasiliensis* is significantly larger, overall paler, more silvery blue, including lesser wing-coverts, and with white (not yellow) lower underparts. Voice. Calls mainly rapid streams of high, chipping "tic" notes, often accelerating into trills, especially as group takes flight; higher-pitched than calls of many congeners. No song yet described.
Habitat. Humid forest borders, broken second growth, lighter or disturbed forest, trees in clearings, along river and oxbow-lake edges, and along gallery forests in partly open areas; small numbers also in upper canopy and emergent treetops of lowland forest. Lowlands to c. 500 m over most of range; to 1000 m in Colombia and Venezuela (once to 2000 m on Cerro de la Neblina, in S Venezuela); isolated race *brasiliensis* to 500 m in SE Brazil.
Food and Feeding. Arthropods and fruits. Of four stomachs examined, three contained only vegetable matter and one only animal matter; additional contents included mistletoe berries (Loranthaceae). In Trinidad, recorded as eating 26 species of fruit, of which 31% were berries of *Miconia* species; other fruit prominent in diet included *Cecropia* (13%), *Ficus* (10%) and *Ilex* (8%); in SE Brazil (race *brasiliensis*), recorded as taking buds of Leguminosae, melastome berries, pieces of guava fruit (*Psidium*), and bananas. Notably social, lives in groups of 3–10 individuals, sometimes more; usually independent of mixed-species flocks, or associates with them irregularly or for only short periods of time. In SE Brazil, more often seen in pairs. Forages from canopy down to about eye level, higher when searching for insects. In Trinidad, insect-seeking accounted for 47% of 433 foraging records, fruit for 53%; typically, took berries while perched and either swallowed them whole or mashed them; pecked pieces from larger fruit. Most insects sought on underside of rather open bare and often dead branches of c. 1·3 cm or less in diameter (91% of 201 insect-hunting records); also spent some time in searching foliage, flowerheads and seedheads, and made sallies to air. Elsewhere in range, foraging behaviour similar to that observed in Trinidad, this species favouring middle levels to high open, bare branches as foraging sites.
Breeding. In E Colombia nests reported in Feb and Oct; season Apr–Oct in Trinidad and Feb–Apr and Aug in Suriname; recorded Nov in Pará, in Brazil. Pairs separate from flock to breed, but start rejoining flock intermittently as soon as eggs hatch. Co-operative breeding recorded at two nests in Trinidad, where nestlings fed by and attended by all members of group from hatching until independence. Nest built by female, attended by male, a deep cup of moss and fibres, decorated on outside with lichens and leaves, two Trinidad nests 6 m and 7·5 m above ground, one in upright fork of mango tree; reported as usually nesting high in Suriname; a Brazil nest was in branch fork in shrub. Clutch 2–3 eggs, greyish to greenish with brown or purple markings; in captivity, incubation period 12–14 days. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Widespread, and uncommon to locally common; small isolated population along coastal SE Brazil (*brasiliensis*). Found in many protected areas and also widely in unprotected areas. Primarily an "edge" species that derives some benefit from limited forest disturbance. Status of *brasiliensis* more problematic, because of extreme deforestation in coastal region of SE Brazil; may be largely confined to protected areas, such as Sooretama and Poço das Antas Biological Reserves, among others.
Bibliography. Beebe (1909), Belcher & Smooker (1937), Burns & Naoki (2004), Boesman (1998), Collins & Araya (1998), Descourtilz (1852), Diamond & Lovejoy (1985), Dick *et al.* (1984), Dunning (1982), ffrench (1991), Haverschmidt (1948, 1968), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Ingels (1974c), Isler & Isler (1999), Marantz & Zimmer (2006), Mee *et al.* (2002), Munn (1985), Novaes (1973), Oren & Parker (1997), Parker & Goerck (1997), Pearson (1971, 1975b), Pelzeln (1869), Pinto (1944b), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snow, B.K. & Snow (1971), Snow, D.W. & Collins (1962), Snyder (1966), Souza (2002), Sproule (2006), Terborgh & Weske (1969), Tostain *et al.* (1992), Willis (1977), Yuri & Mindell (2002), Zimmer (1943c).

106. Plain-colored Tanager

Tangara inornata

French: Calliste gris **German**: Schlichttangare **Spanish**: Tangara Cenicienta
Other common names: Plain Tanager

Taxonomy. *Calliste inornata* Gould, 1855, Santa Fé de Bogotá, Colombia.
Based on genetic data this species is sister to *T. mexicana*. Three subspecies recognized.
Subspecies and Distribution.
T. i. rava Wetmore, 1963 – Caribbean slope in Costa Rica (S from Heredia) and Panama (S to Colón and Coclé).
T. i. languens Bangs & Barbour, 1922 – Panama (Caribbean side E from Colón and Coclé, and Pacific slope E from W Panamá) E to Colombia (Chocó, and S in Pacific lowlands to N Valle del Cauca).
T. i. inornata (Gould, 1855) – N Colombia at N base of W Andes (Sinú Valley in Antioquia), lower Cauca Valley (in Antioquia), and middle Magdalena Valley (from Antioquia S to Caldas, Santander, Boyacá and Cundinamarca).



Descriptive notes. 12 cm; 16·4–19·1 g. One of the few members of genus that lacks colourful plumage. Nominate race is mainly dark lead-grey on head and back, slightly paler grey on rump and uppertail-coverts; lesser upperwing-coverts bright blue (usually concealed), rest of coverts, flight-feathers and tail plain blackish; throat, chest and sides plain neutral-grey, fading to dull whitish (or faintly tinged buff-white) on centre of breast, belly and undertail-coverts; underwing-coverts white; iris dark brown; bill and legs black. Sexes similar. Immature is duller and even plainer than adult. Race *rava* is similar to nominate, but has faint buff tinge on breast, more prominent buff on belly and undertail-coverts; *languens* differs in having head and upperparts decidedly paler, more plain grey, rump slightly paler than back, and throat and chest slightly paler grey than nominate, central breast tinged buffy white (not white). Voice. Song of c. 15 notes, a short fast series of "tsst" that gradually slows; also described as a random series of high thin whistles, short staccato notes and sputters, "tseee tsp tsp tsee tsp tseee tseee tsp tsp tsp". Calls mostly high-pitched, sibilant, and not especially distinctive, including "tst", "tsit", "tseep" and "jeet", singly or sometimes accelerating into rapid dry trill; short "trrr" in flight.
Habitat. Humid forest borders, second growth and disturbed or semi-open areas, gardens, parks, plantations and urban areas with trees; occasionally forest canopy. Lowlands to c. 400 m in foothills in Costa Rica; to 800 m in Panama and to 1000 m in Colombia.
Food and Feeding. Arthropods and fruit. In Panama recorded as eating wide variety of small (3–5 mm) fruits, including those of *Tetracera* (Dilleniaceae), *Lantana* (Verbenaceae) and *Hamelia* (Rubiaceae), and catkins of *Cecropia*; last-mentioned commonly consumed throughout range. Lives in pairs or in groups of 3–4 when breeding; in groups of up to about six individuals, occasionally larger groups, outside breeding season. Nervous, fidgety, almost hyperactive, and often noisy as it constantly flicks wings and tail, and flies from tree to tree. Forages mainly in canopy of trees, but descends to shrubs for fruit.
Breeding. All information from Panama. Season Mar–Aug. At one nest two nestlings fed by four adults, which visited together. Nest a tidy cup of light-coloured fibres covered with green moss, spider webs and cocoon silk; each of three nests c. 9 m up in foliage of fruiting tree, another nest 20 m up. Clutch 2 eggs, whitish, speckled. No other information.
Movements. Resident. Reported seasonal variation in numbers in C Panama, suggesting some regional movements.
Status and Conservation. Not globally threatened. Uncommon to fairly common in much of range. Found in several protected areas, including Metropolitan, Soberanía, Chagres and Darién National Parks (Panama) and Los Katíos National Park and El Paujíl Reserve (Colombia). This species' range also includes much suitable second-growth and forest-edge habitat. Unlikely to face any risks in immediate future.
Bibliography. Burns & Naoki (2004), Davis (1972), Dunning (1982), Eisenmann (1952), Garrigues & Dean (2007), Greenberg (1981c), Hilty & Brown (1986), Isler & Isler (1999), Karr (1977), Leck (1971a, 1971b, 1972c, 1975), Meyer de Schauensee (1964, 1966, 1970a), Moynihan (1962c), Olivares (1969), Remsen *et al.* (2010), Ricklefs (1976), Ridgely & Gwynne (1989), Salaman *et al.* (2008), Sedano & Burns (2010), Skutch (1954, 1976), Slud (1964), Stiles (1983), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984), Willis (1980), Willis & Eisenmann (1979).

107. Azure-rumped Tanager

Tangara cabanisi

French: Calliste azuré **German**: Cabanistangare **Spanish**: Tangara Chiapaneca
Other common names: Cabanis's Tanager

Taxonomy. *Calliste cabanisi* P. L. Sclater, 1868, Costa Cuca, Guatemala.

On following pages: 108. Grey-and-gold Tanager (*Tangara palmeri*); 109. Paradise Tanager (*Tangara chilensis*); 110. Seven-colored Tanager (*Tangara fastuosa*); 111. Green-headed Tanager (*Tangara seledon*); 112. Red-necked Tanager (*Tangara cyanocephala*); 113. Brassy-breasted Tanager (*Tangara desmaresti*); 114. Gilt-edged Tanager (*Tangara cyanoventris*).

Originally described under name *Calliste sclateri*, but that name is invalid, as preoccupied. On basis of plumage, habitat and voice appears most closely related to *T. palmeri*. Monotypic.
Distribution. S Mexico (Sierra Madre de Chiapas) and adjacent SW Guatemala.



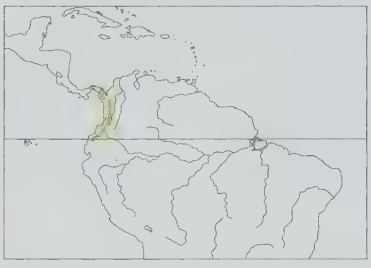
Descriptive notes. 14 cm. Pale blue-grey tanager with black-speckled collar across whitish chest. Has crown bluish-grey, becoming silvery blue on nape, bluish-green on mantle and azure-blue on rump; crown and back somewhat speckled and scaled with dusky; lesser upperwing-coverts mostly pale blue (turquoise-blue), median and greater coverts black, edged bluish, flight-feathers black, all except outermost primaries edged pale blue, tertials black, more broadly edged pale blue; tail feathers blackish, narrowly edged pale blue; lores black, black extending narrowly over bill, and blackish line across lower ear-coverts (variable in extent and length); otherwise, face and entire underparts pale bluish-white to greenish-white (varies with light), lower throat, chest and upper breast somewhat scaled and mottled with black (forming speckled collar); iris dark brown; bill dark grey, dusky tip; legs blackish. Differs from similar *T. palmeri* mainly in smaller size and more bluish appearance. Sexes similar. Juvenile is like adult, but duller, crown greyish with pale blue tinge, back similar but with small amount of dark mottling, lesser wing-coverts greyish, flight-feathers edged duller blue, lores blackish, lower edge of ear-coverts with variable number of dark markings, whitish below, breast with minor dark mottling (amount variable), bill grey; older juvenile soon moults into plumage essentially identical to that of adult. Voice. Calls include high, rising "seee", rapid "chi-di-di-dit", high tittering notes and, in chases in flight, a buzzier "bzzz bzzz bzzz zeeah" and other notes. Song, delivered from high bare treetop branch, apparently a high, thin "seeeeawit, chi-di-di-di", sometimes repeated in rapid succession; may sing for several minutes from one perch, then move to another and continue singing.
Habitat. Tall humid broadleaf evergreen forest, forest borders and small plantation-like clearings with scattered trees, at 600–1800 m; most records above 1000 m, mainly 1250–1650 m.
Food and Feeding. Observed to eat figs (*Ficus*), melastome berries and insects in Mexico. Most often seen singly or in pairs, but noted also in small groups, and once a party of 26 individuals; occasionally forages with mixed-species flocks, but apparently more often independent of them. Active and noisy bouts of foraging interrupted by periods of quiet and rest in tops of large trees. Forages mostly in upper levels and canopy of forest, but sometimes lower, and once on ground at base of melastome shrub. Insect-searching behaviour included peering at leaves and leaf axils, examining undersides of outer branches by hopping and leaning down, first on one side, then on other, to inspect mossy branches; also examined mossy branches less than 5 cm in diameter, and often executed short clumsy or heavy aerial sallies from exposed perches above canopy.
Breeding. Breeding recorded in early wet season, mid-Apr to mid-Jun, in Mexico although wet season extends to Sept. Co-operative breeding with helpers recorded; 4–6 birds in adult plumage observed at nest, although not known if all contributed food. Most of following details from a year-long study in which eight nests were located. Nest material brought by both adults, but more of construction work carried out by one member of pair (presumably female); cup-nest of moss and lichen, placed usually in fork where foliage densest and near end of long horizontal branch in upper half of large tree (taller than 15 m), five of eight nests in *Ficus cookii*; also, one nest reported in pine (*Pinus*), one in exotic *Cupressus*, another in an *Inga* growing over coffee, and one mossy cup-nest was 12 m above ground in branch fork c. 1·5 m from end of large limb of fig tree overhanging canyon. Clutch apparently 2 eggs (inferred from number of nestlings), undescribed; incubation presumably by female alone, at two nests for, respectively, 73·9% and 81·7% of daylight hours, average length of incubation stint 18·7 minutes (average recess 6·7 minutes) at one nest and 20·7 minutes (average recess 5·7 minutes) at other, incubation period c. 14 days; chicks fed by both adults, also by helpers when present, c. 5–8 feeding visits per hour, helpers accounted for 4% of feeds at onset and up to 38% on day before young left nest; nestling period c. 15 days. Data from six nests indicated nest success c. 29–43%.
Movements. Resident. During year-round study believed to remain on territory throughout.
Status and Conservation. ENDANGERED. Restricted-range species: present in North Central American Highlands EBA. Locally common to rare. An extremely localized and declining species. Known from five localities in SE Mexico, but all recent reports from El Triunfo Biosphere Reserve (mainly in buffer zone, which includes numerous expanding settlements). In adjacent Guatemala presently known from eight sites, including S slope of Volcán Santa María, Dos Marías Reserve, San Maracos, Volcán Tajumulco, Volcán Atitlán, and middle valley of R Madre Vieja N of Pochuta. Most of these sites have some legal protection, including as private nature reserves, and include coffee plantations and primary forest. Within these very restricted areas the species appears to be locally common. Expanding human settlement and loss of habitat from deforestation are main threats; some revenue from tourism and birdwatching at these sites, however, is helping local communities to realize a benefit from conserving these areas.
Bibliography. Álvarez del Toro (1964), Anon. (2010a), Blake (1953), Brodkorb (1939), Butchart & Stattersfield (2004), Davis (1972), Eisenmann (1955), Eisermann, Arbeiter, López, Avendaño & de León Lux (2011), Eisermann, Arbeiter, López, Avendaño, de León Lux, Burge *et al.* (2011), Eisermann, López *et al.* (2011), Gómez de Silva *et al.* (1999), Heath & Long (1991), Hilty & Simon (1977), Howell & Webb (1995), Isler & Isler (1999), Land (1970), Long & Heath (1994), de Silva Garza (1997), Stattersfield & Capper (2000).

108. Grey-and-gold Tanager

Tangara palmeri

French: Calliste or-gris **German**: Palmertangare **Spanish**: Tangara Grisdorada

Taxonomy. *Calospiza palmeri* Hellmayr, 1909, River Sipí, Chocó, Colombia.
On basis of plumage, habitat and voice appears most closely related to *T. cabanisi*. Monotypic.
Distribution. E Panama (including Cerro Tacarcuna, Altos de Quía, Cerro Pirre and Cerro Sapo; sight records from Nusagandi, in E San Blas province, and Cerro Azul), and Pacific slope and lowlands of W Colombia and W Ecuador (S to Esmeraldas and Pichincha; also Cordillera de Chindul, in N Manabí).
Descriptive notes. 15 cm; 30–32·6 g. Fairly large, plump, predominantly grey and black *Tangara* with black-speckled foreparts; "gold" colour inconspicuous. Plumage is mostly light pearly grey above (depending on angle of light), the grey of mantle mixed with black speckling and sprinkled with gold and silvery green, scapulars black; short black mask across base of forehead and extending through lores to just behind eye and to chin; lesser upperwing-coverts medium grey, median and greater coverts black, edged and tipped grey, flight-feathers and tertials black, edged grey; tail feathers black, edged grey; throat, side of head and median underparts off-white, variable black



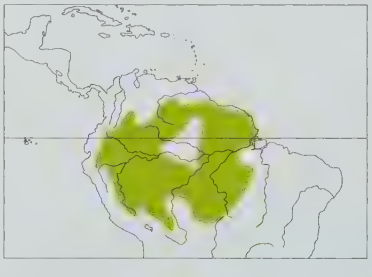
speckling of neck extending down across lower side of chest to form irregular necklace of black speckling, this mixed with gold across pectoral area; sides and flanks tinged medium grey, undertail-coverts white; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile is much duller and dingier than adult, with bill greyish and no gold on chest; soon moults into plumage that closely resembles that of adult. Voice. Unlike most congeners, a notably vocal species. Several semi-musical calls and staccato notes, most common of which is a sweet "chup chup-sweeeeet", last long note rising and often given over and over, or any of these notes given singly. Pair-members greet and fly off rapidly with energetic series of "chip", "chup", "sweet" and other notes.
Habitat. Mainly humid to very wet (pluvial) forest, often on steep hillsides, forest borders, tall second growth and scattered trees in clearings. Lowlands to c. 1100 m; most numerous above c. 300 m in Colombia and above c. 400 m in Ecuador.
Food and Feeding. Fruits and berries, and arthropods. In W Colombia observed to eat more than 32 species of fruit (80% of 541 observations); *Miconia* berries accounted for 40% of all fruit eaten, *Cecropia* a further 35%, and figs (*Ficus*) 7%. One individual seen to take insects to a nestling. Lives in pairs or in lively, excitable groups of 3–8 individuals, and may forage with mixed-species canopy flocks for short periods, but typically moves too rapidly for other species to follow and apt to fly off long distances before alighting again; reported in about half of mixed-species flocks at one site in upper Anchicayá Valley (W Valle del Cauca), in Colombia. Forages mainly in canopy or upper levels of trees, occasionally down to middle heights, rarely down to 3 m above ground; unlike congeners, does not regularly descend low to fruiting shrubs. Median foraging height in 450 observations of foraging was c. 12 m. Typically, takes berries and small fruits from upright perched position by leaning out to pluck the item, rarely plucks fruit while in flight; often takes *Cecropia* catkins by hanging with head downwards. Small berries swallowed whole; eats large ones piecemeal by pecking and squeezing or mashing pieces before swallowing. Almost all insects captured during aerial sallies (82% of 106 insect-hunting observations). Often perched near flowers that attracted insects, and was observed to sally to foliage for arthropod prey. May hop along treetop branches or explore foliage, but does not employ "leaning-down" search motion of many congeners. One member of a pair was seen to be struck and killed in flight by a Bat Falcon (*Falco rufigularis*) in Colombia.
Breeding. Nests found in early Jul, early Aug and Dec; nest-building seen in Jan, and nest in Feb and pair feeding fledgling in Apr; in upper Anchicayá Valley (W Colombia) some breeding may occur all year. Nest a mossy cup placed c. 30 m above ground on large, moss-covered branch. No other information.
Movements. Resident; no evidence of any seasonal movements in W Colombia.
Status and Conservation. Not globally threatened. Uncommon to fairly common. Occurs at rather low density or distributed locally in Chocó–Pacific forests. Occurs in a few protected sites, such as Los Katíos National Park, possibly also Farallones de Cali National Park and El Pangan Nature Reserve, in Colombia. Species' range includes considerable intact forest that is unprotected, but much of this (at least in Colombia) may ultimately be at risk in the long term. The species persists, in small numbers, in tall old second growth or partly disturbed areas. In Ecuador most numerous in Esmeraldas, but continues to be reported at Tinalandia, a privately held property in Pichincha; current status in Cordillera de Chindul, in Manabí, uncertain. Baseline population-monitoring desirable.
Bibliography. Angehr *et al.* (2004), Dunning (1982), Hilty (1981, 1997, 2009a), Hilty & Brown (1986), Hilty & Simon (1977), Isler & Isler (1999), Jahn *et al.* (2002), Lehmann (1957), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Naoki (2003c), Pearman (1993), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Robbins *et al.* (1985), Salaman *et al.* (2008), Sedano & Burns (2010), Wetmore *et al.* (1984).

109. Paradise Tanager

Tangara chilensis

French: Calliste septicolore **German**: Siebenfarbentangare **Spanish**: Tangara del Paraíso

Taxonomy. *Aglaïa Chilensis* Vigors, 1832, no locality = Bolivia.
Molecular data indicate that this species is most closely related to *T. velia* and *T. callophrys*. Race *caelicolor* intergrades with *paradisea* in E Venezuela and Guyana. Race *caelicolor* often misspelt "*coelicolor*" but former is the original spelling. Four subspecies recognized.
Subspecies and Distribution.
T. c. paradisea (Swainson, 1837) – SE Venezuela, the Guianas and N Brazil (S to N bank of R Amazon).
T. c. caelicolor (P. L. Sclater, 1851) – E Colombia (Meta, Guainía and Vaupés), S Venezuela (Amazonas) and NW Brazil (R Uaupés and upper R Negro).
T. c. chilensis (Vigors, 1832) – S & SE Colombia (W slope of E Andes in upper Magdalena Valley, in Huila; and Caquetá, Putumayo and Amazonas) S to E Ecuador, E Peru and Bolivia (S to Santa Cruz), and E through W Brazil (E to Rondônia, SE Amazonas E Mato Grosso and SE Pará).
T. c. chlorocorys J. T. Zimmer, 1929 – N Peru (upper Huallaga Valley).



Descriptive notes. 12–13 cm; 16–17 g (*paradisea*), 17–27 g (nominate and *chlorocorys*). Unmistakable tanager with a harlequin pattern of contrasting colors. Nominate race has most of crown and side of head scaly apple-green (feathers with black bases and pale green tips), narrow black line over bill and prominent (almost clown-like) black orbital ring; hindcrown, nape and back deep velvety black, lower back and rump entirely bright red or (e.g. Tres Esquinas area of Caquetá, in Colombia) changing to orange narrowly on uppertail-coverts; tail uniformly black; bend of wing and lesser upperwing-coverts turquoise, median coverts cobalt-blue, greater coverts, flight-feathers and tertials deep black, basal half of primaries (except innermost ones), as well as primary coverts, edged cobalt-blue to purplish-blue; throat to central chest glistening violet, breast, sides and flanks glistening turquoise-

blue, centre of belly and undertail-coverts deep black; iris dark brown; bill jet-black; legs dark grey to black. Sexes similar. Immature is similar to adult, but duller, with lower back variously orange to orange-red. Race *caelicolor* is similar to nominate, but lower back and most of rump flame-red and uppertail-coverts contrastingly bright golden-yellow; *paradisea* differs from previous mainly in having red of lower back slightly paler and more restricted in extent, uppertail-coverts lighter yellow, also differs from nominate in smaller size, and median wing-coverts same colour as throat (not paler cobalt to turquoise); *chlorocorys* is similar to *caelicolor*, but larger, green of top of head extending farther rearwards, and green colour is brighter, more yellowish-tinged. Voice. Noisier than most congeners. Individuals, especially when in flock, almost constantly give rapid, high-pitched chipping notes, including sharp "chak", and a rising "zeet" or "swee", either singly or in excited series, sometimes rapidly. Notes given in flight and during foraging or moving rapidly through canopy. Dawn song "cheek, cheet" (second note may be slightly higher-pitched) repeated over and over in long, somewhat irregular series, average c. 13 notes in 10 seconds; also described, in Peru, as a regularly spaced series of "swee? tchip" phrases. Day song in SE Peru "tsip seeea-wee", repeated over and over.

Habitat. Everywhere found in high canopy and treetops, and often in canopy of emergent trees (leafless or with foliage) such as *Ceiba pentandra*. In Amazonian lowlands, occurs in tall humid *várzea* and *terra firme* forest, somewhat less frequently in forest borders or tall second growth, or tall trees in clearings. In humid and wet Andean foothills and at lower elevations, occupies variety of forested habitats, including broken landslide and steep hillside forest, occasionally even rather scrubby woodland. Lowlands to c. 1500 m or slightly higher.

Food and Feeding. Fruits and small berries, also arthropods; observed to eat *Miconia* berries and fruits of *Aralia*. Of twelve stomachs examined, ten contained only vegetable matter and one only animal matter and one contained both; contents included fruit pulp and insects. Other stomachs contained seeds, fly larvae (Diptera), short-horned grasshoppers (Caelifera) and spiders (Araneae). At one nest chicks fed with spiders, orthopterans and caterpillars. Excitable and noisy, and notably gregarious, almost always encountered in single-species flocks of 3–15 individuals, sometimes more, or in groups that associate with canopy mixed-species flocks; regularly associated with *T. schrankii*, and the two species may forage together, either accompanying mixed flocks or travelling independently of them. Moves in and out of slower-moving mixed-species flocks, sometimes remaining for only a few minutes before flying off, abandoning a mixed flock. Forages mainly very high up, averages 25–50 m above ground, only infrequently dropping low along forested edges to reach fruiting shrubs. Groups restless and active, individuals searching rapidly on high open branches almost exclusively by hopping outwards and leaning downwards, first along one side of a branch and then the other, to check sides and undersurface; searches both bare and mossy branches. Also searches in foliage for small berries.

Breeding. In Peru, breeding recorded in Jun–Sept in SE and nest-building observed in Nov in C (Pasco); nest reported in Oct in French Guiana. Nest in SE Peru a small cup built mostly by female, both adults visited during construction but only one (presumably female) carried material, including green lichen-like moss, a fungus (*Rhizomorpha corynephora*), fluff from seeds like those of dandelion (*Taraxacum*), possibly spider web, and straw-like grass lining, placed 31 m up in small outer branch fork of *Ceiba pentandra* tree; no information on clutch size, incubation stints variable, 15–55 minutes, incubation period less than 16 days; nestlings fed by both parents, by which time tree had lost all its leaves and nest was exposed; nest ultimately failed following disturbance (unknown causes); c. 1 month later a second nest was under construction in same tree, disappeared after 8 days. In Brazil, cup-nest 5–20 m above ground reported; eggs apparently white or greenish-white with lilac and purplish-red markings, especially around large end. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread, and fairly common to common. Found in many protected areas, and widely distributed in unprotected areas. This species does not face any immediate threats, although it suffers adverse impact locally from destruction of Amazonian rainforest.

Bibliography. Bock (1995), Burns & Naoki (2004), Burns *et al.* (2002, 2003), Chapman (1926), Clements & Shany (2001), Delacour (1948), Descourtilz (1852), Dick *et al.* (1984), Donahue & Wood (1992), Dunning (1982), Gilliard (1941), Haverschmidt & Mees (1994), Hilty (1994, 2003), Hilty & Brown (1986), Isler & Isler (1999), Marantz & Zimmer (2006), McCarthy (2006), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), Munn (1985), Ogilvie-Grant (1912), O'Neill (1974), Ottavio *et al.* (2008), Pacheco *et al.* (2007), Parker *et al.* (1982), Pearson (1971), Phelps & Phelps (1963), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snethlage (1914), Snyder (1966), Souza (2002), Taczanowski (1884), Terborgh & Weske (1969), Tostain *et al.* (1992), Willis (1977), Wood *et al.* (1992), Zimmer (1943b).

110. Seven-colored Tanager

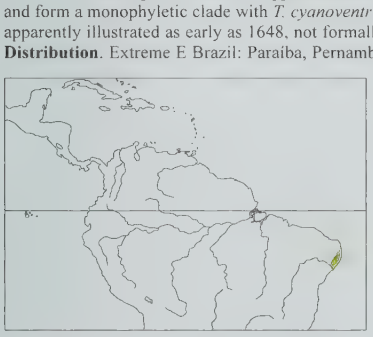
Tangara fastuosa

French: Calliste superbe **German**: Vielfarbentangare **Spanish**: Tangara Sietecolores

Taxonomy. *Tanagra fastuosa* Lesson, 1831, Pernambuco, Brazil.

Recent molecular-genetic studies suggest that this species and *T. seledon* are likely sister-species and form a monophyletic clade with *T. cyanoventris*, *T. cyanocephala* and *T. desmaresti*. Although apparently illustrated as early as 1648, not formally described until 183 years later. Monotypic.

Distribution. Extreme E Brazil: Paraiba, Pernambuco and Alagoas.



Descriptive notes. 13 cm. A brilliantly coloured and boldly patterned tanager, with bill relatively thick for the genus. Has narrow black ocular ring and line surrounding base of bill; otherwise, entire head to hindneck and upper throat bright greenish-turquoise, mantle and scapulars deep black, back, rump and uppertail-coverts bright burnished yellow-orange; tail feathers black, edged deep blue; lesser upperwing-coverts turquoise-blue, median coverts cobalt-blue, greater coverts black, broadly edged deep violet-blue, flight-feathers black, edged dark blue, tertials black, broadly edged orange-yellow on outer webs; lower throat black, the black extending narrowly onto side of neck to meet black of back; chest light blue, shading to deep ultramarine-blue on lower breast, belly and undertail-coverts; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile undescribed. Voice. In disputes or when excited, a high "ti-ti-ti-ti", much like that of many congeners. No other information.

Habitat. Humid floodplain-forest and upland forest, forest borders and older second-growth woodland in lowlands and foothills, to c. 1000 m. Occurs also in degraded habitat composed predominantly of *Cecropia* and *Parkia*, although long-term viability in such habitats unknown. Possibly also in somewhat drier, more open habitat (*cerrado*); confirmation needed.

Food and Feeding. Fruits and arthropods One stomach contained vegetable matter. Occurs in pairs and in small groups, often with mixed-species flocks, staying mostly in upper levels and canopy, but descending low along forest borders and in young second growth, gardens, and orchards with bromeliads. Searches for insects by hopping along branches and peering down on one side and then the other. Behaviour similar to that of *T. chilensis* and *T. seledon*.

Breeding. Breeding reported in Oct–Mar (austral spring and summer). Nests reported in forest middle storey, usually in large bromeliads, which could be keystone plants in breeding requirements. No other information.

Movements. Resident.

Status and Conservation. VULNERABLE. Restricted-range species: present in Atlantic Slope of Alagoas and Pernambuco EBA. Uncommon to rare; declining within its very small global range. Confirmed sites (more than 50) for this species are in areas of Atlantic Forest. It has been recorded also in Rio Grande do Norte (at Capim Macio and Parque das Dunas Costeiras, and Baía Formosa), but these sites are *cerrado*, a significantly different habitat from those where the species has been found previously; records possibly involve escaped cagebirds. As late as 1987, the species was still relatively numerous in forests of Serra Branca, near Murici, in Alagoas. Since then it has declined steadily, as a result of severe deforestation coupled with trapping for cagebird trade. Estimated that no more than 2% of original Atlantic Forest remains in NE Brazil, the consequence of logging, and conversion to sugar-cane plantations and cattle pastures; few, if any, forest tracts larger than 4000 ha remain in this area, and sites are threatened by fires from adjacent plantations and by new roads (which facilitate logging). Intense trapping also continues, because of high price commanded by this species in trade. These factors, combined with its extremely limited range, place this species at significant risk. Known to occur in a number of protected areas, including Dunas de Natal State Park, Charles Darwin Ecological Refuge, Mata do Pau Ferro Ecological Park, Serra dos Cavalos UFPE and Tapacurá Ecological Stations, and Saltinho and Pedra Talhada Biological Reserves. Reforestation projects underway in Pedra Talhada and elsewhere may eventually increase the area of available habitat.

Bibliography. Anon. (2010a), Burns & Naoki (2004), Butchart & Stattersfield (2004), Carvalho (1986), Forbes (1881), Isler & Isler (1999), Lamm (1948), Ridgely & Tudor (1989, 2009), Sedano & Burns (2010), Sick (1985, 1993), Silveira *et al.* (2003), Souza (2002), Stattersfield & Capper (2000).

111. Green-headed Tanager

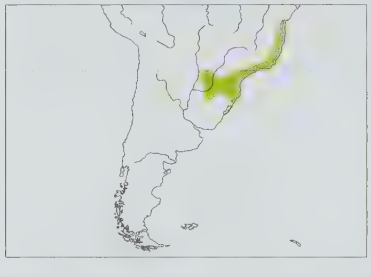
Tangara seledon

French: Calliste à tête verte **German**: Dreifarbentangare **Spanish**: Tangara Arcoiris

Taxonomy. *Tanagra Seledon* Statius Müller, 1776, Cayenne; error = Rio de Janeiro, Brazil.

Recent molecular-genetic studies suggest that this species and *T. fastuosa* are likely sister-species and form a monophyletic clade with *T. cyanoventris*, *T. cyanocephala* and *T. desmaresti*. Monotypic.

Distribution. SE Brazil (from SE Bahia S to Santa Catarina and NE Rio Grande do Sul) and adjacent parts of SE Paraguay (Alto Paraná) and NE Argentina (Misiones).



Descriptive notes. 13 cm; mean 18·7 g (nine birds from Paraguay), two others 16 g and 20 g. Brightly coloured tanager with complex plumage pattern reminiscent of that of *T. chilensis* and *T. fastuosa*, but greener and more pastel. Male has narrow black line surrounding bill and narrow black orbital ring; otherwise, entire head, nape and chin bright aquamarine-green, broad band across nape and wrapping around on sides of neck to throat shining pale lime-green (varying to burnished yellowish-green); back and scapulars mostly black, rump burnished yellow-orange, uppertail-coverts bright apple-green; tail black, edged pale green basally, changing to turquoise-blue distally; upperwing-coverts rich dark violet-blue, alula and primary coverts black, edged violet-blue on outer webs; flight-feathers black, broadly edged light green; lower throat and central upper chest black, which extends variably over side of chest; breast and central belly bright turquoise-blue, sides of belly, flanks and undertail-coverts bright apple-green; iris dark brown; bill black; legs dark grey to black. Female is similar to male or slightly duller. Immature is much duller than adult. Voice. Call a high, slightly buzzy "zweet" with rising inflection, and sometimes followed by other excited notes, e.g. "zwéé-dit, zwéé-dit-see" or "zwéé-di-di-di-dit", and other twittering notes. Dawn song, from crown of tree, a high-pitched, steadily repeated, trisyllabic "sít sir zwéét", up to 90 in a minute.

Habitat. Found in canopy of humid forest, along forest borders, in small clearings with scattered trees and shrubs, and in second growth of various ages, also parks, gardens and around human dwellings. Lowlands to c. 900 m; most numerous at low elevations.

Food and Feeding. Fruits, also arthropods. Takes wide variety of cultivated fruits, including oranges, papayas (*Carica papaya*) and bananas, as well as many wild fruits, such as figs (*Ficus*), *Hamelia*, *Urtica*, and berries from bromeliads; in Paraguay observed to eat fruit of *Allophyllus edulis*. Of six stomachs examined, five contained only vegetable matter and one only animal matter; contents included fruit and ants (Formicidae). Occurs in pairs and in small groups, sometimes in larger groups containing up to 20 individuals; pairs or groups forage alone or associate with mixed-species flocks. Forages mostly from middle heights to canopy (c. 9–25 m up) in forest, sometimes lower along forest borders and in disturbed areas. Foraging behaviour versatile; often employs acrobatic movements when hopping along branches, or peering and gleaning from leaf surfaces, bark, lichens and epiphytes, and regularly leans down to inspect sides of bare branches. In Paraguay obtained fruit of *Allophyllus edulis* mostly by perching and reaching for fruits, which it often manipulated with bill to remove seeds or soften pulp. Will visit feeding trays.

Breeding. Season Nov–Feb in Brazil, and recorded in Nov and Dec in Paraguay and Nov in NE Argentina; apparently, second brood often attempted shortly after completion of first. Nest reportedly built by both sexes, a compact cup of grass and leaves, lined with softer material, and concealed in foliage of tree or shrub, in bromeliad along side of trunk or among epiphytic orchids on limb; nests also reported in mature banana plants. Clutch usually 3 eggs (once 2), white or pinkish-white with various shades of brown and grey markings, especially at large end; no information on incubation and nestling periods in the wild; young from first and second broods may accompany adults for most of first year. In captivity: incubation period reported as 17 days; young leave nest after 30–35 days, but fed by parents up to 75 days.

Movements. Resident. Possible seasonal movements between forest and semi-open areas reported.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Despite occurrence in variety of disturbed and second-growth habitats, this species has, since late 1980s or earlier, disappeared from large areas of recently deforested terrain, and is also absent from remnant woodlots studied in São Paulo state of SE Brazil; this suggests that total numbers are much reduced and distribution highly fragmented. Viable populations now confined mainly to protected areas, among them Sooretama, Poço das Antas and Augusto Ruschi (Nova Lombardia) Biological Reserves and Itatiaia, Tijuca, Serra dos Órgãos and Iguaçu National Parks (Brazil) and Iguazú National Park (Argentina).

Bibliography. Athanas (2010a), Belton (1974), Bertoni (1901), Burns & Naoki (2004), Descourtilz (1852), Diamond & Lovejoy (1985), Euler (1867, 1900), Goeldi (1894), Hempel (1949), Isler & Isler (1999), Mitchell (1957), Narosky & Di Giacomo (1993), Nehrkorn (1899), Norgaard-Olesen (1973), de Oliveira & Rech (1981), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Sazima *et al.* (1993), Sedano & Burns (2010), Sick (1985, 1993), Snethlage & Schreiner (1929), Souza (2002), Vigil (1973), Willis (1979).

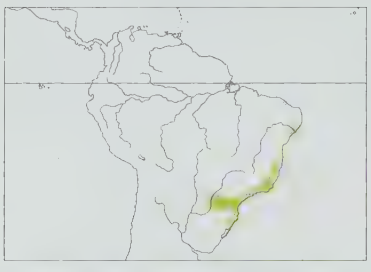
112. **Red-necked Tanager**

Tangara cyanocephala

French: Calliste à tête bleue **German**: Blaukappentangare **Spanish**: Tangara Militar

Taxonomy. *Tanagra cyanocephala* Statius Müller, 1776, Cayenne; error = Rio de Janeiro, Brazil.
Based on molecular-genetic studies this species forms a monophyletic clade with *T. fastuosa*, *T. seledon*, *T. cyanoventris* and *T. desmaresti*. Three subspecies recognized.

Subspecies and Distribution.
T. c. cearensis Cory, 1916 – Ceará, in NE Brazil.
T. c. corallina (Berlepsch, 1903) – Pernambuco and adjacent N Bahia, in E Brazil.
T. c. cyanocephala (Statius Müller, 1776) – SE Brazil (from Espírito Santo S to Rio Grande do Sul), SE Paraguay (Canindeyú) and adjacent NE Argentina (Misiones).



Descriptive notes. 13 cm; 16–21·6 g. Unmistakable, brilliantly patterned tanager with green underparts and red nuchal area. Male nominate race has forehead and lores down to chin black, black orbital ring dotted turquoise; upper forehead and ring around eye shining turquoise, crown glistening violet-blue, bright deep red to scarlet band across nape continuing forwards across ear-coverts and cheek, and narrowing onto upper throat; mantle and scapulars deep black, rump and uppertail-coverts bright green; tail feathers dusky, edged and tinged green; lesser upperwing-coverts jet-black, median coverts mostly coppery gold (forming small but conspicuous band), greater coverts black, broadly and extensively edged bright green; basal half of outer flight-feathers and all of inner flight-feathers and tertials broadly edged bright green; small central throat area blackish, becoming violet-blue on lower throat and bright glistening blue across central chest; rest of underparts, including undertail-coverts, bright glistening green; iris dark brown; bill black; legs dark grey to black. Female is similar to male, but much duller (lacking glossiness), has crown dull blue, back greenish with heavy black mottling, nape band duller red, chin black, throat dusky with faint blue tinge. Juvenile resembles adult but much duller. Race *cearensis* differs from nominate in having crown blue (less violet-tinged), nuchal band less deep red, lower throat cobalt-blue (not violet-blue) and uppertail-coverts glistening turquoise-blue, female like nominate but throat more strongly tinged blue and bordered below by narrow band of brighter blue on chest, belly tinged yellowish-buff; *corallina* differs from previous in having small patch on throat dark blue, turquoise around eye extends backwards as eyebrow, uppertail-coverts intermediate in colour between those of other races. Voice. Call a high, sharp "seet!" and softer "sip", either note sometimes in a series accelerating into a trill; also a high, sharp "tsit-tsit-tsit". Song possibly a rapid twitter, or the series of notes that quicken to a trill.

Habitat. Forest-based species found in canopy, forest borders, light woodland and second growth, and sometimes in urban parks; also occurs in scrub or *caatinga* in N part of range. To 1000 m or more.

Food and Feeding. Fruit supplemented by some insects; reported food items include *Phytolacca*, melastome berries, *Urtica*, and myrtle. Occurs in pairs and in lively little parties up to about seven individuals; in forested areas regularly with mixed-species flocks containing others of its genus, but in drier, scrubbier N portions of range (where few such flocks) singles or pairs are usually alone. Searches rapidly, mostly quite high in forest, but will descend low to fruiting shrubs.

Breeding. All information from observations of captives. Deep, grassy cup-nest; clutch 3 eggs, whitish with brownish spots, mostly at larger end; incubation entirely by female, period 12–13 days; both adults fed young, which left nest at 15 days and were fed by adults for a further three-and-a-half weeks.

Movements. Resident.

Status and Conservation. Not globally threatened. Status not well known; common in some places. Range highly fragmented, with four isolated populations, and total numbers now substantially reduced from former levels. Populations once contiguous across S Brazil W to Paraguay and Argentina, but now separate. Still thrives in some numbers in main coastal parts of range, i.e. in Augusto Ruschi (Nova Lombardia) Biological Reserve, in Espírito Santo, and Serra dos Órgãos and Tijuca National Parks, above Rio de Janeiro. In addition, this species is capable of utilizing some second-growth and disturbed habitats.

Bibliography. Athanas (2010a), Burns & Naoki (2004), Davis (1945b, 1946), Descourtilz (1852), Diamond & Lovejoy (1985), Dunning (1982), Forbes (1881), Hamilton (1871), Isler & Isler (1999), Lamm (1948), Mitchell (1957), Norgaard-Olesen (1973), Parker & Goerck (1997), de la Peña & Rumboll (1998), Pinto (1954), Ridgely & Tudor (1989, 2009), Sazima *et al.* (1993), Sedano & Burns (2010), Sick (1985, 1993), Sick & Pabst (1968).

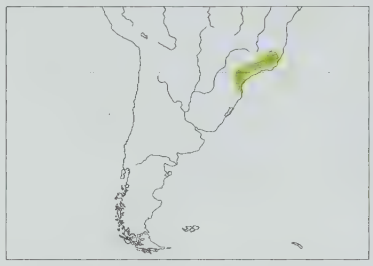
113. **Brassy-breasted Tanager**

Tangara desmaresti

French: Calliste de Desmarest **German**: Orangebrusttangare **Spanish**: Tangara de Desmarest
Other common names: Gould's Tanager ("*T. gouldi*")

Taxonomy. *Tanagra Desmaresti* Vieillot, 1819, Rio de Janeiro, Brazil.
Based on molecular-genetic studies this species forms a monophyletic clade with *T. fastuosa*, *T. seledon*, *T. cyanocephala* and *T. cyanoventris*. Described form *T. gouldi* appears to be a hybrid between present species and *T. cyanoventris*. Monotypic.

Distribution. Coastal SE Brazil from SE Minas Gerais, Espírito Santo and Rio de Janeiro S through E São Paulo, E Paraná and E Santa Catarina.



Descriptive notes. 13 cm; 19–21·5 g. Colourful, predominantly green tanager with blue on face and large golden patch on throat and chest. Has narrow area around bill and well-defined ocular ring black; otherwise, forehead (rather diffusely demarcated), lores and broad ocular area turquoise, mid-crown to nape, side of neck, mantle and back bright yellowish apple-green, crisply streaked black, rump and uppertail-coverts plain green; tail feathers blackish, broadly edged green; bend of wing and lesser upperwing-coverts brassy golden (often partly hidden), median coverts dusky, broadly edged and tipped brassy golden, greater coverts black, sharply edged and tipped apple-green, flight-feathers black, edged green; side of head green (unstreaked), throat yellow, with rounded black spot in centre of lower throat, below which is a triangular brass-gold area reaching down onto mid-breast; rest of underparts mostly bright green, narrow buff-yellow median line down breast and belly; undertail-coverts mostly yellow, tinged green; iris dark brown; bill black; legs dark horn-grey. Sexes similar. Immature is like adult, but much duller. Voice. Contact note a high, thin "tseee" or abrupt "tsit!", singly or repeated rapidly in short series. Also gives rapid chittering trill, and groups may call noisily at times.

Habitat. Found mainly in humid pre-montane and montane forest and at forest edge, less often in second growth and clearings with scattered trees. Recorded at 500–2200 m, but mostly at 800–1800 m.

Food and Feeding. Mostly fruits, some arthropods. Reported items include melastome berries, *Urtica* and myrtle. One stomach contained only vegetable matter. Food items brought to nestlings included spiders (Araneae), seed masses, an orthopteran nymph, caterpillar, planthopper nymphs (Fulgoroidea), katydid nymph (Tettigoniidae) and unidentified winged insect. Markedly social, occurring in pairs, families and monospecific groups of up to about a dozen individuals; frequently found with mixed-species flocks, but moves rapidly and may at times leave slower-moving species behind. Agile, often forages on slender branches within foliage near tip of branch. Of 41 observations of foraging: 16 involved leaf-gleaning; eight were sallies to foliage; seven sallies to air; eight involved scanning and picking at lichens and moss; remainder undocumented. Occasionally forages for arthropods by hopping quickly along limbs, leaning head downwards first on one side of a branch and then on other to inspect surfaces as it progresses outwards; also actively hops and peers in foliage.

Breeding. Nest in Jan and another in Feb in Rio de Janeiro (Itatiaia massif). Both sexes bring nest material, but one assumes majority of construction work; nest a deep, thick-walled cup (9 × 8 cm outer diameter) made from dry bamboo leaves (of both native and introduced species), thin twigs, rachises of compound leaves, rootlets, lichen, fungal rhizomorphs, cocoons and spider silk, one nest with moss on outside; 0·5–9 m above ground, one well anchored in multiple-branched fork of tree, two in branched nodes of bamboo, often in man-made clearing. No information on clutch size; eggs whitish, speckled with fine grey spots; male may feed sitting female, incubation period 12–13 days. No other information.

Movements. Resident; possibly some movement in Espírito Santo.

Status and Conservation. Not globally threatened. Restricted-range species: present in Atlantic Forest Mountains EBA. Locally fairly common. Confined mainly to montane regions where remnant forest patches remain. Occurs in numerous protected areas, among them Serra dos Órgãos National Park, in Rio de Janeiro, Patrimônio Natural Special Reserve, in Minas Gerais, and Itatiaia National Park, on border between those two states. Outside protected areas, this species is regarded as highly vulnerable because of severe forest loss within its limited range.

Bibliography. Belcher & Smooker (1937), Bond (1947), Burns & Naoki (2004), Davis (1945b, 1946), Descourtilz (1852), Diamond & Lovejoy (1985), Gagliardi (2007b), Gonzaga & Castiglioni (2006), Hellmayr (1936), Hempel (1949), Holt (1928), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Parker & Goerck (1997), Pinto (1944a, 1951), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Sazima *et al.* (1993), Sclater (1886), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Steinbacher (1938).

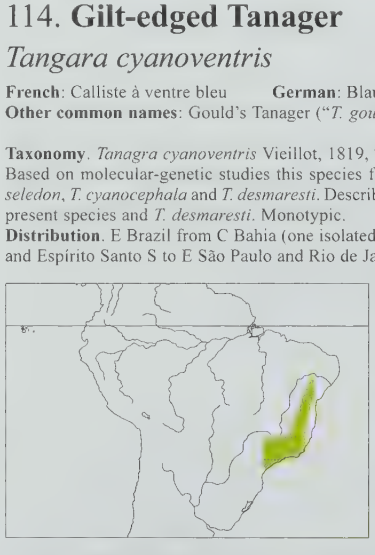
114. **Gilt-edged Tanager**

Tangara cyanoventris

French: Calliste à ventre bleu **German**: Blaubrusttangare **Spanish**: Tangara Ventriazul
Other common names: Gould's Tanager ("*T. gouldi*")

Taxonomy. *Tanagra cyanoventris* Vieillot, 1819, "Brésil" [Brazil].
Based on molecular-genetic studies this species forms a monophyletic clade with *T. fastuosa*, *T. seledon*, *T. cyanocephala* and *T. desmaresti*. Described form *T. gouldi* appears to be a hybrid between present species and *T. desmaresti*. Monotypic.

Distribution. E Brazil from C Bahia (one isolated record from extreme N Bahia), S Minas Gerais and Espírito Santo S to E São Paulo and Rio de Janeiro.



Descriptive notes. 13 cm; 16–20 g. Colourful tanager, mostly golden above and blue below, with golden head. Has narrow area surrounding bill and thin orbital ring jet-black; otherwise, entire head, including chin and side of throat, and upperparts golden-yellow, crown, nape and rear side of neck to back streaked black; tail feathers black, edged green; lesser upperwing-coverts mostly bright green (usually concealed), median and greater coverts dusky, edged green, primary coverts and flight-feathers black, edged green, tertials mostly green with dusky inner webs; central throat black, breast and sides turquoise-blue, centre of lower breast and belly yellowish-green, undertail-coverts yellow to yellowish-green or pale yellow-buff; iris dark brown; bill black; legs dark grey. Sexes similar, female tends to be duller. Juvenile undescribed. Voice. Abrupt sharp call notes include "tsit" and "seet!", which may accelerate into chittering trill; also a lower-pitched "chip" or "chup", also sometimes accelerating into short bursts or trills.

Habitat. Humid pre-montane forest and forest borders, to lesser extent also second-growth woodland and overgrown clearings. Lowlands to 1200; now mostly above 500 m.

Food and Feeding. Diet includes both fruit and some insects. Recorded fruit items include melastome berries and fruit of *Urtica*. Lives in pairs and in small groups of up to about eight individuals, often found with mixed-species flocks containing others of genus; possibly not so often in large monospecific groups as is *T. desmaresti*. Forages from middle heights up to canopy in forest, but descends lower along forest edges to exploit fruiting shrubs. Searches for insects mostly by hopping among small slender outer twigs and peering in terminal foliage; occasionally also checks curled green leaves. Behaviour much like that of forest-based congeners of SE Brazil.
Breeding. A nest found in Nov in Rio de Janeiro was 12 m up in fork of tree; nest possibly lined with strips of bamboo. Offspring of a previous brood have been seen to act as helpers at nest. No other information.

Movements. Resident.
Status and Conservation. Not globally threatened. Locally common. Range now much fragmented, and numbers substantially reduced. Survives in remaining forested areas in SE coastal range, and (as with many other SE Brazil endemics) bulk of population may now be confined largely to protected areas. Considered still common at several reserves, including Augusto Ruschi (Nova Lombardia) Biological Reserve, in Espírito Santo, and Itatiaia National Park, in Rio de Janeiro.
Bibliography. Dunning (1982), Erickson & Mumford (1976), Hellmayr (1936), Holt (1928), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Parker & Goerck (1997), Pinto (1951), Remsen *et al*. (2010), Ridgely & Tudor (1989, 2009), Sclater (1886), Sedano & Burns (2010), Sick (1985, 1993), Skutch (1961), Souza (2002).



115. **Blue-whiskered Tanager**

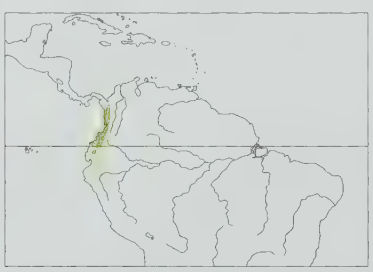
Tangara johannae

French: Calliste moustachu **German**: Blaubarttangare **Spanish**: Tangara Bigotuda

Taxonomy. *Calliste johannae* de Dalmas, 1900, El Paillon [= Estero Pailón], near Buenaventura, Valle, Colombia.

Genetic data indicate that this species is part of a monophyletic species group that includes also *T. schrankii*, *T. florida*, *T. arthus*, *T. icterocephala*, *T. xanthocephala*, *T. chrysotis* and *T. parzudakii*. Monotypic.

Distribution. Colombia (W slope of W Andes from Mutatá, in W Antioquia, and C Chocó) S to W Ecuador (Pichincha, once to Los Ríos).



Descriptive notes. 13 cm. Small tanager with green body, black face and throat, and conspicuous blue malar. Has face, including lores, area around eye, side of head and throat black, surrounded anteriorly by variable narrow turquoise border; prominent large turquoise malar patch separating black of face from black of throat; rest of plumage mainly bright apple-green with golden tinge, forecrown sometimes faintly flecked with black, mantle and back streaked black, rump plain bright yellow, longer uppertail-coverts dusky, edged and tipped green; tail black, feathers edged turquoise broadly at base and more narrowly near tip; upperwing-coverts black, narrowly edged turquoise-blue, a few innermost greater coverts often somewhat edged green; flight-feathers black, outer ones prominently edged blue, inner ones and tertials edged green; base of black throat with narrow edge of blue (usually concealed); breast and lower underparts mainly bright apple-green, centre of belly and undertail-coverts greyish to buff; iris dark brown; bill black; legs dark horn-grey. Sexes similar, female often slightly duller than male. Juvenile is very dull and largely without distinctive pattern or bright colour; immature similar to adult, but duller. Voice. Call or contact note during foraging a shrill buzzy "tzzeee", similar to that of *T. arthus*. No song has yet been described.

Habitat. Canopy and borders of wet forest to pluvial forest, older second growth, forest regrowth around landslides, and slashed clearings. Lowlands to c. 700 m, rarely to 1000 m.

Food and Feeding. Fruits, some arthropods. Occurs in pairs or in family groups of 3–4 individuals,

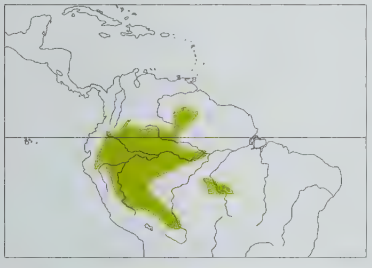
and a regular member of mixed-species flocks. Forages mainly at middle levels or higher in forest, occasionally lower along forest borders. Visits variety of small to large fruiting trees and shrubs for fruit. Forages for insects by moving in little spurts along relatively slender mossy or bare limbs, then pausing briefly and leaning head downwards to inspect first one side (or underside) of a branch and then the other; distinctive "stereotyped" movements resemble those of many congeners.
Breeding. One adult carrying food to a cup-nest on high mossy limb in Jan in Colombia (W Valle). No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Chocó EBA. Rare to uncommon, locally fairly common. Generally occurs at rather low density, but has been reported as fairly common at Río Ñambí Natural Reserve, in SW Colombia. May occur in Utría and Sanquianga National Parks, in Colombia; possibly also in Cotocachi-Cayapas Ecological Reserve, in NW Ecuador, but otherwise few protected sites within its limited range. Is able to use various age-stages of second growth, and its range includes (or formerly included) considerable intact lowland forest. Believed to be in moderate to rapid decline because of loss of forest habitat in Chocó–Pacific lowlands, which have, in recent decades, been besieged by logging, clear-cutting for cattle pastures, gold-mining, palm and coca cultivations, and illegal farming activities.
Bibliography. Anon. (2010a), Burns & Naoki (2004), Butchart & Stattersfield (2004), Haffer (1967a, 1975), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Renjifo *et al.* (2002), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000).

116. Green-and-gold Tanager

Tangara schrankii

French: Calliste de Schrank **German**: Goldbrusttangare **Spanish**: Tangara de Schrank

Taxonomy. *Tanagra schrankii* Spix, 1825, no locality = Tabatinga, River Solimões, Brazil.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. florida*, *T. arthus*, *T. icterocephala*, *T. xanthocephala*, *T. chrysotis* and *T. parzudakii*. Taxon *anchicayae*, described from mountains above R Anchicayá, in Valle (Colombia), erroneously as a race of present species, is now known to be referable to *T. florida*. Two subspecies recognized.
Subspecies and Distribution.
T. s. venezuelana Phelps, Sr & Phelps, Jr, 1957 – S & SE Venezuela (E & S Amazonas and S Bolívar from upper R Caura E to upper R Caroní).
T. s. schrankii (Spix, 1825) – SE Colombia (from Caquetá and Vaupés) S through E Ecuador and E Peru to EC Bolivia (Santa Cruz), and E in Brazil (mostly S of R Amazon) to E Amazonas and extreme NW Mato Grosso.



Descriptive notes. 12 cm; 14–23 g. Colourful green, yellow and black plumage. Male nominate race is mainly bright emerald-green; forehead, supraloral line and narrow area around eye black, this extending into large squarish to triangular black patch on ear-coverts, pale bright turquoise crescent in front of eye, and narrow, bright turquoise margin behind black ear-coverts; mid-crown bright yellow, nape and side of neck (behind black patch) green to golden-green (depending upon light), flecked and mottled with black (imparting obscure scaled appearance); mantle and back bright emerald-green, broadly streaked black, rump and uppertail-coverts bright yellow with faint greenish tinge; tail blackish, edged green to greenish-blue; upperwing-coverts, primary coverts, flight-feathers and tertials black, lesser and median coverts heavily edged and tipped turquoise-blue, outermost greater coverts edged blue and inner ones edged bright green, primaries edged turquoise, secondaries and tertials edged green; chin black, upper throat and underparts mainly bright emerald-green, lower throat and all of central breast to belly bright yellow; undertail-coverts buff, somewhat mixed dull green; iris dark brown; bill black; legs dark horn-grey. Female is similar to male, but slightly duller, with crown greenish, flecked black, yellow on rump reduced. Juvenile is dull greyish-brown with little of adult pattern evident; immature similar to adult, but yellow and green of plumage very dull. Race *venezuelana* is much like nominate, differing in having yellow of rump slightly less extensive and brighter yellow. Voice. Calls and contact calls are high, thin "chit" and "tsi" notes, often uttered rapidly and sometimes in excited bursts, e.g. "tsi-ti-ti-ti-ti-ti-...tsi-ti-ti-ti-ti-ti-...". Song, at dawn, one to several weak, high-pitched trills, the notes run together and blurred, "t-ttttttt...ttttttt..ttttttt...". a possible variation includes a series of lower-pitched, more chattery trills mixed with occasional "chat" notes.
Habitat. Humid *terra firme* and *várzea* forest in lowlands, and decreasing numbers in humid and wet foothill forest; less often along forest borders, and only occasionally in scattered trees in clearings. Lowlands mainly to c. 1200 m; to 900 m in Venezuela and to 1600 m in Peru.
Food and Feeding. Fruits, especially *Cecropia*, also some arthropods. Of 17 stomachs examined, 14 contained only vegetable matter and two only animal matter and one held both; contents included fruit, seeds and insects. Occurs in pairs when breeding, but otherwise typically in small to fairly large groups, sometimes of up to 20 individuals, or even more, when with canopy flocks; regularly associates with mixed-species flocks, both in canopy and, sometimes, much lower; also a regular associate of *T. chilensis*, the two frequently foraging together away from mixed flocks. Sometimes found in forest understorey when canopy and understorey flocks join up temporarily. Forages by hopping rapidly along larger horizontal branches, where it leans with head down, first on one side of a branch and then on other, to inspect sides and undersurfaces of branches. In Bolivia, 18 observations of insect-foraging from leaves included nine with acrobatics, seven without acrobatics, and two by hovering; also noted as sallying to air, and hanging downwards to glean from branch. In Peru, six observations included gleaning from undersurface of slender branches, three by hanging to glean from beneath leaves, and once from uppersurface of a leaf. Occasionally checks dead leaves.
Breeding. Few nests found, in Jul, Aug and Oct in Peru; females in breeding condition Jul–Dec (but very few specimens Dec–May). Nest cup-shaped, made from dried leaves, lined with plant fibres and rootlets (sometimes mixed with dry leaves), external diameter 10·2–11 cm and height 8–12·2 cm, internal diameter 4·3–6 cm, depth 5–6·6 cm, placed 75 cm to 2 m above ground at base of understorey plant, e.g. at base of *Geonoma* palm frond or beneath base of *Asplenium serratum* fern, woven to plant and generally well concealed by overhanging vegetation or the like; also recorded nesting in hollow of rotting trunk. Clutch 2 eggs, pale reddish-brown with dense darker red speckles; at one nest, female laid replacement clutch after first brood preyed on, apparently by Slate-coloured Hawk (*Leucopternis schistacea*), incubation of replacement 15–17 days, no information on duration of nestling period.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Widespread and common across much of W Amazonia. Occurs in a number of large protected areas, among them Canaima National Park (Venezuela), Amacayacu National Park (Colombia), Cuyabeno Wildlife Reserve (Ecuador), Manu National Park (Peru), Madidi National Park (Bolivia) and Serra do Divisor National Park (Brazil). Within this species' range there also is extensive intact forest which is unprotected, but at little risk.
Bibliography. Athanas (2010a), Burns & Naoki (2004), Dunning (1982), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Lehmann (1957), Marra (1990), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), Munn & Terborgh (1979), Novaes (1957), Parker *et al.* (1982), Pearson (1975b), Phelps & Phelps (1950, 1963), Remsen *et al.* (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Terborgh & Weske (1969, 1975), Van Houtan & Alvarez-Loayza (2006), Zimmer (1943b).

117. Emerald Tanager

Tangara florida

French: Calliste émeraude **German**: Smaragdtangare **Spanish**: Tangara Florida

Taxonomy. *Calliste florida* P. L. Sclater and Salvin, 1869, Costa Rica.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. arthus*, *T. icterocephala*, *T. xanthocephala*, *T. chrysotis* and *T. parzudakii*. Proposed race *auriceps* (described from Buenavista, in Nariño, in SW Colombia) considered indistinguishable from birds elsewhere in species' range. The form *anchicayae*, from mountains above R Anchicayá, in Valle (Colombia), described erroneously as a race of *T. schrankii*, is now known to be a synonym of present species. Monotypic.
Distribution. Caribbean slope of Costa Rica and Panama (E from Chiriquí and Veraguas; also Pacific coast in Darién) and Pacific coast of Colombia (S from S Chocó) to NW Ecuador (Imbabura, Esmeraldas and Pichincha).



Descriptive notes. 12 cm; 16·5–20·5 g. Small green-and-yellow tanager. Male has narrow black area encircling bill, narrow black orbital ring, and prominent squarish black patch on rear ear-coverts; upper forehead to nape yellow-green, purer yellow over most of crown; mantle and back glistening emerald-green, coarsely and boldly streaked black, rump unstreaked bright yellow, uppertail-coverts mostly glistening green (feathers dusky basally, tipped green); tail uniformly dull black above, outer feathers obscurely edged green (tail paler below); upperwing-coverts black, median coverts edged green, greater coverts broadly edged and tipped green, flight-feathers black, inner ones and tertials sharply edged green; throat and underparts mainly bright emerald-green, becoming yellow on centre of lower breast and belly and dull buff-yellow on crissum; iris dark brown; bill black; legs horn-grey. Female is similar to male, but somewhat duller green, and with crown green (not yellow) and belly duller yellow. Juvenile is almost entirely dull greyish-brown with little evidence of green-and-black adult plumage, but acquires hint of dusky markings on head and upperparts; immature also dull, but generally shows outline of adult markings; subadult male resembles female (age at which adult male plumage acquired unknown). Voice. Calls include raspy "jree" or "dzreee", penetrating and burrier than notes of *T. arthus* and *T. icterocephala*, and these sometimes given in accelerating series. Also, during foraging, weak "tsit" notes. Apparently sings only rarely; possible song, from branch c. 8 m up, a high burry "zeeeeee" note, louder than call, repeated regularly for up to several minutes with intervening pauses of c. 3 seconds.
Habitat. Humid and wet mossy forest and borders, and adjacent older second growth. Mostly foothills and lower elevations of mountains, at c. 500–1200 m in Costa Rica; at 100–1100 m in Colombia.
Food and Feeding. Fruits, some arthropods. Observed to eat berries of *Phytolacca*, *Schefflera* and *Trema* in Costa Rica. In Colombia fruit accounted for 71% of 468 observed foraging attempts, and 29 species of fruit were taken; *Miconia* berries accounted for 61% of all fruit eaten, *Cecropia* catkins comprised 10%, and holly (*Ilex*) 7% of fruit records. Contents of two stomachs were seeds and fruit. Occurs in pairs and in small groups usually associated with mixed-species flocks containing other tanagers (e.g. congeners, *Cyanerpes*). In W Valle del Cauca (Colombia), foraged from shrub tops to forest canopy, with median foraging height c. 9 m. Almost all fruit taken while bird perched. Also regularly searches in head-downward position from leaf petioles or from *Cecropia* catkins; regularly hung downwards from twigs or petioles next to berry clumps, such as those of *Ilex*, and was observed to eat flowers or flower buds of *Topobea brachyura*. Also in W Valle del Cauca, 95% of 116 records of arthropod-seeking were on moss-covered branches (rather than bare ones), where typically used a stereotyped leaning-the-head-down movement (73 of 97 records) to check first one side, then the other, of branches mostly 1·3–2·5 cm in diameter, a search strategy similar to that employed by many congeners. Also hung upside-down from branches or moss to reach hard-to-check sites in hanging moss clumps and underneath larger branches; may pull moss loose with bill to uncover arthropod prey. On one occasion several were observed foraging 0·3–2·4 m up over a swarm of highland *Labidus praedator* army ants in W Andes of Colombia.
Breeding. Two nests and a stub-tailed juvenile in Jan–Apr in Colombia; nest in Mar in Costa Rica. In Colombia a mossy cup nest, one on epiphyte-covered limb 8 m above ground and the other on moss-covered limb 12 m up; nest in Costa Rica only 1·5 m up in sapling in forest clearing. One adult brought food to nest in Costa Rica; in Colombia a pair observed to bring food (both insects and fruit). No other information.
Movements. Resident. In Costa Rica, some apparent seasonal movement to lower elevations during rainiest months when not breeding.

On following pages: 118. Golden Tanager (*Tangara arthus*); 119. Silver-throated Tanager (*Tangara icterocephala*); 120. Saffron-crowned Tanager (*Tangara xanthocephala*); 121. Golden-eared Tanager (*Tangara chrysotis*); 122. Flame-faced Tanager (*Tangara parzudakii*).

Status and Conservation. Not globally threatened. Fairly common in Costa Rica and Colombia; more local in Panama. Can be found in a number of protected areas, including Braulio Carrillo and Tapantí National Parks (Costa Rica), Chagres and Darién National Parks (Panama), and Los Katíos National Park and probably El Pangan Nature Reserve and lower slopes of R Anchicayá (part of which is under protection) in Valle (Colombia). While considerable intact unprotected forest remains in its range, deforestation for cattle-raising, human settlement, gold-mining and various legal and illegal agricultural crops are creating intense pressure on the foothill habitat that this species requires.

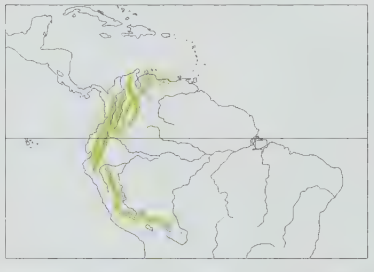
Bibliography. van den Berg & Bosman (1984), Burns & Naoki (2004), Carriker (1910), Davis (1972), Dunning (1982), Garrigues & Dean (2007), Hilty (1974, 1981, 1997, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Naoki (2003c), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).

118. Golden Tanager

Tangara arthus

French: Calliste doré **German**: Goldtangare **Spanish**: Tangara Dorada
Other common names: Perija Tanager ("*aurulenta* group"); Sclater's Tanager (*sclateri*); Beautiful Tanager ("*pulchra* group")

Taxonomy. *Tangara Arthus* Lesson, 1832, Caracas, Venezuela.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. florida*, *T. icterocephala*, *T. xanthocephala*, *T. chrysotis* and *T. parzudakii*. Races possibly represent more than one species, e.g. it has been suggested that nominate race may merit isolated treatment, being markedly different from all others. Other plumage groups include: *sclateri*; *aurulenta*, *occidentalis*, *goodsoni* and *palmitae*; and *pulchra*, *aequatorialis* and *sophiae*. Further research required. Race *palmitae* poorly differentiated from *aurulenta* and possibly better synonymized with it. Nine subspecies currently recognized.
Subspecies and Distribution.
T. a. arthus Lesson, 1832 – mountains of N & W Venezuela (from NW Lara and Sierra de San Luis, in Falcón, E to Distrito Federal and Miranda; Andes from S Lara S to N Táchira).
T. a. aurulenta (Lafresnaye, 1843) – NW Venezuela (Sierra de Perijá) and W slope of E Andes of Colombia (S from about latitude of Bogotá).
T. a. occidentalis Chapman, 1914 – W slope of C Andes and both slopes of W Andes (S to Nariño), in Colombia.
T. a. goodsoni E. J. O. Hartert, 1913 – W slope of Andes in Ecuador, and probably also NW Peru.
T. a. palmitae Meyer de Schauensee, 1947 – W slope of E Andes at La Palmita (Santander), in Colombia.
T. a. sclateri (Lafresnaye, 1854) – both slopes of E Andes of Colombia (from Boyacá and Santander S to Cundinamarca, and in Macarena Mts), probably also Andes of adjacent SW Venezuela (S Táchira).
T. a. aequatorialis (Taczanowski & Berlepsch, 1885) – E slope of Andes in Ecuador and adjacent N Peru (Chaupe).
T. a. pulchra (Tschudi, 1844) – E slope of Andes in Peru (from Chachapoyas S to Chanchamayo).
T. a. sophiae (Berlepsch, 1901) – E slope of Andes in SE Peru (S from Cuzco and Puno) S to Bolivia (La Paz and W Cochabamba).



Descriptive notes. 13 cm; 18·7–27·5 g. Beautiful Andean tanager with plumage of rich gold and black, but notable for complex plumage variation. Nominate race has head rich deep glistening orange-yellow, with narrow black line above bill, black lores, narrow black orbital ring, and also a large squarish to trapezoidal black patch on ear-coverts; mantle and back greenish-yellow, heavily and sharply streaked black, lower back and rump golden-yellow (slightly paler than head); upperwing black, coverts narrowly edged and more broadly tipped pale yellow, secondaries and tertials sharply but narrowly edged yellow, sometimes with greenish tinge; tail black, outer feathers narrowly edged greenish; throat golden-yellow, broad chestnut band across upper breast and continuing down sides and flanks, rest of underparts rich golden-yellow; iris dark brown; bill jet-black; legs dark horn-grey. Sexes similar, female usually slightly duller than male. Juvenile is very dull, but may show hint of black markings on head and back; immature similar to respective adult, but much duller. Races differ mainly in plumage pattern and tones, nominate the only one with chestnut breastband and sides: *aurulenta* differs from nominate in having entire underside from throat to undertail-coverts rich golden-yellow; *occidentalis* resembles previous, but edgings on wing-coverts and flight-feathers more golden-yellow, and entire head and underparts slightly darker and richer golden-yellow, underparts showing hint of tawny wash; *goodsoni* is much like *aurulenta*, but slightly paler golden-yellow; *palmitae* closely resembles previous two, but forecrown of male slightly more golden-orange; *sclateri* is much darker and overall more tawny on head, rump and underparts, but retains greenish to yellowish-green edgings on wing-coverts and flight-feathers; *aequatorialis* differs in having variable wash of tawny-rufous on throat and chest; *pulchra* has throat and chest rich rufous-chestnut (darker than last), fading to golden-yellow on lower underparts, also has crown and side of neck tawny; *sophiae* is like last, but crown and side of neck golden (not tawny). Voice. Call a buzzy "seet" or "bzeet", often given over and over during foraging. Possible song in Venezuela a forceful, rapid "chid-it, chid-id-id-it" or "chíd-id-id-it chup", with pauses of 2–6 seconds between phrases.
Habitat. Humid and wet montane forest and forest borders, sparingly extending into trees and second growth in clearings near forest. More of an interior-forest species than are many congeners, although, at least in Venezuela, regularly comes to forest borders and feeding trays. At 600–2500 m; most numerous c. 1000–2000 m.
Food and Feeding. Fruit, some arthropods; also flower parts. Of nine stomachs examined, eight contained only vegetable matter and one contained both vegetable and animal matter, including fruit, seeds and insects. In W Valle del Cauca, in Colombia, about half of diet is fruit (57% of 307 observations): at least 22 species of fruits recorded in diet, 59% of all fruit taken being melastomes, especially *Miconia* species (89% of all melastomes); other commonly eaten fruits included holly (*Ilex*), accounting for 13%, and *Cecropia* and figs (*Ficus*), each making up 12%. Ate flowers or flower parts (possibly immature ovaries) of *Topobea brachyura* (Melastomataceae), which accounted for 2% of all records of vegetable matter being consumed. Nestling diet in Ecuador included katydids (Tettigoniidae), unidentified insects, whole fruit and mashed fruit. Singly and in pairs when breeding, but at other times several, sometimes up to a dozen or more, forage with mixed-species flocks containing other members of genus, but not in single-species flocks; regularly gathers with other small frugivores at fruiting trees. Forages at middle level to canopy; median foraging height above ground in W Valle del Cauca was c. 10 m, rarely below 3 m. Forages by peering with head down alternately on one side of branch and then the other, behaviour typical of genus. Gleans more from mossy or partly mossy branches (usually not twigs or foliage), 76 of 102 observations involving branches 1·3–5 cm in diameter and 84% of all insect-foraging on mossy branches, 16% on bare limbs. Even near terminal part of branches searches twigs and moss, not leaves. Also occasionally hangs from or clings to sides of vines to search bark or moss. Took fruits mostly when in upright, perched position, also occasionally while hanging head down from petioles or catkins. Has been observed to peck pieces from larger fruits.
Breeding. One nest found at end Mar in Ecuador (in Mushullacta Community Forest Reserve, SW Galeras Mts, c. 8 km SE of Guamaní, in Pichincha); in W Colombia, nest-building observed Jul, Sept and Oct and begging juveniles in May on W slope of W Andes, begging juveniles in Jul and Aug on E slope of W Andes, also ten breeding-condition birds in Apr–Sept in N. In Ecuador, a cup-nest wedged in epiphytes on thick horizontal branch, c. 10 m up in subcanopy tree on steep slope; held two nearly naked chicks; of 68 observed visits, 20 (almost 30%) were by a trio of adult-plumaged birds, indicating helpers or co-operative breeding; remaining visits were by single individual or pair. In captivity, both sexes carried nest material, only female built nest; clutch 1–2 eggs, white, tinged pink, and with reddish-brown spots coalescing at large end; incubation by female, period 14–15 days; chicks fed almost entirely by female. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Widespread, and generally fairly common to locally common throughout range. Occurs in numerous protected areas, from Henri Pittier, Yacambú, Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), S to Manu National Park (Peru) and Madidi and Amboró National Parks (Bolivia). Some populations, especially in N portions of Andes, now reduced and fragmented by deforestation, but the species' range still includes considerable unprotected montane-forest habitat that is probably not at serious risk in the immediate future.

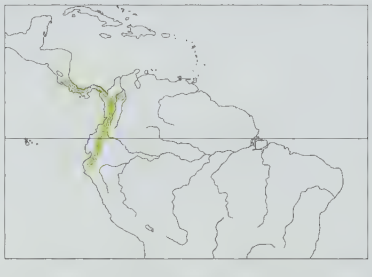
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Álvarez-Rebolledo *et al.* (2003), Burns & Naoki (2004), Ciarpaglini (1971), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Gelis *et al.* (2006), Hilty (1981, 1997, 2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Moore *et al.* (1999), Naoki (2003c, 2007), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sedano & Burns (2010), Thomas (1982), Walker (2001), Weske (1972), Wetmore (1939), Zimmer (1943b).

119. Silver-throated Tanager

Tangara icterocephala

French: Calliste safran **German**: Silberkehltangare **Spanish**: Tangara Goliplateada

Taxonomy. *Calliste icterocephala* Bonaparte, 1851, Punta Playa Valley, south of Quito, Ecuador.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. florida*, *T. arthus*, *T. xanthocephala*, *T. chrysotis* and *T. parzudakii*. Three subspecies recognized.
Subspecies and Distribution.
T. i. frantzii (Cabanis, 1861) – N Costa Rica S on both slopes of mountains to W Panama (Veraguas).
T. i. oresbia Wetmore, 1962 – mountains of WC Panama (Coclé and W Panamá).
T. i. icterocephala (Bonaparte, 1851) – mountains of Pacific slope of extreme E Panama (E Darién), and Andes of Colombia (W slope of C range in Antioquia; W slope of W range S from Antioquia) and W Ecuador (S to El Oro and W Loja); possibly also NE Peru (E Tumbes).



Descriptive notes. 13 cm; 17·7–24·7 g. Sleek, mostly bright yellow tanager with black moustachial stripe and silvery greenish-white throat. Nominate race has crown and upper nape to below eye bright golden-yellow, narrow yellow orbital ring; yellow of crown and side of head bordered below by long black moustachial stripe which extends from small black patch at bill base back to rearmost ear-coverts, becoming slightly broader towards rear; mid-crown to nape usually with hint of obscure greenish and black streaking (black bases of feathers showing through); partly concealed narrow band at base of nape bluish; mantle and back yellow, broadly streaked black, lower back to uppertail-coverts plain bright golden-yellow; tail feathers black, edged green, central feathers weakly tinged green; upperwing and its coverts black, lesser and median coverts faintly edged and broadly tipped yellow, greater coverts more broadly edged greenish to greenish-yellow, flight feathers and tertials edged green; throat silvery white often with faint greenish tinge, this colour extending outwards on to side of neck and down to chest; rest of underparts, including undertail-coverts, mainly bright golden-yellow; iris dark brown; bill black; legs dark grey. Sexes similar, female slightly duller than male (seldom apparent in field), with more greenish tinge, and sometimes some black mottling on crown. Juvenile is extremely dull and nondescript, dingy greyish-brown with little, if any, of adult plumage pattern evident; immature much duller than adult, often mainly dull greenish-olive above, with black wing and tail edged with greenish, and dingy greyish-olive below, with only centre of breast and belly yellowish; older immature has obvious pale throat and hint of black moustachial stripe. Race *frantzii* is much like nominate, but partly concealed narrow band at base of nape paler, pale greenish-blue, and foreneck and throat paler, more whitish; *oresbia* is darker than other races, decidedly darker yellow throughout, band on hindneck darker bluish-green, foreneck and throat darker, and sides and flanks darker with greenish-yellow cast, female has edging on back feathers greener, less yellowish. Voice. Call, during foraging and often in flight, a very buzzy "shreet" or "bzzeet", harsher than that of *T. florida* and *T. arthus*. No song yet described or recorded; song recordings attributed to this species require confirmation.
Habitat. Humid forest and wet forest, forest borders, and older second-growth woodland, in all areas favouring wet mossy forest; in Costa Rica regularly in scattered trees in clearings, but rarely away from forest in Colombia. At c. 600–1700 m, rarely to 2300 m, in Costa Rica, but nearly down to sea-level in rainiest months; c. 400–2100 m in Colombia and recorded at 150–1550 m (mainly 500–1350 m) in W Ecuador. In Andes numbers diminish rapidly above c. 1200 m, where replaced by *T. arthus*.

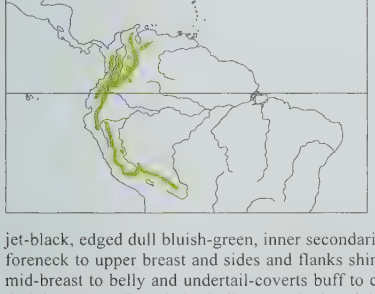
Food and Feeding. Fruits, flower buds, and some arthropods. Three stomachs contained only vegetable matter, including fruit and *Cecropia* seeds. In Costa Rica reported as commonly eating arillate fruits of epiphytic vine *Souroubea guianensis* (Marcgraviaceae). In W Valle del Cauca, in Colombia, recorded as taking at least 32 species of fruit, which comprised 80% of 758 foraging observations; various species of melastome comprised 55% of all fruit taken, and one genus, *Miconia*, accounted for 88% of all melastome fruits consumed; *Cecropia* accounted for additional 21% of fruit eaten. Occurs in pairs and in groups of various sizes, occasionally of up to 15 individuals or even more, that associate with mixed-species flocks; often in mixed flocks with *T. arthus* and *T. florida*. In W Valle del Cauca, foraged mainly in crowns of shrubs or trees (78% of 523 observations), with median foraging height 8·6 m (706 observations), and rarely below 3 m. Took fruit usually from upright perched position, also readily hung head downwards from petioles, leaves or catkins to reach *Cecropia* catkins and similar; rarely clung to larger fruits or berries to peck out pieces, or snatched berries in flight, or ate flower buds. Insect-seeking done predominantly on sides or undersides of thin mossy branches (1·3 cm or less in diameter); hops quickly, or pauses to lean, head down, to check first one side and then the other; less often hung or clung to moss clumps, ferns, vines or stems to obtain prey, or probed into moss or bromeliads, or hanging dead leaves. Has been reported as descending low to forage opportunistically at swarm of army ants (*Labidus praedator*) in Colombian Andes; a group of ten of these tanagers was once observed at a highland army-ant swarm in Colombia. Behaviour in general similar to that of *T. arthus* and *T. florida*.
Breeding. Season Feb–Sept in Costa Rica breed (all records above c. 750 m), and breeding recorded in Feb in Panama and in Feb, Apr and Oct in Colombia; sometimes two broods attempted. Following details from study of 52 nests in Costa Rica. Nest material gathered by both sexes (male's contribution variable), female may build nest alone or male may help, most construction work done in morning hours, work completed in 3–6 days; nest a bulky structure of moss (especially base), leaves, ferns, spider web and plant filaments, hidden 1–11 m (rarely to 13 m) above ground on mossy branch of isolated tree in clearing adjacent to forest or tree in bushy pasture or tree in garden around house, some nests no doubt located inside forest. Clutch 2 eggs, dull white or greyish, thickly marked with brown, especially at large end; incubation by female alone, period c. 13–14 days; chicks fed by both adults, nestling period c. 15 days. Success: c. 54% of nests in Costa Rica produced at least one fledgling.
Movements. Seasonal elevational movements downslope almost to sea-level occur on both slopes during rainiest months in Costa Rica. Little or no such movement observed on Pacific slope in Anchicayá Valley, in Colombia.
Status and Conservation. Not globally threatened. Fairly common to common throughout range. Sight record of this species in NE Peru (E Tumbes) may involve a vagrant individual or, perhaps, be indicative of a small resident population. Occurs in a number of protected areas, including Braulio Carrillo, Tapantí and Chirripó/La Amistad National Parks (Costa Rica), La Amistad, Volcán Barú, Santa Fé and Darién National Parks (Panama), and Los Katíos, Tatamá, Farallones de Cali and Cerro Munchique National Parks and Tambito and El Pangan Nature Reserves (Colombia), also in Cotocachi-Cayapas Ecological Reserve (Ecuador). Deforestation resulting from mining, human settlement and various agricultural activities has reduced and fragmented this species' range everywhere, and these activities are increasing dramatically in parts of its range, especially in Colombia.
Bibliography. Burns & Naoki (2004), Buskirk (1976), Carriker (1910), Davis (1972), Donegan & Dávalos (1999), Dunning (1982), Garrigues & Dean (2007), Hartman (1955), Hartman & Brownell (1961), Hilty (1974, 1981, 1997, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Mazar Barnett *et al.* (2006), Meyer de Schauensee (1964, 1966, 1970a), Moynihan (1962c), Naoki (2003c), Oniki (1972), Powell (1979), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ross & Whitney (1995), Salaman *et al.* (2008), Salvin & Godman (1883), Schulenberg *et al.* (2007), Sedano & Burns (2010), Skutch (1954, 1980a), Slud (1964), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984), Wheelwright *et al.* (1984), Zimmer (1943b).

120. Saffron-crowned Tanager

Tangara xanthocephala

French: Calliste à tête dorée **German**: Gelbkopftangare **Spanish**: Tangara Coronigualda

Taxonomy. *C.*[*allospiza*] *xanthocephala* Tschudi, 1844, Vítoc [Valley], Junín, Peru.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. florida*, *T. arthus*, *T. icterocephala*, *T. chrysotis* and *T. parzudakii*. Three subspecies recognized.
Subspecies and Distribution.
T. x. venusta (P. L. Sclater, 1855) – W Venezuela (both slopes of Sierra de Perijá; Andes from S Lara S to S Táchira), Colombia (both slopes of W & C Andes, locally both slopes of E Andes, and Macarena Mts) and Ecuador (both slopes) S to N & C Peru (E slope of E Andes from Cajamarca S to N Pasco).
T. x. xanthocephala (Tschudi, 1844) – E slope of Andes in C Peru (Chanchamayo region).
T. x. lamprotis (P. L. Sclater, 1851) – E slope in SE Peru (Ayacucho and Cuzco) S to Bolivia (to W Santa Cruz).



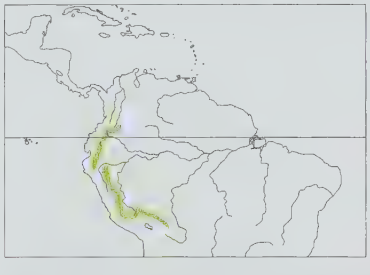
Descriptive notes. 13 cm; 15–23·6 g. Colourful Andean tanager with blue-green body and yellow to orange on head. Male nominate race has small black mask consisting of narrow black line over bill and black lores, orbital ring and throat; rest of head bright saffron-yellow, black nuchal collar extending narrowly across side of neck to meet black of throat; upperparts mainly opalescent blue to turquoise-green (depending on light), mantle and back streaked with black (black feathers broadly edged blue-green); tail black, outer feathers edged turquoise-blue; upperwing-coverts black, narrowly edged bright turquoise-blue, primaries jet-black, edged dull bluish-green, inner secondaries and tertials black, narrowly edged pale blue; foreneck to upper breast and sides and flanks shining opalescent blue to greenish-blue, centre of mid-breast to belly and undertail-coverts buff to cinnamon-buff; iris dark brown; bill black; legs dark horn-grey. Female is similar to male, but duller, e.g. buff of underparts lighter and less rich. Juvenile is very dull and with little of adult pattern evident, although may have paler yellowish-brown head; immature also very dull, but with slightly contrasting dingy yellowish head, black mask faint or lacking, back dull greenish-blue with dusky scales and streaks, rump mixed dull opalescent green and brown, wing and wing-coverts dusky with hint of greenish edging, throat and underparts mainly dingy greyish to greenish-buff, becoming much more buff to cinnamon on belly and undertail-coverts. Race *lamprotis* differs from nominate in having crown contrastingly deep orange (not yellow), cheek deeper golden-yellow, back more extensively black (almost solidly black on some) and with streaking more opalescent green, and rump opalescent green; *venusta* differs from previous in having crown bright yellow (not orange), and back streaked black and opalescent blue (not so greenish). Voice. Contact note during foraging a high "tsit", when excited a rapid stream of "tsit" notes. Possible song a short series of high squeaky or wheezy notes.
Habitat. Humid and wet mossy forest, along forest borders and in middle-aged and older second growth; sparingly in scattered trees in clearing near forest. At 1000–2600 m, generally most numerous above c. 1400 m; once to 3150 m in Colombia.
Food and Feeding. Mostly small fruits, including *Miconia* species, *Cecropia* and *Morus*, also some arthropods; regularly seen to take nectar from *Inga* flowers in Urubamba Valley (Cuzco), in Peru. Of 15 stomachs examined, 13 contained only vegetable matter and two contained both vegetable and animal matter, including fruit pulp, berries, seeds and insects. Most often seen in groups of 3–10 individuals, sometimes more, with mixed-species flocks containing other tanagers and New World warblers (Parulidae). Forages from eye level to canopy. Takes fruit usually while perched upright and without acrobatics. Searches for insects by peering with head down first along one side of branch and then along other; unlike others of genus that use this method (e.g. *T. arthus* and *T. icterocephalus*), forages on average more on slender and bare to partly mossy branches and twigs, somewhat less on larger mossier branches.
Breeding. Nest in Nov in Peru; birds in breeding condition in Mar–Jul in Colombia. Peru nest was 12 m up in clump of moss hanging from beneath branch and c. 0·7 m from trunk. No other information.
Movements. Resident. Some minor seasonal elevational movements possible.
Status and Conservation. Not globally threatened. Fairly common to common on E slope of Andes; rare to uncommon on W slope in Ecuador. Occurs in numerous protected areas, including Guaramacal and Sierra Nevada National Parks (Venezuela), La Orquídeas, Farallones de Cali, Cerro Munchique and Chingaza National Parks and Río Blanco de Manizales, Tambito and El Pangan Nature Reserves (Colombia), Sangay and Podocarpus National Parks and Cayambe-Coca Ecological Reserve (Ecuador), Manu National Park (Peru) and Madidi National Park (Bolivia). Although the species' range, especially in N, is now fragmented and reduced by deforestation, considerable intact habitat exists outside protected areas and at least parts of this thought not likely to be at risk in the near future.
Bibliography. Burns & Naoki (2004), Clements & Shany (2001), Donegan & Dávalos (1999), Donegan *et al.* (2007), Dunning (1982), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Miller (1963), Naoki (2003c), Remsen *et al.* (1987), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg *et al.* (2007), Sedano & Burns (2010), Terborgh & Weske (1975), Walker (2001), Zimmer (1943b).

121. Golden-eared Tanager

Tangara chrysotis

French: Calliste à oreilles d'or **German**: Goldohrtangare **Spanish**: Tangara Orejidorada

Taxonomy. *Calliste chrysotis* du Bus de Gisignies, 1846, Peru.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. florida*, *T. arthus*, *T. icterocephala*, *T. xanthocephala* and *T. parzudakii*. Monotypic.
Distribution. S Colombia (at head of Magdalena Valley in Huila; E slope of E Andes from Caquetá) S on E slope through Ecuador, E Peru and N Bolivia (S to Yungas of Cochabamba).



Descriptive notes. 14 cm; 23–25·5 g. Distinctively marked, mostly lime-green tanager with black crown, golden to yellow cheeks and rufous lower underparts. Male has centre of crown to nape, narrow line over bill, lores, tiny area around eye and chin black, narrow black moustachial line ending in small streaked area on side of neck; forehead and supercilium shining straw-yellow, patch from below eye to ear-coverts coppery gold (ear-coverts can be spread outwards, looking like small ears); mantle and back black, streaked lime-green, lower back to uppertail-coverts pale lime-green; upperwing-coverts, primary coverts and flight-feathers black, heavily edged bluish-green; throat and underparts shining lime-green, centre of lower breast, centre of belly and undertail-coverts contrastingly rich cinnamon-rufous; iris dark brown; bill black; legs dark grey. Female is similar to male, but duller, and generally with cheek and ear-coverts straw-yellow (not coppery gold). Juvenile is much duller above and below, and without sharply contrasting black-and-green pattern. Voice. Call "tsuck", somewhat lower-pitched than calls of congeners; also a strong, doubled "tsuck-seet", varied to "chuk-eet", and variety of thin high notes. Captive males sing a hissing, piping song or series of high rattling notes while raising ear-tufts.
Habitat. Humid and wet pre-montane and montane forest, forest borders, and older second-growth woodland. Occurs in narrow elevational band on E slope of Andes: c. 1100–2400 m in Colombia, 1100–1700 (once down to 850 m) in Ecuador, 1100–2300 in Peru, and 1150–1750 m in Bolivia; old (presumed 19th-century) Bolivian records ranging from 760 m to 2100 m.
Food and Feeding. Fruits, some arthropods. One stomach contained small worms (Oligochaeta) and plant material. Eats many small fruits, especially melastome (*Miconia*) berries. Typically singly and in pairs, much less infrequently groups of three or four individuals, and generally with large mixed-species flocks containing other members of genus. Forages mostly from middle heights to canopy of trees; in Bolivia c. 10–30 m above ground, median distance to top of canopy was c. 1·5 m. Active, fast-moving and apt to spend only brief periods of time in a tree before flying ahead to another site nearby. Readily visits fruiting trees, especially when congeners present, but often remains for only a few moments. In Peru and Bolivia works rapidly along bare or mossy branches of 2·5–7·6 cm in diameter, gleaning insects partly by hopping and peering with head down on alternate sides of branches in stereotyped manner typical of many others of its genus; also checks dead leaves, and gleans insects from outer leaves. Erectile ear-tufts used in displays of aggression (possibly also in courtship), when bird may posture motionless with ear-tufts erected and head raised for up to several minutes.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon. Generally less numerous than other members of genus with which it occurs. Found in a few protected areas, including Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador), Tingo Maria and Manu

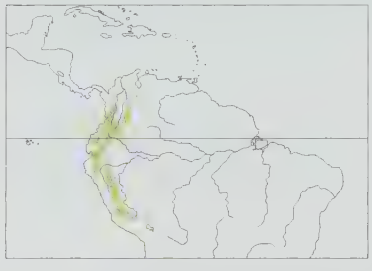
National Parks (Peru) and Madidi National Park (Bolivia). Confined to a narrow band of humid forest on E Andean slope where considerable intact forest still remains, but this is a region of increasing human activity and settlement, and deforestation may eventually put this species at risk.
Bibliography. Burns & Naoki (2004), Hilty & Brown (1986), Ingels (1974b), Isler & Isler (1999), Lysinger *et al.* (2005), Norgaard-Olesen (1973), Parker & Parker (1982), Remsen (1984), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Weske (1972), Zimmer (1943b).

122. **Flame-faced Tanager**

Tangara parzudakii

French: Calliste à face rouge **German**: Rotstirntangare **Spanish**: Tangara Carafuego
Other common names: Yellow-faced Tanager (*lunigera*)

Taxonomy. *Tanagra Parzudakii* Lafresnaye, 1843, environs of Santa Fé de Bogotá, Colombia.
Genetic data indicate that this species is part of a monophyletic group that includes also *T. johannae*, *T. schrankii*, *T. florida*, *T. arthus*, *T. icterocephala*, *T. xanthocephala* and *T. chrysotis*. Three subspecies recognized.
Subspecies and Distribution.
T. p. lunigera (P. L. Sclater, 1851) – Pacific slope of W Andes from Colombia (S from Risaralda) S to W slope in Ecuador (S to El Oro).
T. p. parzudakii (Lafresnaye, 1843) – SW Venezuela (Andes of SE Táchira); E Andes of Colombia (W slope from Santander to Cundinamarca and head of Magdalena Valley in Huila; E slope probably throughout, but recorded only Meta, Caquetá, Putumayo and Nariño) and E slope in Ecuador.
T. p. urubambae J. T. Zimmer, 1943 – E slope of Andes in Peru (S to Cuzco and Ayacucho).



Descriptive notes. 14–15 cm (nominate), c. 13–14 cm (*lunigera*); 25–31 g. Boldly coloured tanager with flame-red to orange on face. Nominate race has lowermost forehead, lores, ocular ring, chin, throat and broad bar extending across side of neck black (sometimes a narrow black line behind eye extending to meet top of neck band); cheek and malar region deep flame-red, upper forehead and forecrown deep flame-red, becoming bright silky yellow on hindcrown and nape; mantle and upper back black, lower back and rump opalescent to golden-straw, often with bluish tinge, and feathers of uppertail-coverts usually showing more bluish; tail black; lesser and median upperwing-coverts shining opalescent bluish to greenish opalescent, greater coverts jet-black, broadly edged shining pale blue (varying with light to slightly greenish); flight-feathers jet-black, secondaries and tertials narrowly and inconspicuously edged bluish; underparts shining opalescent silvery green mixed with buff (colour highly variable depending upon light), centre of belly pale cinnamon-buff, becoming darker on flanks and undertail-coverts; iris dark brown; bill black; legs dark grey. Sexes similar. Immature has red areas of head replaced by dull yellow, throat dingy pale buffy grey, other black areas of plumage dull dusky, black of lores and ocular ring obscure, and plumage overall much duller and lacking shining aspect, below dull pale greyish-buff (sometimes hint of greenish), lower underparts dull buff, turning cinnamon on undertail-coverts. Race *lunigera* is slightly smaller than nominate, has forecrown and cheek orange-red (not red) and malar area yellow, shoulder and tips of median and greater wing-coverts more silvery green (less blue), lower back to uppertail-coverts with stronger greenish-opalescent tinge, chest to mid-breast brighter silvery opalescent green, and central lower underparts darker cinnamon-buff; *urubambae* is much like nominate, differing in shorter bill, slightly darker and duller red forehead, top of head on average slightly lighter yellow, underparts with dusky subterminal area of feathers more pronounced, belly paler tawny and with hint of streaking. Voice. Calls include a notably high-pitched, slightly buzzy "seeet" note; also a sharp, forceful, smacking "chit!" or "tsuk!", and a series of "ti" notes, especially in flight. Song not certainly described, possibly a series of "chit" notes accelerating into twittering trill.
Habitat. Humid and wet montane forest, and adjacent older second growth. Less at forest borders than many congeners. At 1000–2600 m (once to 700 m on Pacific slope) in Colombia, 1100–2400 m (once to 700 m) in Ecuador, and 1500–2500 m in Peru; in all areas most numerous at c. 1800 m.
Food and Feeding. Fruits, also arthropods. Eight stomachs contained vegetable matter, including fruit and seeds. Like its congeners, seems to eat variety of small fruits and berries, especially of *Miconia*, larger-sized melastome fruits, and *Cecropia* catkins. Most often seen singly or in pairs, much less often in groups of 3–7 individuals, and usually with mixed-species flocks containing other members of genus. Active bouts of foraging regularly interrupted by periods of quiet, when it perches in canopy for up to 10–15 minutes. Most often searches mossy limbs, where it employs diagonal-lean or head-down method, peering first on one side of branch and then on other, as do many others of genus. Also regularly hangs head downwards on sides of mossy branches, peers beneath mossy limbs, often in rather methodical and deliberate manner, and probes and pecks at moss; rarely forages in outer foliage.
Breeding. Nest-building in Feb and nest with chick found in Jun in NW Ecuador; nest-building, courtship feeding and birds in breeding condition in Feb–Jun in Colombia. Following details from two nests at 1800 m, in Inti Llacta Reserve, NW Ecuador. One nest being built by female, accompanied for most of time by male, construction work continued for six days; placed 20 m up in isolated *Ceroxylon* palm; incubation by female, seen to be fed once by male; nest attempt apparently failed. Second nest, made from leaf fragments, moss, tiny twigs, pieces of orchid stems, bits of *Chusquea* bamboo leaves and similar, placed 3 m up in *Cinchona* shrub (close to failed Feb nest in palm); contained one nestling, also one egg, white with red-brown spots.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Distribution in Colombian E Andes not fully known: probably found throughout, at least formerly, on W slope; on E slope recorded only from Meta, Caquetá, Putumayo and Nariño but, again, likely to be present throughout. Occurs in a few protected areas, including Las Orquídeas, Tatamá, Farallones de Cali and Cueva de los Guácharos National Parks and Tambito Nature Reserve (Colombia), Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador) and Tingo Maria National Park (Peru). Confined to a narrow band of humid forest on E Andean slope, where considerable unprotected intact forest still remains; increasing human settlement and deforestation in this area, however, may eventually put this species at risk.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Arcos-Torres & Solano-Ugalde (2007), Athanas (2010a), Burns & Naoki (2004), Clements & Shany (2001), Donegan & Dávalos (1999), Donegan *et al.* (2007), Fjeldså & Krabbe (1990), Hesse (1980b), Hilty (2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Moore *et al.* (1999), Naoki (2007), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Zimmer (1943b).

PLATE 13 ➤

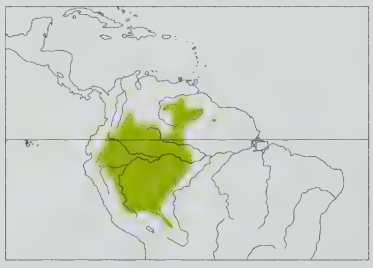


123. **Yellow-bellied Tanager**

Tangara xanthogastra

French: Calliste à ventre jaune **German**: Gelbbauchtangare **Spanish**: Tangara Ventriamarilla

Taxonomy. *Calliste xanthogastra* P. L. Sclater, 1851, Río Negro, Peru.
Genetic data indicate that this species and *T. punctata*, *T. guttata*, *T. varia* and *T. rufigula* form a species group. Highland race *phelpsi* differs in numerous ways from nominate, and may merit separate species status. Two subspecies recognized.
Subspecies and Distribution.
T. x. xanthogastra (P. L. Sclater, 1851) – E Colombia (from Meta and Vaupés) E to S Venezuela (S Amazonas and SW Bolívar), S to E Ecuador, E Peru, W Brazil (E to R Negro, middle R Juruá and upper R Purús), and N Bolivia (S to Cochabamba).
T. x. phelpsi J. T. Zimmer, 1943 – S Venezuela in N Amazonas and N & E Bolívar (from lower R Caura E to Uei-tepui, on Brazilian border); also E Guyana.
Descriptive notes. 11 cm; 13–18 g. Small, green, heavily spotted tanager with bright yellow along central abdomen; bill rather thin. Nominate race has lores black, ocular ring bright green, rest of



head and neck mainly bright emerald-green, spotted black (feathers black with rounded green edges); upperparts black, rounded feather edges broadly pale greenish-blue (imparting spotted appearance), rump greenish, vaguely mottled with black; rectrices dusky with bright bluish-green edges; upperwing-coverts black, broadly edged and tipped greenish-blue, primary coverts and flight-feathers black, edged greenish-blue, tertials more broadly and roundly edged greenish-blue; below mainly green, speckled with black and mixed yellow, and becoming mostly bright unspotted yellow on centre of lower breast and belly; sides and flanks mainly green, mixed yellow; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile undescribed. Race *phelpsi* is similar to nominate, but has slightly longer wing and tail, heavier bill, more yellowish-green head, duller flanks, and more yellow on underparts, including belly. VOICE. Weak "chit" and "seet" notes, much like those of many congeners.

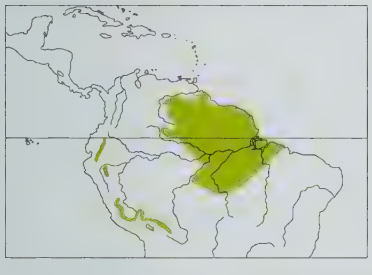
Song a series of descending, buzzy trills, "tic tic'Zzzzzzzzeeeer", shrill, fairly high-pitched and repeated at maximum rate of about one song every 2–3 seconds; possible song, in Peru, a high, buzzy "tik tik-tik dzheeweew".
Habitat. Primarily occurs in high canopy and emergent trees of humid *várzea* and *terra firme* forest; mainly found at elevations of 100–750 m. In contrast, highland race *phelpsi* inhabits humid and wet montane forest, forest borders, and stunted or disturbed melastome-dominated second-growth forest on both white sand and other soil types, in tepui highlands at elevations of c. 1000–1800 m.
Food and Feeding. Diet includes small fruits and insects. Recorded fruits are *Miconia* species and other melastome berries, *Cecropia* catkins, and mistletoe berries (Loranthaceae). Of 13 stomachs of nominate race examined, nine contained only vegetable matter and four only animal matter; contents included fruit and caterpillars (one of latter measuring 4 cm). Notably social, usually seen in small groups that forage with mixed-species flocks containing other members of its genus; regularly visits fruiting trees and shrubs with other species. Early in morning, lowland birds often perch in open atop high emergent trees, regularly gathering with other members of genus and *Dacnis* and *Cyanerpes* species before setting off to forage. Nominate race in lowlands forages mainly high in canopy and emergent treetops, and rarely seen lower; those in Andean foothills, however, behave more like tepuis race (*phelpsi*), foraging from middle heights to canopy and regularly coming down to eye level along forest borders to visit fruiting shrubs. Insect-hunting somewhat generalized, includes some lean-down branch-searching (like that of e.g. *T. arthus*), and acrobatic searching of foliage in outer perimeter of trees (much like that of *T. guttata*).
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon, and at rather low density across lowlands; race *phelpsi* perhaps locally more numerous in tepui highlands. Occurs in numerous protected areas. Highland *phelpsi* found in Canaima, Jaua-Sarisariñama and Serranía de la Neblina National Parks, in Venezuela, and probably also Pico da Neblina National Park, in adjacent N Brazil; lowland nominate race occurs in almost all national parks in Amazonian lowlands of SE Colombia, E Ecuador and E Peru S to Madidi National Park, in Bolivia, as well as in Serra do Divisor National Park (and probably others), in Brazil. In addition, extensive unprotected habitat exists within this species' range, and it appears unlikely to be faced with any serious threats even in the long term.
Bibliography. Burns & Naoki (2004), Dunning (1982), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), O'Neill (1974), Phelps & Phelps (1963), Remsen & Traylor (1983), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Snethlage (1914), Souza (2002), Zimmer (1943b).

124. Spotted Tanager

Tangara punctata

French: Calliste syacou **German**: Drosseltangare **Spanish**: Tangara Puntosa

Taxonomy. *Tanagra punctata* Linnaeus, 1766, Suriname.
Genetic data indicate that this species and *T. xanthogastra*, *T. guttata*, *T. varia* and *T. rufigula* form a species group. Despite significant geographical separation, as well as differences in habitat elevation, the possibility that western and eastern populations may represent two distinct species has not yet been investigated in detail. Five subspecies currently recognized.
Subspecies and Distribution.
T. p. zamorae Chapman, 1925 – E slope of Andes in Ecuador (Sucumbíos) and N Peru (Moyobamba).
T. p. perenensis Chapman, 1925 – E slope of Andes in C Peru (Junín, mainly in Chanchamayo area).
T. p. annectens J. T. Zimmer, 1943 – E slope in SE Peru (Inambari region).
T. p. punctulata (P. L. Sclater & Salvin, 1876) – E slope in N Bolivia (La Paz and Cochabamba).
T. p. punctata (Linnaeus, 1766) – S Venezuela (S of R Orinoco), the Guianas, and N Brazil (R Negro E to Amapá and, S of Amazon, in Pará).



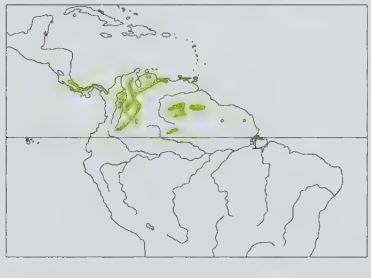
Descriptive notes. 11–12 cm; 13–17 g. Small, mostly green tanager with dark-spotted appearance. Nominate race on entire front half of body, above and below, has dark feathers broadly fringed yellowish-green, palest on face to lower breast, crown to back edged green, crown more strongly tinged greenish-blue; rump and uppertail-coverts unspotted green; tail blackish, edged green; upperwing and its coverts blackish, feathers edged blue-green to green, usually greenest on lesser coverts, tertials broadly edged greenish; below spotted breast, the sides, flanks and undertail-coverts are yellowish-green, centre of belly white; iris brown; bill black; legs slate-coloured. Female is similar to male, but black spotting above and below somewhat duller. Immature is considerably duller than adult, with spotting dull brownish-grey (not black) and not well defined, and lower underparts dull whitish with traces of darker feather tips. Races differ mainly in darkness of plumage coloration: *zamorae* is slightly larger than nominate, with wing-coverts and flight-feathers edged green; *perenensis* has the least spotted underparts of any race, and lower underparts more broadly pure white, female spots especially dull; *punctulata* differs from previous in stronger yellow tinge on mantle and wing-coverts, paler rump and flanks, and even more spotting below; *annectens* is intermediate between preceding two races, being more heavily spotted above and below than *perenensis* but less sharply marked than *punctulata* and, compared with latter, has less white above lores, darker rump and flanks, less yellowish on margins of mantle feathers and upperwing-coverts, and less extensive spotting below. Voice. Call a sharp "tsuu" and extremely high "chip" or "tsick", usually in rapidly repeated staccato series, sometimes accelerating into a trill, and sometimes diminishing at end. Some of these series may constitute a song.
Habitat. Mainly humid and wet pre-montane forest, forest borders and second-growth woodland in Andes, often where forest fairly mossy; c. 500–2000 m. Lowland nominate race in humid forest, forest borders, and scrubbier savanna forest, second growth and shady plantations; from lowlands to 1600 m.
Food and Feeding. Diet consists of fruits and arthropods. Of five stomachs examined, four contained only vegetable matter and one only animal matter; contents included fruit pulp, seeds, berries, and a snout beetle (Curculionidae). Most often seen in pairs or in groups of 3–4, although occasionally up to eight individuals. In Andes generally found with mixed-species flocks, as is also the case in E Venezuelan lowlands; around Manaus, in Brazil, however, recorded only sporadically with mixed flocks; in all parts of range readily joins groups of small birds at fruiting trees. Forages high, mostly 15–50 m up, occasionally lower in small trees or tall shrubs at forest edge. Forages for insects mainly in outer foliage, where it hops and peers actively in outermost leaves, sometimes walking or standing atop foliage. May take prey about equally from top and bottom surfaces of leaves.
Breeding. No information.
Movements. Probably resident. No movements verified but, if they occur, likely confined to local shifts in response to fruit abundance.
Status and Conservation. Not globally threatened. Uncommon in Guianan and E Amazonian lowlands; fairly common to locally common in Andes. The four Andean races occur in several large protected areas, among them Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador), Manu National Park (Peru) and Madidi National Park (Bolivia). Single E race (nominate) can be found in Canaima National Park (Venezuela), Kaieteur National Park (Guyana), Brownsberg Nature Park and the Central Suriname Nature Reserve (Suriname), and Montanhas do Tumucumaque National Park (Brazil), among others. This species' Andean range includes considerable intact but unprotected forest that is subject to deforestation from various human activities, but is probably secure in the short term. E population faces few, if any, current or imminent threats.
Bibliography. Beebe (1916), Burns & Naoki (2004), Clements & Shany (2001), Dick *et al.* (1984), Gilliard (1941), Haverschmidt (1948), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Marantz & Zimmer (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Naoki (2003c), Oren & Parker (1997), Pacheco *et al.* (2007), Phelps & Phelps (1963), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snyder (1966), Tostain *et al.* (1992), Willis (1977), Zimmer (1943b).

125. Speckled Tanager

Tangara guttata

French: Calliste tiqueté **German**: Fleckentangare **Spanish**: Tangara Pintoja

Taxonomy. *C.*[*allispiza*] *guttata* Cabanis, 1851, Cerro Roraima, Bolívar, Venezuela.
Genetic data indicate that this species and *T. xanthogastra*, *T. punctata*, *T. varia* and *T. rufigula* form a species group. Nominate race isolated; the possibility that the other races might merit treatment as a separate species may be worth investigating; taxonomic status of *chrysophrys* may likewise deserve research. Six subspecies recognized.
Subspecies and Distribution.
T. g. eusticta Todd, 1912 – Costa Rica (from Alajuela and, on Pacific slope, from San José) E to Panama (Caribbean slope) and extreme W Colombia (Cerro Tacarcuna, in extreme NW Chocó).
T. g. tolimae Chapman, 1914 – E slope of C Andes of Colombia (S to Tolima).
T. g. bogotensis Hellmayr & Seilern, 1912 – Sierra de Perijá, Andes of Venezuela (from Lara S to Táchira), and adjacent E Andes of Colombia (W slope from Norte de Santander S to Cundinamarca, Macarena Mts, and to W Caquetá and E Cauca, possibly also Nariño; probably throughout E slope, but records sparse).
T. g. chrysophrys (P. L. Sclater, 1851) – N & S Venezuela (Sierra San Luis, in Falcón, and coastal cordilleras from Yaracuy E to Sucre and Monagas; also locally in mountains of Amazonas and Bolívar) and extreme NW Brazil (Sierra de Curupira).
T. g. trinitatis Todd, 1912 – N Trinidad.
T. g. guttata (Cabanis, 1851) – SE Venezuela (SE Bolívar E of R Caroní), adjacent extreme N Brazil (Cerro Uei-tepui), and locally in the Guianas.



Descriptive notes. 12 cm; 15–20·5 g. Small, mostly green tanager with yellow-tinged face and dense black spotting. Nominate race has lores black, forehead, eyebrow and orbital area bright yellowish; rest of head and upperparts mainly green, spotted and scaled with black (feathers with black centres and broad rounded greenish edges), rump and uppertail-coverts dull unspotted greenish or with indistinct blackish mottling; tail dusky green, edged green, brightest on margins and fading toward centre of each feather; upperwing-coverts black, broadly edged and tipped pale opalescent blue, primary coverts dusky, faintly edged greenish-blue, flight-feathers including tertials black, basal half of primaries edged green, secondaries edged bluish, tertials edged pale bluish and tipped greenish; throat, breast and sides white, spotted black (spots tiny on throat, becoming progressively larger on breast), centre of lower breast and belly unspotted white, flanks and undertail-coverts yellow-green; bend of wing and underwing-coverts white; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile is like adult, but back and breast less speckled and yellow superciliary obscure or lacking. Race *tolimae* has crown and side of head mainly yellowish-green (little yellow on head), lower breast, belly and undertail-coverts olive-yellow, flanks bright grass-green; *bogotensis* is similar to previous, but upperwing-coverts and secondaries more extensively edged blue and flanks duller green; *eusticta* has rump bright yellowish-green, and undertail-coverts yellowish with black spots; *trinitatis* has more extensive yellowish on forehead, eyebrow and facial area than all preceding races, and yellow colour relatively rich; *chrysophrys* is much like last, but forehead paler yellow and upperparts brighter yellow-green. Voice. More vocal than many congeners, often almost constantly uttering high-pitched "chit, chip" and "tsit" notes, often in fast stream when about to take flight, or in flight. Some notes clear, almost bell-like. No definite song yet described.
Habitat. Humid foothill forest and mountain forest, forest borders, second growth and adjacent shady tree-scattered clearings; also sometimes in disturbed vegetation around human dwellings. In some areas, such as Trinidad, appears to be confined to tall forest and old second growth. Re-

On following pages: 126. Dotted Tanager (*Tangara varia*); 127. Rufous-throated Tanager (*Tangara rufigula*); 128. Bay-headed Tanager (*Tangara gyrola*); 129. Rufous-winged Tanager (*Tangara lavinia*).

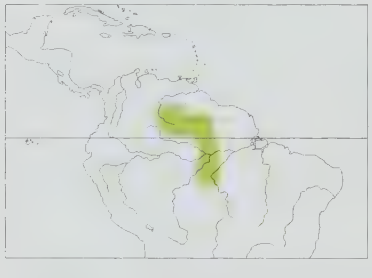
corded at 300–2000 m; in Costa Rica, mainly 400–1000 m on Caribbean side and 300–1400 m on Pacific side; c. 450–1350 m in Panama; mostly 700–1500 m in Andes.
Food and Feeding. Small and large fruits, also some arthropods. Of three stomachs examined, two contained only vegetable matter and one contained both vegetable and animal matter; contents included fruit and a beetle (Coleoptera). In Trinidad, recorded as eating 14 species of fruit, which comprised 74% of 96 foraging records; *Miconia* berries accounted for 53% of all fruit taken; other common species exploited included species of Euphorbiaceae and Ulmaceae (36% of fruit taken). In Costa Rica six species of arillate fruit taken, especially *Souroubea guianensis* (Marcgraviaceae) and *Dipterodendron elegans* (Sapindaceae). Also readily comes to feeding trays, where it eats a variety of cultivated fruits. Notably social, outside breeding period almost always seen in lively little family parties or groups of up to eight or so individuals, and often with mixed-species canopy flocks, especially those containing other members of its genus; some evidence suggests that amount of time spent with mixed-species flocks varies geographically; regularly with other small frugivores at fruiting trees. Forages mostly in canopy, but will descend low to fruiting shrubs; in Trinidad, rarely below 3·5 m above ground. Small berries swallowed whole; pecks pieces from large fruits. Seeks insects in high foliage near tips of branches; often rather acrobatic as it scrambles out through foliage, peers up, leans out or down, hang downwards, or clings beneath leaves to check leaf surfaces, all of this behaviour typical of genus.
Breeding. Recorded in Apr–Jun in Costa Rica; birds in breeding condition in May–Jun in NE Colombia. In Costa Rica, helpers observed to attend nests. Nest built by both sexes, a tight open cup of leaves, leaf fragments and rootlets; in Costa Rica five nests were 3–8 m up in foliage, four in isolated trees. Clutch 2 eggs, mottled brown, especially at larger end; incubation by female, occasionally fed by male, period 13 days; nestling period c. 15 days; family-members may remain together for up to a year.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common to common. Occurs in various protected areas, including Braulio Carrillo, Tapantí and Chirripó/La Amistad National Parks (Costa Rica), La Amistad, Santa Fé and Darién National Parks (Panama), Los Katíos National Park and Reinita Cielo Azul, Arrierito Antioqueña, Bavaria and Río Blanco de Manizales Reserves (Colombia), and Yacambú, Henri Pittier, Paria and Canaima National Parks (Venezuela). The ability of this species to use older second growth, coffee plantations and other disturbed sites provides an important buffer against habitat loss, although it also will be vulnerable to extensive deforestation and fragmentation of habitat in longer term.
Bibliography. Belcher & Smooker (1937), Burns & Naoki (2004), Davis (1972), Dunning (1982), ffrench (1991), Garrigues & Dean (2007), Gilliard (1941), Ginés *et al.* (1951), Haverschmidt & Mees (1994), Hilty (2003, 2009a), Hilty & Brown (1986), Ingels *et al.* (2003), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moynihan (1962c), Nehrkorn (1899), Ogilvie-Grant (1912), Phelps & Phelps (1950), Remsen *et al.* (2010), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schäfer & Phelps (1954), Sedano & Burns (2010), Skutch (1954, 1961, 1977, 1980a), Slud (1964), Snow & Snow (1971), Souza (2002), Stiles & Skutch (1989), Wetmore *et al.* (1984).

126. **Dotted Tanager**

Tangara varia

French: Calliste tacheté **German**: Tüpfeltangare **Spanish**: Tangara Manchada

Taxonomy. *Tanagra varia* Statius Müller, 1776, Cayenne, French Guiana.
Genetic data indicate that this species and *T. xanthogastra*, *T. punctata*, *T. guttata* and *T. rufigula* form a species group. Monotypic.
Distribution. S Venezuela (E & S Amazonas E of R Orinoco, and S Bolívar), SW Guyana and N Brazil (N of R Amazon, from R Negro E to C Pará; S of R Amazon, from lower and middle R Tapajós E to E of R Xingu); old records from SW Suriname and E French Guiana; recent records NE Peru (local) and E Colombia (sight record near Inírida, in Guainía).



Descriptive notes. 11 cm; one bird 10 g. Small tanager, essentially uniformly green, and can easily be confused with immatures of several congeners. Male is mostly bright green above and below; lores black; upperwing-coverts edged dull greenish-blue, outer primaries dusky with minimal edging, inner primaries, secondaries and tail are dusky, edged dull greenish-blue, tertials mostly greenish-blue with dusky inner webs; throat, side of head and chest, sometimes also forecrown, weakly dotted with black, or with black feather bases showing through here and there (inconspicuous at distance); iris dark brown; bill black; legs dark grey. Female is similar to male, but lores green (not black), few or no black dots on foreparts, and throat and underparts slightly paler, more yellowish-green; wing-coverts and flight-feathers dusky, narrowly edged green (not blue). Juvenile undescribed. Voice. Song, in Peru, a high, hissing series of descending, melancholy notes, "tsip... tsee-tseee-tsee-tsee-tsee". Call a high "tsip".
Habitat. Humid forest and forest edge, second growth, trees in clearings adjacent to forest, and shady plantations; lowlands to c. 300 m.
Food and Feeding. Poorly known. Diet insects and fruit. Singles and pairs reported as regularly associated with mixed-species canopy flocks. Forages from middle levels to tree crown, 15–50 m above ground; searches small branches and foliage for food items.
Breeding. No information.
Movements. Presumably resident.
Status and Conservation. Not globally threatened. Rare. Poorly known, and perhaps often overlooked because of great height at which it normally occurs in forest. Recently recorded at one locality in E Colombia (Guainía), but probably more widespread in that region. Status in Suriname and French Guiana uncertain; scattered 19th-century records from both countries, but no known recent records. Found in a few parks, among them Jaua-Sarisariñama National Park and possibly Canaima National Park, in Venezuela; may occur also in Montanhas do Tumucumaque National Park, in Brazil. Although local and thinly spread across Guianan and NE Amazonian region, this species has a range encompassing vast amounts of unprotected but intact forest that is unlikely to be facing any serious threats in the immediate future.
Bibliography. Braun *et al.* (2000), Burns & Naoki (2004), Haverschmidt & Mees (1994), Hellmayr (1936), Hilty (2003), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), Oren & Parker (1997), Phelps & Phelps (1963), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Tostain *et al.* (1992), Willis (1977).

127. **Rufous-throated Tanager**

Tangara rufigula

French: Calliste à gorge rousse **German**: Rostkehltangare **Spanish**: Tangara Golirrufa

Taxonomy. *T.*[*anagrella*] *Rufigula* Bonaparte, 1851, Calacali, 12 miles [c. 20 km] north of Quito, Ecuador.
Genetic data indicate that this species and *T. xanthogastra*, *T. punctata*, *T. guttata* and *T. varia* form a species group. Monotypic.
Distribution. Pacific slope of Colombia (from below Cerro Tatamá, in Risaralda) S to W Ecuador (locally S to El Oro).



Descriptive notes. 12 cm; mean 19·1 g. Small, modestly patterned tanager with mostly black head and spotted underparts. Crown to nape and side of head to below eye are dusky black; lower nape and mantle to upper back black, heavily scaled greenish-buff to tawny, lower back and rump mostly unspotted glistening opalescent green to pale buff, with some black mottling; upperwing-coverts black, heavily edged and tipped pale blue-green to buff, primary coverts faintly edged bluish-green, basal half of outer 3–4 flight-feathers narrowly edged opalescent bluish-green, entire length of rest of inner primaries, secondaries and tertials narrowly edged pale bluish-green; chin and throat contrastingly dull rufous, wash of rufous spreading slightly onto chest; otherwise, chest, breast, sides and flanks opalescent green (often looking whitish), spotted and scaled black (centres of feathers black, rounded tips edged opalescent green-ish), centre of belly and undertail-coverts pale salmon-buff to whitish; iris dark brown; bill black, base of lower mandible greyish-horn; legs black. Sexes alike. Immature is duller than adult, but soon acquires some spotting and scaling. Voice. Relatively noisy and vocal for its genus, often uttering excited bursts of ticking and twittering notes, "tic-ti-ti-ti-ti-ti-ti-ti...", especially as pair flies back and forth across small clearing. Bursts of ticking notes may constitute a song.
Habitat. Humid to very wet pre-montane forest borders (mossy forest), and trees in small forest clearings; most numerous in broken or irregular forest on steep slopes, and usually not found in forest interior. At 400–2100 m.
Food and Feeding. Fruits and arthropods. Animal prey items identified include caterpillars, other larvae, and flying termites (Isoptera). In W Valle del Cauca, in Colombia, fruit comprised 73% of all foraging records, at least 24 species of fruit recorded in diet, and two-thirds of all fruits taken were *Miconia* berries, eaten green and ripe; *Cecropia* catkins comprised an additional 7% of fruit taken; flower parts and flower buds comprised 4% of diet, buds of *Topobea brachyura* (Melastomataceae) representing 67% of all flowers eaten. Occurs in pairs and in family groups of three or four individuals, independently of mixed-species flocks as often as with them; eagerly joins feeding assemblages at fruiting trees such as *Miconia*. From 1100 observations of foraging in W Valle del Cauca, median foraging height was c. 9 m, rarely (5% of records) less than 3 m; fruit taken, on average, at lower heights (8·5 m) than were insects (13·7 m). Takes fruit normally from a perched position, somewhat less often while hanging downwards; fruit items typically mashed and swallowed whole. Most insect-hunting was on surfaces of leaves in perimeter of canopy, where the species commonly employed acrobatic movements, including stretching upwards or outwards, and hanging downwards; also stood or hopped on upper surfaces of large leaves, and frequently sallied short distances (26% of all insect-searching records) to air or hovered at leaf surfaces (10% of insect captures).
Breeding. All data from Colombia. Breeding activities recorded Aug–Jan, with nests found in Aug and Sept, single individuals and pairs carrying nest material and building in mid-Oct and late Jan, and pair feeding young in mid-Dec. In upper R Anchicayá Valley (W slope of W Andes in Valle), two cup-nests made from moss found, one 10 m and the other 18 m above ground, one in epiphyte suspended (like hanging basket) by vine beneath large limb; a pair and one helper, presumed offspring from earlier brood, attended the higher nest, which later failed. No other information.
Movements. Resident. No movement recorded during 16-month observation of colour-ringed birds in Anchicayá Valley (1050 m), in Colombia.
Status and Conservation. Not globally threatened. Fairly common to locally common. Occurs in a few protected areas, notably Tatamá, Farallones de Cali and Cerro Munchique National Parks and Tambito and probably El Pangan Nature Reserves (Colombia), and probably also in Cotacachi-Cayapas Ecological Reserve (Ecuador). This species is vulnerable to deforestation within its narrowly prescribed range, but in the short term is secure as considerable intact habitat remains at present.
Bibliography. Burns & Naoki (2004), Donegan & Dávalos (1999), Dunning (1982), Hilty (1997, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Moore *et al.* (1999), Naoki (2007), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sedano & Burns (2010).

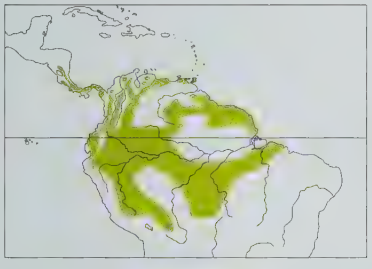
128. **Bay-headed Tanager**

Tangara gyrola

French: Calliste rouverdin **German**: Grüntangare **Spanish**: Tangara Cabecibaya
Other common names: Green Tanager; Bay-and-blue Tanager ("*albertinae* group"); Bay-and-green Tanager ("*viridissima* group")

Taxonomy. *Fringilla Gyrola* Linnaeus, 1758, Suriname.
Forms a superspecies with *T. lavinia*; replaced by latter in wet Chocó–Pacific lowlands. Races probably constitute more than a single species; morphological differences between some races as great as those between present species and *T. lavinia*. Races appear to form three plumage groups: "*albertinae* group" (including *bangsi*, *deleticia*, *nupera*, *catharinae* and *parva*), with blue underparts; "*viridissima* group" (including *toddi*), with green underparts; and monotypic "*gyrola* group", with mixed underparts; these have in the past been treated as three separate species. Name "*gyroloides*", dating to 1847, was in the past applied variously to birds of races *deleticia*, *albertinae* or *catherinae*; however, it is a replacement name for the preoccupied "*Aglaïa Peruviana*", which is itself unidentifiable due to contradictory features in the description. Nine subspecies recognized.
Subspecies and Distribution.
T. g. bangsi (Hellmayr, 1911) – E Nicaragua, Costa Rica and W Panama (E to Panamá).
T. g. deleticia (Bangs, 1908) – E Panama (Darién) and generally in W Colombia (E to W slope of E Andes, S to Patía Valley, in Nariño).

T. g. nupera Bangs, 1917 – SW Colombia (Nariño S of Patía Valley), W Ecuador and NW Peru (Tumbes).
T. g. toddi Bangs & T. E. Penard, 1921 – N Colombia (Sierra de Santa Marta, Sierra de Perijá, and E slope of E Andes in Norte de Santander and N Boyacá) and mountains of W & N Venezuela (E to Miranda).
T. g. viridissima (Lafresnaye, 1847) – mountains of NE Venezuela and Trinidad.
T. g. catharinae (Hellmayr, 1911) – E base of E Andes of Colombia (from Meta and Macarena Mts) S to E Ecuador, E Peru and Bolivia (S to Cochabamba and W Santa Cruz).
T. g. parva J. T. Zimmer, 1943 – S Venezuela (SW Amazonas), adjacent E Colombia, and mountains of adjacent N Brazil (upper R Negro).
T. g. gyrola (Linnaeus, 1758) – S Venezuela (from N Amazonas and NW Bolívar) E across the Guianas and extreme N Brazil (headwaters of R Uraricoera E to C & S Amapá).
T. g. albertinae (Pelzeln, 1877) – NE Peru (Loreto) and Brazil S of R Amazon (from R Purús E to NE Pará and S to N Mato Grosso).



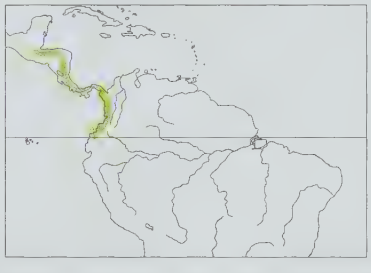
Descriptive notes. 12 cm; 17·5–26·5 g. Small rufous-headed tanager, highly variable in plumage. Nominate race has entire head to hindcrown, chin and upper throat brownish-rufous, narrow golden-yellow nape band; upperparts entirely green, upper surface of tail green; lesser upperwing-coverts yellowish-green, median and greater coverts pale green, slightly tinged yellowish, flight-feathers dusky, basal half of outermost narrowly edged green, inner ones more broadly edged green, tertials mostly green with dusky inner webs; underparts green, narrow band of blue in centre of breast and belly, thigh fawn to buff; undertail-coverts green, undertail dark neutral grey; iris dark brown; bill dusky horn; legs dark grey. Sexes similar, female sometimes slightly duller than male. Juvenile is almost entirely dull greyish-brown to dull greenish above, paler below, generally with dingy brownish-grey area on forecrown and side of head, later with hint of brownish-rufous on head; immature much duller than adult, but gradually acquires hint of blue and green in plumage and usually shows contrasting, although dull, head colour. Races differ principally in colour of underparts, colour of rump, colour of lesser wing-coverts, and intensity (or absence) of yellow nape band: *bangsi* differs from nominate in having orange-yellow lesser wing-coverts, blue rump, and throat and entire underparts all blue; *deleticia* is bright blue from throat to vent, has obscure yellow nuchal collar, partly green lesser wing-coverts, blue rump; *nupera* is pale blue from throat to vent, lacks yellow nuchal collar, has only faint yellow on lesser wing-coverts; *toddi* is all green above (including rump) and below, yellow nuchal collar faint or lacking, wing-coverts tinged yellowish-green; *viridissima* is much like previous (including green rump), but duller green to bluish-green below; *albertinae* is almost entirely blue from throat to vent (sides and flanks very narrowly green), has bright yellow on nape reaching smoothly down onto mantle and scapulars, chestnut-brown lesser wing-coverts, light blue rump; *catharinae* resembles last, but entirely blue from lower throat to vent (no green on sides); *parva* is slightly smaller, entirely blue from throat to vent, with prominent yellow nuchal collar. Voice. Call, one of the most distinctive among this vocally undistinguished group, a buzzy "seeaawee", middle part slurred down and then up, typically given at well-separated intervals. Other, less distinctive calls include short scratchy "tssit", also coarse "shree", often given in flight. Song in Trinidad of 5 notes, "seee, seee, seee, tsou tsooy", last 2 notes lower in pitch; in Costa Rica described as 4–6 thin notes descending in pitch and with whining twang.
Habitat. Wide range of humid and wet forest habitats, including tall lowland forest, mossy cloudforest, forest borders, forest clearings with scattered trees, shady coffee plantations and older second growth. Elevational distribution complex: races *bangsi* and *deleticia* mostly at 500–1600 m in E Costa Rica, down to lowlands on Pacific slope from Costa Rica to Canal Zone (Panama), and mainly 500–2100 m on Pacific slope of N Colombia (where replaced at lower elevations by *T. lavinia*); other races occur from lowlands to as high as c. 1800 m. In general more numerous in highlands than in lowlands.
Food and Feeding. Fruits, some arthropods. Of twelve stomachs examined, ten contained only vegetable matter and two contained vegetable and animal matter, including fruit, large seeds, and insects. Fruit accounted for 70% of 564 observations of foraging in Trinidad and 60% of 188 observations in Colombia; combined total of 43 species of fruit recorded at two sites. Fruit of *Miconia*, *Cecropia*, and figs (*Ficus*) predominate in diet. In Costa Rica, arillate fruit of seven species, including the epiphytic vine *Souroubea guianensis* (Marcgraviaceae), were taken. More solitary than most other members of genus. Typically seen singly and in pairs, or for short periods with accompanying juvenile, otherwise not in groups; regularly follows mixed-species flocks, especially those with others of its genus, and joins other birds at fruiting trees. Forages mostly at middle level to canopy heights inside forest, lower at edges and in second growth; in Trinidad and Colombia (W Valle) most foraging heights were above 7·5 m, rarely below 3 m; median foraging height in Colombia 12·2 m. Typically perches upright to take fruits, which swallowed whole, or mashed to remove seed or skin; observed also to snatch berries while in flight, and to peck pieces from large fruits. Readily hangs head downwards to eat catkins of *Cecropia*, and takes tiny protein corpuscles from petioles of *Cecropia*. About 90% of all insect-hunting done on branches (bare or partly mossy) of 5 cm or less in diameter. Forages by leaning head downwards, first on one side and then on other, in stereotyped series of movements as it progresses outwards along branches; gleans prey from sides or beneath live or dead branches; also inspects flowerheads, moss, seed stalks and hanging dead leaves, and occasionally even clings to tree trunks to search bark. Regularly clings to side of hanging vines, but rarely sallies to air for flying prey.
Breeding. In Costa Rica breeding Feb–Sept, sometimes three broods attempted; in Colombia 13 birds in breeding condition Apr–Sept, begging juvenile in Aug, and juveniles in Nov and Mar. In Costa Rica, cup-nest covered on outside with green moss, rootlets, rhizomes and the like, finer material on inside, placed 2–8 m up in foliage; clutch 2 eggs, dull white, spotted with brown, especially in wreath at large end. No other information.
Movements. Resident. Some short seasonal movements, apparently in response to fruit availability, reported in C Panama.
Status and Conservation. Not globally threatened. Locally common to uncommon; widespread. Abundance varies, generally uncommon in lowlands, locally quite common in highlands. Some races apparently secure, with few real threats (e.g. Guianan and Amazonian populations), whereas some montane races have declined considerably and ranges are fragmented because of past and current deforestation. Populations at greatest risk are those in Central America (both in highlands and in lowlands), W Ecuador (especially at lower elevations), and locally throughout Andes of Colombia. The species does occur in most major parks and reserves in lower Central America and throughout its Andean and N Venezuelan range.
Bibliography. Álvarez-Rebolledo *et al.* (2003), Athanas (2010a), Burns (1997a), Burns & Naoki (2004), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Chapman (1926), Davis (1972), Donegan & Dávalos (1999), Dunning (1982), ffrench (1991), Garrigues & Dean (2007), Gilliard (1941), Haffer (1967b), Hartman & Brownell (1961), Haverschmidt & Mees (1994), Hilty (1981, 1997, 2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Karr (1977), Marantz & Zimmer (2006), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Naoki (2003c), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ridgway (1902), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Skutch (1954), Slud (1964), Snethlage (1914), Snow & Snow (1971), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Tostain *et al.* (1992), Wetmore *et al.* (1984), Zimmer (1943c).

129. Rufous-winged Tanager

Tangara lavinia

French: Calliste à ailes rousses **German**: Goldflügeltangare **Spanish**: Tangara Alirrufa
Other common names: Lavinia's Tanager

Taxonomy. *Calliste Lavinia* Cassin, 1858, Isthmus of Darién, Panama.
Forms a superspecies with *T. gyrola*; replaces latter in lowlands of wet Chocó–Pacific region. Three subspecies recognized.
Subspecies and Distribution.
T. l. cara (Bangs, 1905) – extreme E Guatemala (Puerto Barrios), Honduras, Nicaragua and Costa Rica S to Panama (to San Blas).
T. l. dalmasi (Hellmayr, 1910) – locally on Pacific slope of Panama (Chiriquí and Veraguas E to E Panamá).
T. l. lavinia (Cassin, 1858) – extreme E Panama (E Darién) and S along Pacific slope of Colombia (from N Chocó), including Gorgona I, to W Ecuador (Pichincha).



Descriptive notes. 12 cm; mean 24 g. Male nominate race has head to well below eye rich glossy chestnut, nape and upper back bright shining golden-yellow, becoming bright glossy green on lower back, rump and upper-tail-coverts; central pair of tail feathers green, remainder dusky with green outer webs; upperwing-coverts and outer primaries bright reddish-chestnut, inner primaries, secondaries dusky, strongly tinged greenish, tertials green with variable dusky tinge, especially on inner webs; mostly bright glossy green below, with central throat and narrow median stripe down centre of breast and centre of belly to vent blue, undertail-coverts green, thigh fawn; undertail dull neutral grey, underwing-coverts greyish; iris dark brown; bill black; legs dark grey. Differs from similar *T. gyrola* in having rufous wings and brighter and more extensive golden on upperparts. Female is duller than male, with head golden-bronze and wing patch olive-bronze, colouring of these areas sometimes reduced in extent, little or no golden-yellow shine on upper back, blue of abdomen paler. Juvenile is rather pale dull green above and below, with head tinged pale yellowish to yellowish-brown (only slight contrast with rest of plumage), wing-coverts and outer flight-feathers pale yellowish-brown, tips of primaries and secondaries dull brown, tail like that of adult; immature similar to juvenile, but flight-feathers more obviously rufous and head dull brownish with tinge of green. Races vary mainly in extent of blue on underparts of male: *cara* is similar to nominate, but only centre of belly blue, rest of underparts green; *dalmasi* is like nominate, but only central throat blue, rest of underparts green, has upper mandible and tip of lower mandible dusky brown, rest of lower mandible mostly neutral grey, base paler; legs neutral grey, undersides of toes honey-yellow. Voice. Not especially vocal. Calls mostly weak, "tseeup" or "tseep", and sharp piercing "zeek"; a thin tittering in flight. In Costa Rica, short wiry song described as "seet-sir tsir-tsir tsir-tsir".
Habitat. Inhabits humid forest and wet forest, and tall second-growth woodland and borders. Lowlands to 750 m in N of range (from Guatemala S to Nicaragua); 400–800 m, occasionally descending lower, in Costa Rica; c. 500–1000 m in Panama; lowlands to c. 500 m (rarely to 1000 m) in Colombia.
Food and Feeding. Fruits and arthropods. Recorded as eating fruits of figs (*Ficus*), *Cecropia* and melastomes in W Colombia. Behaviour not so well known as that of *T. gyrola*. Usually seen singly or in pairs, or with a dependent juvenile, less often in small groups. Regularly forages with mixed-species flocks, at middle heights or higher in forest, but lower along edges. Searches for insects on bare or moss-covered branches, often dead ones, by using a stereotyped lean-down foraging movement typical of many members of genus, inspecting first one side of branch and then the other as it progresses outwards.
Breeding. Few records. Nesting in May in Costa Rica; individual building nest in Jul in Colombia (W Valle). A cup-nest in Costa Rica was composed of mosses mixed with fine rootlets and grass stems, lined with fine black fungal fibres, placed c. 2 m up in a citrus tree near edge of forest. Clutch 3 eggs, white, spotted and speckled with shades of brown, especially on larger end. No other information.
Movements. Largely resident. Some seasonal elevational movements reported on Caribbean slope in Costa Rica, where may descend nearly to sea-level during wet season.
Status and Conservation. Not globally threatened. Uncommon over most of range; absent or quite local in most of E Panama. Generally scarce and local in Central American portion of range; more numerous in Chocó-Pacific lowlands of W Colombia. Occurs in a few protected areas, including Braulio Carrillo National Park (Costa Rica), probably Santa Fé National Park (Panama), and lower end of Farallones de Cali National Park (Colombia). Within this tanager's mostly lowland and foothill range extensive deforestation has taken place and, while intact habitat remains, the species seems vulnerable to continuing fragmentation of its habitat and continued population declines over the longer term.
Bibliography. Burns & Naoki (2004), Carriker (1910), Davis (1972), Dunning (1982), Garrigues & Dean (2007), Haffer (1967b, 1975), Hallinan (1924), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Land (1970), Marín & Schmitt (1991), Meyer de Schauensee (1964, 1966, 1970a), Naoki (2003c), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Salvin & Godman (1883), Sedano & Burns (2010), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).



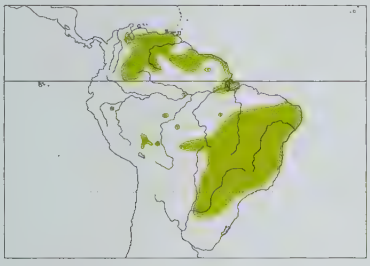
130. Burnished-buff Tanager

Tangara cayana

French: Calliste passevert **German**: Isabelltangare **Spanish**: Tangara Isabel
Other common names: Rufous-crowned Tanager; Stripe-bellied/Ochre Tanager ("*flava* group"); Arnault's Tanager ("*T. arnaulti*")

Taxonomy. *Tanagra cayana* Linnaeus, 1766, Cayenne, French Guiana.
Forms a superspecies with *T. cucullata*, *T. peruviana*, *T. preciosa*, *T. vitriolina* and *T. meyerdeschauenseei*. An aviary specimen, originally described as *T. arnaulti*, is now believed to be a hybrid between present species and *T. preciosa*. Races form two markedly different populations, in N of range nominate and *fulvescens* ("*cayana* group"), which are predominantly buff below, and mainly S of R Amazon in E Brazil *flava*, *sincipitalis*, *margaritae* and *chloroptera* ("*flava* group"), which are predominantly black below; it has been suggested that the two may represent separate species, but they appear to be united by poorly known intermediate race *huberi*, from Marajó I (at mouth of Amazon). Seven subspecies recognized.

Subspecies and Distribution.
T. c. fulvescens Todd, 1922 – Colombia on both slopes of E Andes at N end (S from Norte de Santander).
T. c. cayana (Linnaeus, 1766) – E Colombia (S to Meta and Vaupés) and Venezuela (S to Cerro Yapacana, in C Amazonas, and Bolívar), locally through the Guianas to coastal NC Brazil (Amapá); isolated populations in NE Peru, SE Peru and adjacent N Bolivia, and C Brazil (R Madeira; R Negro).
T. c. huberi (Hellmayr, 1910) – Marajó I (NE Pará), in N Brazil.
T. c. flava (J. F. Gmelin, 1789) – NE Brazil (EC Pará; C Maranhão and N Ceará S to N Goiás and S Bahia).
T. c. sincipitalis (Berlepsch, 1907) – Goiás (except N), in EC Brazil.
T. c. margaritae (J. A. Allen, 1891) – C Brazil (Mato Grosso).
T. c. chloroptera (Vieillot, 1819) – SE Brazil (Minas Gerais, São Paulo and Paraná to Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).
Descriptive notes. 13–14 cm; 15·2–22·5 g. Colourful tanager with two distinctive plumage types, colours of both varying with angle of light. Male nominate race has crown rufous (varying to coppery or golden-rufous), lowermost forehead, lores, area through eye and back to rear ear-coverts



black, forming prominent mask; upperparts, including uppertail-coverts, shining burnished buff (greenish-gold to straw-gold); tail dusky blue, central feathers mostly dull bluish, outermost pairs edged dull pale greenish-blue; lesser upperwing-coverts mainly pale blue-green, median and greater coverts dusky, broadly edged and tipped pale blue-green, primary coverts black, narrowly edged pale blue-green; flight-feathers blackish, edged pale bluish-green, tertials black with outer half of each feather pale blue-green; below mostly shiny buff, sometimes with strong to weak violet-grey tinge on throat and median underparts; iris dark brown; bill blackish; legs dark grey. Female is much duller than male, crown dull coppery rufous, mask duller black, mantle and back dull smoky greyish-green, rump paler smoky yellowish-green; tail tinged dull greenish (not blue); wing and its coverts like those of male, but pale greenish (not bluish); throat and breast dingy greyish, becoming dull smoky greyish to greenish-buff on lower underparts, undertail-coverts mainly buff. Juvenile is very dull smoky greyish with green tinge above, paler below, with greenish edgings on wings and tail, slight brownish-rufous tinge on forecrown, no mask; immature male has dull rufous crown (can be obscure) and dusky mask reminiscent of adult, but much duller. Races differ mainly in colour and pattern of male underparts: *fulvescens* is like nominate, but slightly larger and overall slightly paler, with more silvery (less buffy) body plumage; *chloroptera* differs in having black on side of face extending down across throat and entire median underparts to belly, sharply contrasting with deep buff of rest of underparts, also has underwing-coverts black, female much duller, often with little more than tinge of rufescent on crown, mask faint, throat dull whitish, underparts dull pale greyish-buff with greenish tinge, undertail-coverts buff; *sincipitalis* and *margaritae* are similar to previous, but with black below slightly less extensive and underwing-coverts paler, deep brownish-buff; *flava* also closely resembles *chloroptera*, but black below less extensive and underwing-coverts buffy white; *huberi* is intermediate between N & S races, underparts nearest to *chloroptera*, but with black duller and less well defined, and back, flanks and undertail-coverts paler buff, like nominate. Voice. At times fairly vocal, especially for its genus. Call a buzzy "tzzit", given when perched or in flight. Infrequently heard song a rather long, echo-like (or pulsating), buzzy trill, "sizza' sizza'sizza...", 10 or more notes in c. 2–3 seconds, which sounds like two birds singing simultaneously; reminiscent of songs of *T. heinei* and *T. vitriolina*.

Habitat. Drier open habitats, including ranchland, borders of gallery and savanna woodland, and scrubby wasteland; regularly in gardens and trees around ranch buildings. In Venezuela, lowlands to 2500 m N of R Orinoco and to c. 1800 m S of Orinoco; elsewhere, mainly in lowlands to c. 1000 m; at 1000–1150 m in Peru.

Food and Feeding. Fruits, some arthropods; overall, appears to eat mostly fruit and seems not to capture many insects. Of 19 stomachs examined, 18 contained only vegetable matter and one only animal matter; contents included berries, fruit, seeds of *Michelia champaca* (Magnoliaceae), *Schinus* (Anacardiaceae), guava (Myrtaceae), loquat (*Eriobotrya japonica*), and wasps (Hymenoptera). Mistletoe berries (Loranthaceae) found in other stomachs. Observed to consume termites (Isoptera), *Cecropia* catkins, and fruits of palms, and often pecks pieces from large fruits, including papayas (*Carica papaya*) and bananas; in C Brazil also *Hamelia* fruit. In Venezuela and Suriname seen to take a variety of fruit (and rice) from birdfeeders, and fruit from hotel dining rooms. An "open-country" tanager encountered singly, in pairs and in small family groups about equally; does not follow mixed-species flocks (few of which form in areas inhabited by this species), but does sometimes gather with other birds in fruiting trees and at feeding trays. Forages from low in bushes to treetops. Often seen as it flies by, travelling to some distant shrub or tree, where it eats small fruits and berries and sometimes leans down a few times to inspect alternate sides of branches for insects.

Breeding. Breeding reported Dec–May In Venezuela, Jan–Apr, Jul and Nov in Suriname, and Oct and Nov in S Brazil. Open cup-nest of rootlets, leaves and grass, lined with finer material, placed amid leaves 1·5–2·5 m up in isolated tree. Clutch 2 eggs, whitish, pale blue, lavender or brownish-white, marked with brown, especially around larger end. No other information.

Movements. Resident. Some local movements in response to availability of fruit.

Status and Conservation. Not globally threatened. Common and widespread across much of range. Occurs in many parks and other protected areas over its vast range, thrives in degraded areas, and has profited, at least locally, from conversion of forest into open or semi-open areas with scattered trees. Given the increasing amount of drier open habitat available to this species, it is unlikely to face any risks in the near future or the longer term.

Bibliography. Allen (1891), Bond (1951b), de Brito & Pereira (2006), Burns & Naoki (2004), Cherrie (1916), Contreras (1979a), Descourtilz (1852), Diamond & Lovejoy (1985), Dunning (1982), Erickson & Mumford (1976), Forbes (1881), Friedmann & Smith (1950), Fry (1970), Ginés *et al.* (1951), Haverschmidt (1952, 1955, 1968, 1970a, 1975), Haverschmidt & Mees (1994), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Ingels (1971b), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Moojen *et al.* (1941), Naoki (2003c), Narosky & Di Giacomo (1993), Ogilvie-Grant (1912), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ramo & Busto (1984), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Santos (1948), Sazima (2008), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snethlage (1927, 1928a), Snyder (1966), Souza (2002), Thomas (1982), Tostain *et al.* (1992), Vandieken (2008), Willis & Oniki (2003), Zimmer (1943c).

131. Lesser Antillean Tanager

Tangara cucullata

French: Calliste dos-bleu **German**: Rotkappentangare **Spanish**: Tangara Antillana
Other common names: Hooded Tanager!

Taxonomy. *A.[glaia] Cucullata* Swainson, 1834, no locality = Grenada.
Forms a superspecies with *T. cayana*, *T. peruviana*, *T. preciosa*, *T. vitriolina* and *T. meyerdeschauensei*. Two subspecies recognized.

Subspecies and Distribution.
T. c. versicolor (Lawrence, 1878) – St Vincent, in S Lesser Antilles.
T. c. cucullata (Swainson, 1834) – Grenada, in S Lesser Antilles.



Descriptive notes. 14–15 cm; 25·7–30·3 g (*versicolor*). Male nominate race has crown dark maroon-chestnut, barely contradting with blackish mask from lores to behind eye, tinged blue-green on rear ear-coverts; hindneck to uppertail-coverts pale yellowish-buff with slight greenish tinge; upperwing and its coverts, tertials and tail blackish, heavily edged bluish-green; underparts lavender mixed with some buff, dark spotting on chin and throat, undertail-coverts tawny-buff; iris dark brown; bill black; legs dark horn-grey. Female is much duller than male, with strong greenish tinge in upperparts, and greenish-grey underparts. Juvenile like adult but much duller, with only hint of dark mask; may show little or no rufous on crown. Race *versicolor* is slightly larger than nominate, crown paler (more contrast with mask), and overall plumage brighter. Voice. Call a simple "chirp"; song a series of clear whistles ending in a twitter, "weet-weet-weet-witwitwitwit".

Habitat. Dry and moist forest, wooded borders, second growth, parks and gardens, and montane thickets throughout; also arid scrub on Grenada and also montane rainforest on St Vincent. Occurs at all elevations, but more numerous at higher levels.

Food and Feeding. Fruits and arthropods. Variety of fruit taken, including figs (*Ficus*) and mangos (*Mangifera*), and apparently particularly fond of sour-sop (*Annona*). Occurs in pairs and small flocks, frequently gathering at fruiting trees. Forages from low shrubs to treetops. Gleans arthropods from leaves; also sallies short distances to air.

Breeding. Season Apr–Jul. Reported as stealing material from nests of other birds; open cup-shaped nest built c. 1·8–6 m up in fork of bush or tree, often near human dwelling. Clutch 2 eggs, white to bluish with brown and grey markings, especially in ring at larger end. No further information available.

Movements. None reported.

Status and Conservation. Not globally threatened. Restricted-range species: present in Lesser Antilles EBA. Uncommon on both islands on which it occurs. Has extremely small global range, but believed not to be declining significantly. Like allied *T. cayana*, this species utilizes scrub and disturbed and settled areas; may profit from or, at least, not be adversely affected by many of the environmental changes that result from human activities.

Bibliography. Anon. (1998), Bond (1928b, 1961), Burns & Naoki (2004), Clark (1905), Devas (1954), Isler & Isler (1999), Lack & Lack (1973), Oberle (2008), Ogilvie-Grant (1912), Raffaele *et al.* (1998), Sedano & Burns (2010), Wells (1886).

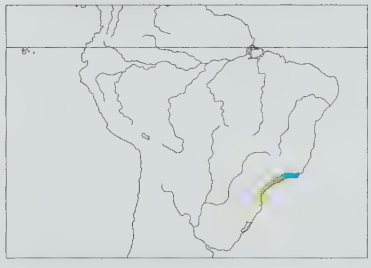
132. Black-backed Tanager

Tangara peruviana

French: Calliste à dos noir **German**: Schwarzmanteltangare **Spanish**: Tangara Dorsinegra
Other common names: Polymorphic Tanager (when treated as conspecific with *T. preciosa*)

Taxonomy. *Tanagra peruviana* Desmarest, 1806, Peru; error = Rio de Janeiro, Brazil.
Forms a superspecies with *T. cayana*, *T. cucullata*, *T. preciosa*, *T. vitriolina* and *T. meyerdeschauenseei*. Has been considered conspecific with *T. preciosa*, the two then being regarded as partially localized morphs of a single species, differing in colour of mantle and back; polymorphism, however, not known to occur in any other member of genus and, further, differences in breeding distribution and habitat suggest that the two are best regarded as separate species. Monotypic.

Distribution. SE Brazil from Espírito Santo S along coast to NE Rio Grande do Sul.



Descriptive notes. 14 cm; 18·5–25·5 g. Male has crown, nape and side of head rufous-chestnut, small dark mask around lores and eye, mantle black, scapulars and back to rump opalescent coppery-straw to pale straw-yellow, often with greenish tinge; lesser and median upperwing-coverts opalescent straw (conspicuous), greater coverts dusky green, broadly edged and tipped opalescent straw; flight-feathers and tail dusky, heavily edged blue-green to blue, tertials mostly blue-green with dusky inner webs, and often with straw-yellow edging; short, inconspicuous straw-coloured malar mark, merging into shining bluish-green on throat, breast, sides and flanks; centre of belly pale yellowish-opal, undertail-coverts dull rufous; iris dark brown; bill black; legs grey. Female is considerably duller than male, has crown and nape pale cinnamon-rufous, mask less clearly marked, upperparts dusky-olive, wing, including coverts, and tail dusky with greenish edgings, underparts dingy silvery green, paler than upperparts, undertail-coverts tinged orange-cinnamon; very much like female of *T. preciosa*. Juvenile like adult but much duller, initially with little of adult pattern or colour evident. Voice. Call a high thin "seeeeek", clear and notably drawn out; also brief high "ti" or "tic" notes, much like those of many congeners. No song described; like many members of genus, either rarely sings or song is brief and easily overlooked.

Habitat. Coastal sandy-soil forest and scrub (*restinga*), also woodland borders, secondary forest, trees and brush at edges of pastures, gardens, orchards and vegetation along streams. From coast and lowlands to foothills, to c. 700 m. Apparently mainly coastal when breeding.

Food and Feeding. Reported feeding on berries and other fruits, including those of *Schinus*; also as eating sweet excretions of plant lice. Faecal analyses indicate diet of 67% fruit (by frequency), mixed with insects and spiders (Araneae). Occurs alone, in pairs and in families or small groups. Alternates active foraging with periods of relative quiet, when it perches atop shrubs and small trees. Behaviour much like that of *T. preciosa*.

Breeding. Reported occasionally to occupy remains of bulky nests of Monk Parakeet (*Myiopsitta monachus*). No other information.

Movements. Apparently largely migratory. Occurs in Espírito Santo and Rio de Janeiro primarily as austral winter visitor in Apr–Sept; very few records to S in Paraná, Santa Catarina and Rio

On following pages: 133. Chestnut-backed Tanager (*Tangara preciosa*); 134. Scrub Tanager (*Tangara vitriolina*); 135. Green-capped Tanager (*Tangara meyerdeschauenseei*); 136. Rufous-cheeked Tanager (*Tangara rufigenis*).

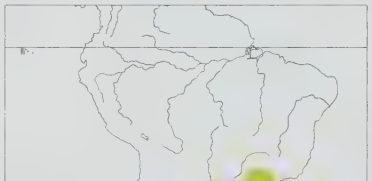
Grande do Sul, however, and movements need confirmation. Local fluctuations in numbers, apparently due to seasonal movements, reported in Rio de Janeiro and around São Paulo.
Status and Conservation. VULNERABLE. Restricted-range species: present in Atlantic Forest Lowlands EBA. Rare and local. Total population estimated at fewer than 10,000 individuals, and declining. No definite records from Santa Catarina since 1930s; first recorded in Rio Grande do Sul in 1999, and only a couple of known records since then. An important threat is loss of *restinga* habitat to beachfront real-estate development and other tourist facilities. Suitable habitat in Rio de Janeiro and Paraná now largely destroyed. Trapping for cagebird trade a minor threat, but could become important as habitat continues to disappear and populations decline further. Occurs in six small protected areas, although enforcement of protection laws in these areas is ineffective. A more comprehensive understanding of this species' seasonal distribution and population trends is urgently required.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Descourtilz (1852), Hellmayr (1936), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Moraes & Krul (1997), Novaes (1950), Palanqué (2005), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Rosa & Agne (2010), Sick (1985, 1993), Sick & Pabst (1968), Souza (2002), Stattersfield & Capper (2000).

133. Chestnut-backed Tanager

Tangara preciosa

French: Calliste à dos marron **German**: Prachttangare **Spanish**: Tangara Preciosa
Other common names: Polymorphic Tanager (when treated as conspecific with *T. peruviana*); Arnault's Tanager ("*T. arnaulti*")

Taxonomy. *C.[allispiza] preciosa* Cabanis, 1851, Rio Grande do Sul, Brazil.
Species has sometimes been referred to as *T. castanonota*, but present name has priority. Forms a superspecies with *T. cayana*, *T. cucullata*, *T. peruviana*, *T. vitriolina* and *T. meyerdeschauenseei*. Has been considered conspecific with *T. peruviana*, the two then being regarded as partially localized morphs of a single species, differing in colour of mantle and back; polymorphism, however, not known to occur in any other member of genus and, further, differences in breeding distribution and habitat suggest that the two are best regarded as separate species. An aviary specimen, originally described as *T. arnaulti*, is now believed to be a hybrid between present species and *T. cayana*. Monotypic.
Distribution. SE Paraguay, NE Argentina (Misiones S to Entre Ríos, and at least formerly to mouth of R La Plata and N Buenos Aires), coastal SE Brazil (São Paulo S to Rio Grande do Sul) and Uruguay.



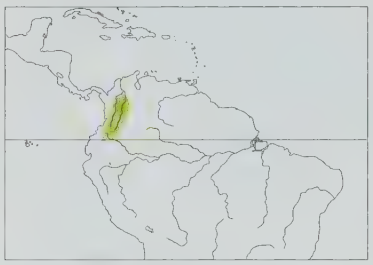
Descriptive notes. 14 cm; 22–24 g. Male has entire crown, nape, side of head, mantle and back rich golden-rufous, scapulars, rump and uppertail-coverts yellowish-opal, longest uppertail-coverts tinged green; upperwing-coverts shining yellow-buff, flight-feathers and tail black, edged greenish-blue; inconspicuous straw-coloured malar stripe merging into shining blue-green on throat and underparts, including breast, sides and flanks; centre of belly pale yellowish-opal, undertail-coverts rufous; iris dark brown; bill black; legs grey. Female is much duller than male, has crown and nape rufescent, otherwise dull greyish-green above, wing, including wing-coverts, and tail dusky with greenish edgings, throat and underparts dingy silvery green, paler than above, undertail-coverts tinged cinnamon; essentially identical to female of *T. peruviana*. Juvenile like adult but much duller. VOICE. Call a squeaky "zeeek!" or "zurk". Song 4–5 high, lisping notes, "seeeee seeeee seeeee seeeee seeeee", all on same pitch.
Habitat. Forest borders, especially where *Araucaria* trees occur, and in woodlots, gardens, and shrubby areas in otherwise partly open areas. Lowlands to c. 1000 m.
Food and Feeding. Fruits and arthropods. Takes a variety of fruit, such as *Schinus* and loquat (*Eriobotyra japonica*), also cultivated fruits. Found in pairs and in small groups, often with mixed-species flocks. Feeds from low down to high up; searches for insects in tree foliage.
Breeding. One nest-site in Rio Grande do Sul was 10 m up in thick fronds of an araucaria tree. No other information.
Movements. Some local seasonal movements, apparently in response to shifting food supplies. Those in extreme S of Brazilian range in Rio Grande do Sul, as well as all of Uruguay, N Argentina and Paraguay, are thought to be almost entirely migratory, moving N for coldest months.
Status and Conservation. Not globally threatened. Uncommon to fairly common. Most numerous in Rio Grande do Sul, e.g. in Aparados da Serra National Park. Occurs also in a number of other protected areas in SE Brazil, and as far W as Iguazú National Park, in Argentina. Because this species is able to utilize a variety of forest-edge and disturbed habitats, it is unlikely to become at risk, at least in the short term. Can cause some damage locally to cultivated fruits.
Bibliography. Belton (1985), Berlepsch & Ihering (1885), Bond (1951b), Cuello & Gerzenstein (1962), Gambarotta (1985), Gore & Gepp (1978), Hellmayr (1936), Isler & Isler (1999), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Narosky & Di Giacomo (1993), Parker & Goerck (1997), de la Peña & Rumboll (1998), Pinto (1944a), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Santos (1948), Sazima & Sazima (2007), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Voss & Sander (1980, 1981).

134. Scrub Tanager

Tangara vitriolina

French: Calliste vitriolin **German**: Rotscheiteltangare **Spanish**: Tangara Matorralera

Taxonomy. *C.[allispiza] vitriolina* Cabanis, 1850, Colombia.
Forms a superspecies with *T. cayana*, *T. cucullata*, *T. peruviana*, *T. preciosa* and *T. meyerdeschauenseei*. Monotypic.
Distribution. Colombia from Pacific slope of W Andes E to W slope of E Andes (Norte de Santander) and E slope of E Andes (E Cauca), S to NW Ecuador.
Descriptive notes. 14 cm; 18·4–26·8 g. Relatively dull tanager, with dingier plumage than that of congeners. Male has crown rufous, lores, ocular area and postocular area dusky, forming fairly conspicuous blackish mask; upperparts mainly shining greyish-green to shining silvery green, rump paler opalescent green, uppertail-coverts shining greyish-green (like back); central tail feathers dull greyish-blue, outer feathers dusky with outer half dull greyish-blue, outermost pair with faint blue-green edges; upperwing-coverts dusky, lesser and median coverts broadly tipped dull pale



green, greater coverts with distal half of each feather dull pale green, primary coverts, flight-feathers and tertials blackish, prominently edged pale blue-green; throat, chest, breast and sides shining pale bluish-grey to greenish-grey (varies with light, but typically with bluish tinge), centre of lower breast and belly pale glaucous, tinged buff, undertail-coverts buff to whitish-buff; iris brown; bill greyish-horn; legs dusky horn. Female is generally similar to male, but duller, with back and rump dull pale greyish-green (not bluish), tail tinged greenish, wing-coverts and flight-feathers edged paler glaucous-green (not blue-green), throat and underparts dull greyish with only hint of greenish-blue, and lower breast lacking bluish tinge, belly and undertail-coverts more extensively buffy. Juvenile is almost completely dingy pale brownish-grey and devoid of markings; immature much duller than adult, but typically some rufous coloration on crown and indication of darker face mask, sometimes weak greenish tinge on back, wing-coverts and flight-feathers, and throat buffy white, underparts dull. VOICE. Call a shrill, buzzy "ziit". Song lisping and buzzy, beginning slowly, then accelerating quickly into buzzing or pulsating trill, "slip...slip, slip slip-sit'sit'it'it'it'it'it'it'it'iiiiiiii'i'it'it", typically repeated a few times at short intervals, then not heard again for long periods.
Habitat. Dry scrubby or cultivated areas, overgrown pastures, agricultural areas, brushy fence rows, and arid intermontane valleys; often around human habitations. Mostly 500–2200 m (recorded 300–3000 m) in Colombia; 800–2500 m, occasionally higher, in Ecuador.
Food and Feeding. Fruits and arthropods. May take more insects than fruit; recorded taking melastome berries. One stomach contained insects. Usually seen singly, in pairs and in families; commonly comes to fruiting trees, often when other birds present, but rarely found with mixed-species flocks. Forages from low in shrubs to tops of tall trees and. Forages by hopping and peering, behaviour somewhat like that of a vireo (Vireonidae); occasionally also peers head down on alternate sides of branches, as do many congeners. Also peers in outer foliage, epiphytes, flowers and seedheads.
Breeding. May breed most of year: in Colombia, fledglings in Feb and juvenile with adult in Mar in Cauca, fledglings in May in Cundinamarca, adults carrying food in mid-Aug in W Valle, and four birds in breeding condition Jun–Aug at N end of W & C Andes, one in Jan in upper Magdalena Valley, two in Mar near Cali and one in Nov in upper Patía Valley. Open cup-nest of moss and fine fibres, near Bogotá placed 3–6 m above ground near end of branch. Clutch 2 eggs, white or tinged blue, green or cream, and boldly marked with lilac and/or brown, especially at large end. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Common. Has expanded its range as a result of deforestation and increased disturbance, and is now found in wetter regions and at higher elevations than in the past. Believed to have arrived in 1960s on Sabana de Bogotá (2600 m), where remained rare until 1990s, but now well established. Similarly, following deforestation, has extended locally into wet Chocó–Pacific slope, a locality where formerly did not occur; more recently still, has been found on E slope of E Andes in E Cauca, where it has followed clearings and settlement. Does not face any significant threats in immediate or longer term.
Bibliography. Álvarez-Rebolledo, Caro *et al.* (2007), Álvarez-Rebolledo, Córdoba-Córdoba & López (2003), Anon. (2000), Burns & Naoki (2004), Dunning (1982), Fjeldsá & Krabbe (1990), Hellmayr (1936), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Miller (1947, 1963), Munves (1975), Nehrkorn (1899), Ogilvie-Grant (1912), Olivares (1969), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Sclater & Salvin (1879), Sedano & Burns (2010), Willis (1966a).

135. Green-capped Tanager

Tangara meyerdeschauenseei

French: Calliste de Schauensee **German**: Grünkappentangare **Spanish**: Tangara Coroniverde

Taxonomy. *Tangara meyerdeschauenseei* Schulenberg and Binford, 1985, 2 km north-east of Sandia, c. 2175 m, Puno, Peru.
Forms a superspecies with *T. cayana*, *T. cucullata*, *T. peruviana*, *T. preciosa* and *T. vitriolina*. Monotypic.
Distribution. SE Peru (E Puno); probably also W Bolivia (Madidi National Park, in La Paz).



Descriptive notes. 14 cm; one male 26·5 g, one female 25·4 g. Dull tanager with little plumage contrast, looking mainly opalescent buff with greenish wings and tail in field; colours vary with angle of light, blues and green predominating when light behind observer, otherwise buff or straw predominant. Crown is opalescent greenish-straw to ochre, with forehead and obscure eyebrow shading to dull bluish-green; lores and ocular area dark grey, forming ill-defined mask; mantle and back pale mealy green with buff tinge, sides of back (near scapulars) somewhat bluer than centre of back, and entire region can appear coppery to creamy buff; scapulars greenish, varying to greyish-turquoise; rump and uppertail-coverts greenish-straw to bluish-green; central pair of tail feathers dark grey near shaft, otherwise glossed with blue-green, outer feathers (except outermost pair) grey on inner web and near shaft, with outer webs blue-green (varying to coppery cream-buff), outermost pair grey, very narrowly and faintly edged with blue-green on outer third of outer web; lesser and median upperwing-coverts glaucous green, greater coverts dusky, broadly edged and tipped light green to greyish-turquoise, primary coverts, flight-feathers and tertials dusky, edged light green to greyish-turquoise; throat and underparts dull cream with faint lavender tinge, undertail-coverts tinged cinnamon; iris brown; upper mandible blackish, lower mandible grey with blackish tip; legs plumbeous grey. Sexes similar, but female greener overall, with crown tinged tawny, pale greenish-straw below. Juvenile undescribed. VOICE. Call a rather dull, heavy "chup". No song has been recorded.
Habitat. Forest edges, gardens and partly cleared slopes that may formerly have been covered with scrub or dry forest; recorded at 1750–2200 m. Believed originally to have been confined to arid, semi-open, intermontane scrub.

Food and Feeding. Reported as taking small fruits and arthropods. Usually seen in pairs or in groups of 3–4 individuals. Observed to forage in fruiting trees; probably also takes fallen fruit on ground. No other information.
Breeding. Two birds with enlarged gonads in Nov. No other information.
Movements. No information; possibility of some seasonal movement between arid scrub and more humid sites has been suggested.
Status and Conservation. VULNERABLE. Restricted-range species: present in Upper Inambari Valley Secondary Area. Fairly common to locally common. Has extremely small known global range, estimated at c. 380 km². In SE Peru, known to occur at three sites in Puno, including head of R Inambari near Sandia, and W side of Abra de Maruncunca. In Bolivia, a published sight record of a pair in Nov 2001 near Tokoaque (at 2150 m), in Madidi National Park, c. 50 km E of R Inambari; as habitat very unlike that utilized by this species in Peru, validity of record is subject to verification. While some doubt remains about original habitat occupied by this species, its presence in semi-arid habitats and settled areas in dry regions of extreme SE Peru (Sandia region) suggests that it probably has always occurred in drier, semi-open terrain; thus, it is able to utilize highly modified habitats. Population trends undocumented, but recent observations suggest the species is increasing in numbers, and may be expanding in conjunction with local habitat degradation.
Bibliography. Anon. (1986, 2010a), Burns & Naoki (2004), Butchart & Stattersfield (2004), Clements & Shany (2001), Fjeldså & Krabbe (1990), Hennessey & Gomez (2003), Hesse (2006), Isler & Isler (1999), Naoki (2003b), Parker & Bailey (1991), Remsen *et al.* (2010), Robbins (2010), Schulenberg & Binford (1985), Schulenberg *et al.* (2007), Ridgely & Tudor (1989, 2009), Sedano & Burns (2010), Stattersfield & Capper (2000).

136. **Rufous-cheeked Tanager**

Tangara rufigenis

French: Calliste à joues rousses **German**: Rotwangentangare **Spanish**: Tangara Carirrufa

Taxonomy. *Calliste rufigenis* P. L. Sclater, 1857, Caracas, Venezuela.
Monotypic.
Distribution. N Venezuela: N end of Andes in S Lara, mountains of Yaracuy (Sierra de Aroa), coastal cordillera from Carabobo E to Miranda, and interior cordillera in S Aragua (Cerro Golfo Triste).
Descriptive notes. 13 cm; 16–17·4 g. Rather small bluish-green tanager with small rufous mask. Has lores and chin back to rear ear-coverts rufous; rest of head to nape, mantle and back smoky bluish-green, rump and uppertail-coverts pale blue (not contrasting strongly with rest of plumage); tail blackish, feathers edged dull blue-green; upperwing and its coverts dusky, lesser coverts edged pale blue, greater coverts edged pale greenish-blue, flight-feathers edged cinnamon-brown, edging becoming pale greenish on tertials; shining bluish-green below, slightly paler on throat, with centre of belly and undertail-coverts cinnamon-rufous to pale rufous; iris dark brown; bill blackish; legs dark grey. Sexes similar. Immature is much duller than adult, but usually with hint of rufous on cheek. VOICE. Contact or foraging call a weak "tsit", sometimes in rapid series. No song described.



Habitat. Humid and wet forest, forest borders, and second growth or disturbed vegetation in small forest openings; also landslides on steep slopes, especially where there are many *Miconia* trees and other melastomes. At 900–2050 m.
Food and Feeding. Fruits, also arthropods. Takes variety of small berries from species of melastome. Occurs alone or, more often, in pairs or small groups, occasionally of up to eight individuals, regularly with mixed-species flocks containing other members of its genus. Active and lively, foraging mostly in outer foliage, primarily in middle and upper levels of trees, also sometimes down to eye level in smaller trees and shrubs along forest borders. Generally energetic and fast-moving, hopping quickly along small terminal limbs; peers at twigs and especially at foliage in restless manner, almost like a New World warbler (Parulidae).
Breeding. No information.
Movements. Some downslope movement during rainier months, May–Sept, in Henri Pittier National Park.
Status and Conservation. Not globally threatened. Restricted-range species: present in Cordillera de la Costa Central EBA. Uncommon; generally at low density. Suitable habitat for this species preserved in a few parks and watersheds, notably Henri Pittier National Park (in Aragua), Palmichal Reserve (in Carabobo), and possibly Terepaima National Park (in Lara). It is known to occur in Sierra de Aroa, a large forested area that does not include any protected sites. Population estimates for this tanager require clarification; the species may well require listing as Near-threatened or even Vulnerable.
Bibliography. Hilty (2003), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1963), Ridgely & Tudor (1989, 2009), Schäfer & Phelps (1954), Wetmore (1939).



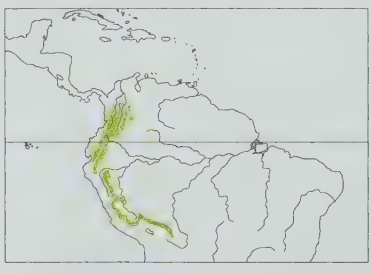
137. **Golden-naped Tanager**

Tangara ruficervix

French: Calliste à nuque d'or **German**: Rotnackentangare **Spanish**: Tangara Nuquirrufa
Other common names: Orange-rumped Tanager; Orange-naped/Yungas Tanager (*fulvicervix*)

Taxonomy. *Tanagra ruficervix* Prévost and Des Murs, 1846, no locality = Bogotá, Colombia.
S race *fulvicervix* sometimes treated as a separate species. The three N races differ markedly in plumage from S ones, and more than one species may be involved. Race *amabilis* may intergrade with *inca* in C Peru. Six subspecies recognized.

Subspecies and Distribution.
T. r. ruficervix (Prévost & Des Murs, 1846) – Andes of Colombia on both slopes of W & C ranges (from Antioquia) and E range (W slope S from Santander, and E slope from Cundinamarca–Meta border S to Cauca and Nariño).
T. r. leucotis (P. L. Sclater, 1851) – W Ecuador (S to El Oro).
T. r. taylori (Taczanowski & Berlepsch, 1885) – E Ecuador (S to W Loja) and extreme N Peru (N of R Marañon, in vicinity of Cajamarca).
T. r. amabilis J. T. Zimmer, 1943 – E slope of Andes in N Peru (S at least to Huánuco).
T. r. inca Parkes, 1969 – S Peru (Junín S to Puno).
T. r. fulvicervix (P. L. Sclater & Salvin, 1876) – E slope of Andes in extreme SE Peru (near Bolivian border) and Bolivia (La Paz and Cochabamba).



Descriptive notes. 13 cm; 16–22·2 g. Small, mostly blue tanager, two populations differing distinctly in plumage. Male nominate race is mainly turquoise-blue; lores, chin, forecrown and ocular area black, small reddish-golden band on rear crown extending around in an arc and almost reaching eye from behind, this band bordered above and below with violet, ear-coverts turquoise-blue, the upper ones with conspicuous whitish or golden tips; mantle and back mainly black, feathers rather narrowly scaled with blue (imparting streaked appearance), lower back, rump and uppertail-coverts bright unspotted blue, or occasionally with

obscure blackish mottling; tail dark blue, feathers narrowly edged light blue; lesser upperwing-coverts mostly bright blue (often hidden), median coverts black, edged and tipped blue, greater coverts black, edged blue, primary coverts blackish, flight-feathers and tertials black, basal half of flight-feathers and entire length of all secondaries and tertials narrowly edged pale blue; throat, breast, sides and flanks mostly bright blue, sides and flanks somewhat mottled greyish-black, centre of lower breast and belly contrastingly buff, becoming darker cinnamon-buff on undertail-coverts; iris dark brown; bill black; legs dusky. Female is similar to male, but slightly duller, with marginally smaller rear crown patch. Juvenile is mainly sooty grey to brownish-grey, including entire head, has back faintly tinged bluish, wing-coverts, flight-feathers and tail sooty with dull blue edgings, below is dingy grey, paler than above, and becoming dull buff on belly and undertail-coverts. Races differ mainly in plumage coloration, three races in S much darker: *leucotis* is much like nominate, but slightly darker blue above and below, forecrown tinged blue, hindcrown slightly darker, more golden-rufous, also has longer bill and shorter wing and tail than nominate; *taylori* differs from previous in having blue colours slighter greener, forecrown patch ultramarine, hindcrown patch slightly paler golden-yellow and reaches down to upper edge of ear-coverts, which are fringed whitish and sometimes with orange-rufous; *amabilis* is darker blue than preceding N races but palest of S races, has blackish forecrown, greenish tinge on back, with buff to fawn lower underparts (darker than N races but palest of S races); *inca* is dark blue, darker than previous, black of face mainly confined to lores and ocular area, and band on nape rufous (not golden-buff) and without violet borders; *fulvicervix* is darkest race, differs from last in having distinctly darker, richer and more purplish-tinged blue on underparts. Voice. During foraging gives weak "chip" or "tic" notes, often in rapid, excited bursts. No song has been described.

Habitat. Humid and wet forest borders, older second growth and sometimes shrubby pastures; less often inside wet mossy forest. At c. 1100–2500 m, but in most areas above 1500 m; reported as low as 900 m in Ecuador and as high as 2500 m in Peru.

Food and Feeding. Takes variety of small fruits and berries, including those of melastomes, figs (*Ficus*), *Morus*, and *Cecropia*; also arthropods. One stomach contained vegetable matter, another both vegetable and animal matter, including fruit pulp, seeds, berries and insects. Occurs in lively pairs, somewhat less often in small groups of 3–5 individuals, about equally with mixed-species flocks and independently of them. Forages at c. 5–25 m up, generally fairly high (median 12 m in W Valle del Cauca, in Colombia). Searches for insects with classic head-down peering along alternate sides of bare to partly mossy branches; also flutters and sallies short distances to foliage for insects.

Breeding. In Colombia, nest found in Apr in W Valle, and dependent juvenile in Sept and seven birds in breeding condition in Feb–Jun in C Andes. Cup-nest; clutch 2 eggs, apparently not described. In captivity, incubation c. 14 days, and adults reportedly fed some food to chicks by regurgitation (needs verification). No other information.

Movements. Presumably resident.

Status and Conservation. Not globally threatened. Uncommon to fairly common. Perhaps more numerous locally in S portions of range. Occurs in a number of protected areas, including Tatamá, Farallones de Cali and Cueva de los Guácharos National Parks and Río Blanco de Manizales, Tambito and El Pangan Nature Reserves (Colombia), and probably Cotocachi-Cayapas, Sangay, El Cajas and Podocarpus National Parks (Ecuador); also Manu National Park (Peru) and Madidi National Park (Bolivia). The species is vulnerable to extensive deforestation, which is occurring almost throughout its range. Within its range, however, considerable amount of intact unprotected habitat exists and, at least in the short term, risks to this species appear small.

Bibliography. Berlepsch (1911), Burns & Naoki (2004), Chapman (1926), Donegan & Dávalos (1999), Donegan *et al.* (2007), Dunning (1982), Fjeldså & Krabbe (1990), Hellmayr (1936), Hilty (2009a), Hilty & Brown (1986), Isler & Isler (1999), Kleefisch (1995), Lysinger *et al.* (2005), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Miller (1963), Moore *et al.* (1999), Murray (1970), Naoki (2007), Parkes (1969b), Remsen *et al.* (2010), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg *et al.* (2007), Sedano & Burns (2010), Walker (2001), Weske (1972), Zimmer (1943b, 1943c).

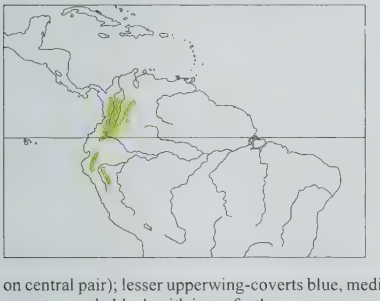
138. Metallic-green Tanager

Tangara labradorides

French: Calliste vert **German**: Schwarznackentangare **Spanish**: Tangara Verdinegra

Taxonomy. *Tanagra* (*Aglaia*) *labradorides* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
Two subspecies recognized.

Subspecies and Distribution.
T. l. labradorides (Boissonneau, 1840) – Andes of Colombia (both slopes of W & C Andes in Antioquia; W slope of E range S from Cundinamarca, also one record on E slope at Guaicaramo; both slopes in Cauca and Nariño) and Ecuador (W slope S to Pichincha, and very locally E slope S to Loja and Zamora Chinchipe).
T. l. chaupensis Chapman, 1925 – N Peru (E slope of Andes in Amazonas and N San Martín).



Descriptive notes. 12 cm; 13–16·4 g. Small tanager, plumage colour varying with angle of light; relatively long bill. Male nominate race is mostly shining opalescent bluish-green; forehead and broad eyebrow pale opalescent to straw with hint of greenish (especially from above eye rearwards); lores and small area surrounding bill (lowermost forehead and chin) black, broad black central crownstripe extending to nape; scapulars black, mantle and back black, variably mixed with shining opalescent green, lower back, rump and uppertail-coverts mostly shining green with opalescent tinge; tail black, feathers narrowly edged green (obscure on central pair); lesser upperwing-coverts blue, median coverts dusky, broadly tipped bluish, greater coverts mostly black with inner feathers very narrowly edged bluish-green, all flight-feathers dusky, narrowly edged bluish-green; throat and underparts mostly shining opalescent green (weak bluish tinge from lower side of head to chest), becoming rich cinnamon-buff to tawny-buff on centre of belly and undertail-coverts; iris dark brown; bill black; legs grey. Female is similar to male, but head to chest uniformly shining opalescent green, without bluish tinge. Juvenile is mostly dull dark greyish-brown, some weak buff spotting on broad eyebrow, has wings and tail dusky brown, median coverts tipped dull buff, flight-feathers and tertials narrowly edged pale blue, tail feathers dusky with obscure blue-green edgings, feathers of underparts buff, tipped dull dusky brown (imparting freckled and finely spotted appearance), central part of lower breast and belly more extensively buff, undertail-coverts plain dull brownish-buff; immature gradually acquires shining plumage of adult. Race *chaupensis* differs from nominate in having much more opalescent green (less opalescent blue) on foreneck and lesser wing-coverts. Voice. Calls include coarse "jitt", squeaky "eeek", and lower-pitched "chup", sometimes doubled or given in longer series, and thin "sip" notes; rapid ticking twitter in flight. Apparently no song described; some of above-mentioned vocalizations may comprise song.

Habitat. Humid-forest edge, second growth and bushy overgrown pastures and clearings; less often in canopy of humid forest. At 1300–2400 m (to 900 m on Pacific slope) in Colombia; mainly 900–2000 m in Ecuador; 1350–2200 m in Peru. One report from as high as 2750 m.

Food and Feeding. Fruits and arthropods. In study in Valle del Cauca, in Colombia, 68% of observed instances of foraging involved insect-seeking. Recorded fruit items include *Miconia* berries and *Cecropia* catkins. Occurs in pairs or in small groups of 3–5 individuals, often with mixed-species flocks along forest borders, especially if other members of its genus present. In Valle del Cauca, median foraging height was 9 m (59 observations), but on average lower for fruit than for insects. Works actively through smaller branches and peers at outer foliage, much in manner of *T. guttata*. Occasionally checks twigs, and sometimes flutters or hangs downwards acrobatically; rarely peers head down at sides of branches in manner of *T. arthus* and many other congeners. Insects almost entirely gleaned from tops and bottoms of terminal foliage.

Breeding. All details from Colombia: one nest in Jul and stub-tailed juveniles seen in Jun, Aug and Nov in Valle; juveniles with adults in Jul in Cundinamarca and Huila and in Aug and Oct in Cauca; 14 birds in breeding condition in Mar–Jul in W Andes and N end of C Andes. No other information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Rare to locally fairly common. More numerous in Colombia than elsewhere. Occurs in a number of protected areas, including Farallones de Cali and Cueva de los Guacharos National Parks and Río Blanco de Manizales, Reinita Cielo Azul, Tambito and probably El Pangan Nature Reserves (Colombia), Podocarpus National Park (Ecuador), and possibly one or more parks in N Peru. Although the bulk of this species' range lies in Colombia, where deforestation has been extensive, it does utilize second growth and forest borders, and is not believed to be at risk in the immediate future.

Bibliography. Burns & Naoki (2004), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Hilty (2009a), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Miller (1963), Moore *et al.* (1999), Naoki (2003c, 2007), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Spencer (2008a), Willis (1966a), Zimmer (1943b).

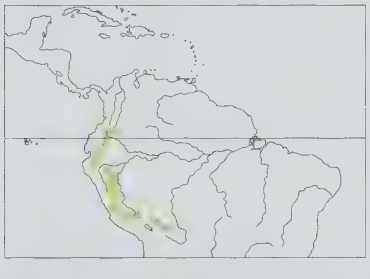
139. Blue-browed Tanager

Tangara cyanotis

French: Calliste à sourcils bleus **German**: Silberbrauentangare **Spanish**: Tangara Cejiazul
Other common names: Black-cheeked Tanager (*lutleyi*)

Taxonomy. *Calliste cyanotis* P. L. Sclater, 1858, no locality = Peru–Bolivia border region, possibly La Paz (Bolivia).
Two subspecies recognized.

Subspecies and Distribution.
T. c. lutleyi Hellmayr, 1917 – S Colombia (head of Magdalena Valley in Huila, and E slope of Andes from W Putumayo) S through Ecuador and Peru (to Cuzco).
T. c. cyanotis (P. L. Sclater, 1858) – Bolivia (E slope of Andes in La Paz and Cochabamba).



Descriptive notes. 12 cm; 12·5–17 g. Scarce tanager with conspicuous bluish eyebrow. Nominate race has crown blackish, bordered by broad pale cream to greenish-blue supercilium extending from above lores back to side of nape; broad mask from bill and chin rearwards to area around eye, separated from black rear ear-coverts by blue patch on anterior ear-coverts; mantle and back dusky greenish-blue, rump shining silvery bluish to silvery green, becoming darker medium blue on uppertail-coverts; scapulars black, lesser and median upperwing-coverts opalescent blue to pale chartreuse-yellow, greater coverts black narrowly edged and broadly tipped greenish-blue; primary coverts, flight-feathers, tertials and tail black, the feathers of each narrowly edged greenish-blue; throat to middle of breast, also sides and flanks, cream to light blue, slightly tinged greenish, centre of lower breast and belly pale cinnamon-buff, undertail-coverts tinged richer yellow, flanks sometimes slightly mottled with black; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile like adult but much duller; initially may show little or no blue in plumage. Race *lutleyi* differs from nominate in having side of head black, including rear cheek and ear-coverts, and upper back black (not dusky). Voice. Dawn song a spirited and rather distinctly three-part "tsip'sit'ch't'"t't' zuit-zuit-zuit- zuit, ti, ti, ti, ti", the first phrase complex, middle one lower and slower. Calls rather hard, sharp "tsik" notes resembling those of many others of genus, especially *T. arthus*.

Habitat. Humid and wet montane forest and forest borders, also older second growth. Mostly 1300–2200 m, but reported to 2600 m; 1400–1900 m in Ecuador and 900–1950 m in Peru.

Food and Feeding. Fruits and arthropods. Nineteen stomachs all contained vegetable matter, including fruit pulp and seeds. Forages singly and in pairs, occasionally in family parties of three individuals, regularly with mixed-species flocks containing others of genus; also sometimes independent of mixed-species flocks. In Bolivia foraging heights were at 3–24 m, in crowns of shrubs and trees; for 16 observations, median height c. 7 m and median distance to canopy top c. 1·5 m. Versatile foraging behaviour includes perching upright, occasionally hanging downwards, taking insects from branches and leaf tops, and perhaps most often employing lean-down behaviour to obtain prey from sides of branches and from moss. In Peru searched for insects mostly in canopy,

On following pages: 140. Blue-necked Tanager (*Tangara cyanicollis*); 141. Golden-hooded Tanager (*Tangara larvata*); 142. Masked Tanager (*Tangara nigrocincta*); 143. Beryl-spangled Tanager (*Tangara nigroviridis*); 144. Spangle-cheeked Tanager (*Tangara dowii*); 145. Green-naped Tanager (*Tangara fucosa*).

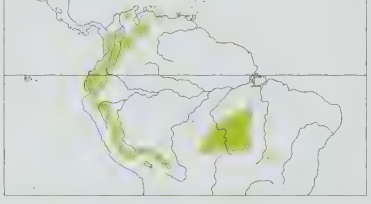
took fruit from melastome shrubs, and mostly examined sides and undersides of bare or sparsely moss-covered branches (mean 1·4 cm in diameter) by using lean-down method on first one side of branch and then other side. Also gleaned prey from undersides of small leaves.
Breeding. Juvenile with adult in Nov, in C Peru (Junín).
Movements. No information.
Status and Conservation. Not globally threatened. Rare to uncommon over most of range; very locally fairly common in Ecuador, and may be more numerous in S portion of range. Regarded as fairly common above San Rafael Falls, in Ecuador. Occurs in a few protected areas, including Tingo Maria National Park (Peru), and possibly Cayambe-Coca Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador). Deforestation an important threat within narrow elevational limits of this low-density species. Its range does, however, include sufficient intact habitat to ensure its survival in at least the immediate future.
Bibliography. Burns & Naoki (2004), Clements & Shany (2001), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Taczanowski (1884), Zimmer (1943b).

140. Blue-necked Tanager

Tangara cyanicollis

French: Calliste à cou bleu **German**: Azurkopftangare **Spanish**: Tangara Cabeciazul

Taxonomy. *A.[glaia] cyanicollis* d'Orbigny and Lafresnaye, 1837, Yuracares, Bolivia.
Molecular-genetic data indicate that this species is most closely related to *T. larvata*, which is sister-species to both present species and *T. nigrocincta*. Taxonomic status of isolated lowland races *melanogaster* and *albotibialis* may be worthy of investigation. Seven subspecies currently recognized.
Subspecies and Distribution.
T. c. hannahiae (Cassin, 1864) – N Colombia (Sierra de Perijá and N end of E Andes in Norte de Santander) and mountains of Venezuela (Andes from S Lara S to Táchira, Sierra de Aroa, in Yaracuy, coastal cordillera in Carabobo and Aragua, and interior cordillera in N Guárico).
T. c. granadensis (Berlepsch, 1884) – Andes of Colombia (W range S to Munchique area of Cauca, C range and W slope of E range from Santander S to NW Cundinamarca).
T. c. caeruleocephala (Swainson, 1838) – Colombia (head of Magdalena Valley in Huila, and E Andes in Boyacá and Cundinamarca and, on E slope, S to Nariño) S on E slope to N Peru (S to La Libertad and, Huallaga Valley, in N San Martín).
T. c. cyanopygia (Berlepsch & Taczanowski, 1884) – entire W slope of Andes in Ecuador.
T. c. cyanicollis (d'Orbigny & Lafresnaye, 1837) – E slope of Andes in Peru (from Huánuco) S to Bolivia (to Cochabamba).
T. c. melanogaster Cherrie & Reichenberger, 1923 – isolated population in lowlands of Amazon drainage in C Brazil (N Mato Grosso and S Pará); recorded also in C Bolivia (Santa Cruz).
T. c. albotibialis Traylor, 1950 – Veadeiros (Goiás), in EC Brazil.



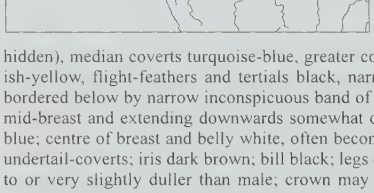
Descriptive notes. 12 cm; 14–18·8 g. Stunning little tanager with blue head and burnished-gold shoulders. Nominate race has entire head and throat turquoise-blue with black lores and ocular ring; mantle black, becoming turquoise on lower back, opalescent yellow on rump and tinged greenish opalescent on uppertail-coverts; tail blackish, edged yellowish-green; upperwing-coverts opalescent yellow, flight-feathers black, primaries only narrowly and obscurely edged greenish-blue (look blackish), secondaries edged blue, tertials more broadly edged bluish-green or often golden-green; blackish below, flanks and belly violet-blue mixed with black, undertail-coverts black with bluish-green scaling; iris dark brown; bill black; legs dark greyish-horn. Sexes similar, but female tends to have head paler blue, with more visible black feather bases on crown and nape. Juvenile is dull, undistinguished and almost without markings, largely dull grey to sooty grey above and paler buffy grey below, head usually slightly paler, shoulders and wing-coverts buff, secondaries edged greenish, tail sooty with faint bluish edges; older individuals may show some blue flecking on head, as well as pale greenish edgings on wing-coverts and flight-feathers, and dull greenish-tinged rump; immature has darker grey head with blue showing, back dull black, underparts with black mottling, wings sooty black with greenish feather edgings. Race *caeruleocephala* is much like nominate, but throat deep violaceous blue, anterior border of forecrown usually violaceous blue, also rump opalescent yellow; *melanogaster* has belly all black (not mixed with dark blue); *hannahiae* is similar to previous, but with more greenish tinge on shoulder, wing-coverts and rump; *cyanopygia* differs from nominate in having only median wing-coverts burnished opalescent yellow, with greater coverts dusky, edged blue-green, scapulars fringed turquoise-blue, rump and uppertail-coverts, as well as flanks and belly, shining dark opalescent blue; *granadensis* differs in strongly opalescent-green rump and uppertail-coverts, greater coverts tinged greenish or bluish-green, outer primaries very obscurely edged opalescent green, inner primaries edged bluish, secondaries edged opalescent green, and tertials prominently edged opalescent bluish-green (overall wing-coverts greener than on nominate), belly bluer; *albotibialis* resembles nominate, but with paler belly. Voice. Calls include rather low-pitched, penetrating "tzup" notes; also higher "tsip'tsip" and "seep" and lisping, slightly disyllabic "sibit"; also rapid chattery streams of "ti" or "tic" notes, especially when birds excited or about to fly. Presumed song a rapid series of chittery notes followed by several strained, rising notes, e.g. "chit-t-t't't't't't't't', suezzz, suezzz, suezzz".
Habitat. Borders of humid forest, second growth, and overgrown pastures and clearings with scattered trees and shrubs, even in isolated trees; rarely in canopy of mature forest, although does travel across top of forest canopy and is sometimes seen at small openings inside forest. Brazilian race *melanogaster* occurs in drier habitats than others, in palm groves, gallery-forest borders, dry forest and scrub. At 300–2400 m, mostly above c. 500 m, in Andes; isolated C Brazilian population in lowlands at c. 200–500 m.
Food and Feeding. Fruits and arthropods. In Colombia study, fruit comprised 86% of all foraging records, insects 13% and flower buds 1%; recorded as eating at least 24 species of fruit, *Miconia* species comprising 51% of all fruit consumed and *Cecropia* catkins 19%. Of ten stomachs examined, nine contained only vegetable matter and one contained both vegetable and animal matter; items included fruit, berries, seeds and insects. Most often seen in pairs or in small family groups; not regularly with mixed-species flocks, although occasionally around them for short periods of time along forest borders; regularly joins congeners and other species at fruiting trees. In W Colombia forages mostly at middle heights or lower, especially in top of bushes and small trees; median foraging height c. 8 m, infrequently more than 15 m (6% of records). Takes fruit from upright and perched positions, less often when hanging head down for items harder to reach. Most insects captured in short fluttery sallies to air (ten observations) and to leaves (three observations); observed also to search flowerheads and fruiting stalk of a palm. In Peru, foraged in canopy foliage and on bare limbs, two seen on lichen-covered branches but none on mossy limbs.
Breeding. In Colombia, six breeding records Jan–Aug (including two nests in Feb) and seven birds in breeding condition in Jun–Aug. A mossy cup-nest found at moderate height in tree in clearing. One clutch contained 2 eggs. In captivity, 2 eggs, white with brown spots; incubation period 15 days; fledglings independent within three weeks. No other information.
Movements. Presumed resident.
Status and Conservation. Not globally threatened. Widespread, and common to locally common. Brazilian race *albotibialis* known only from one site (Veadeiros, in Goiás). Occurs in numerous protected areas, among them Henri Pittier and Yacambú National Parks (Venezuela), Farallones de Cali and Cueva de los Guácharos National Parks, Arrierito Antioqueña Reserve, Reinita Cielo Azul Natural Reserve, Halcón Colorado Bird Reserve and Tambito Nature Reserve (all in Colombia), Cayambe-Coca Ecological Reserve (Ecuador), Tingo Maria and Manu National Parks (Peru) and Madidi National Park (Bolivia). The species' range also includes much suitable habitat that, although unprotected, is at little immediate risk, and it is further advantaged by the fact that it uses primarily edge habitats and variety of disturbed and regrowth habitats.
Bibliography. Brosset (1964), Bruslund & Kirchhöffel (2010), Burns & Naoki (2004), Clements & Shany (2001), Cortes (2009a), Fry (1970), Hilty (1997, 2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Lysinger *et al.* (2005), Marantz & Remsen (1994), Marantz & Zimmer (2006), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Naoki (2003c, 2007), Norgaard-Olesen (1973), Novaes (1960), Olivares (1963, 1969), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Souza (2002), Walker (2001), Zimmer (1943b).

141. Golden-hooded Tanager

Tangara larvata

French: Calliste à coiffe d'or **German**: Purpurmaskentangare **Spanish**: Tangara Cabecidorada
Other common names: Golden-headed/Golden-masked Tanager, Hooded Tanager(!)

Taxonomy. *Calliste larvata* du Bus de Gisignies, 1846, Tabasco, Mexico.
Molecular-genetic data indicate that this species is sister-species to both *T. cyanicollis* and *T. nigrocincta*, and that it is more closely related to former, although it has been treated as conspecific with latter. Geographical variation partly clinal. Four subspecies recognized.
Subspecies and Distribution.
T. l. larvata (du Bus de Gisignies, 1846) – Caribbean slope of SE Mexico (from Tabasco, N Oaxaca and N Chiapas), Belize and E Guatemala S to extreme N Costa Rica.
T. l. centralis (Berlepsch, 1912) – Caribbean slope of Costa Rica and W Panama (Bocas del Toro, N Veraguas and N Coclé).
T. l. franciscae (P. L. Sclater, 1856) – Pacific slope of Costa Rica and W Panama (E to Veraguas).
T. l. fanny (Lafresnaye, 1847) – E Panama (from Colón on Caribbean slope, and from Canal Zone on Pacific slope) E to Colombia (N base of W & C Andes, lower Cauca Valley, middle Magdalena Valley, and Pacific lowlands and slope from Chocó) S to W Ecuador (Manabí and Los Ríos).



Descriptive notes. 12 cm; 17·1–23·9 g. Small, colourful tanager with white belly. Male nominate race has most of head cream to deep golden, turning to rufous on throat; black lores and orbital ring form small mask reaching down onto chin; forecrown violet-blue, this colour extending as smudge of violet-blue surrounding mask and becoming deep blue on cheek; mantle and back black, lower back, rump and uppertail-coverts turquoise-blue, longer uppertail-coverts black, edged light blue; tail black, feathers narrowly edged greenish-blue; shoulder (bend of wing) and lesser upperwing-coverts violet-blue (usually hidden), median coverts turquoise-blue, greater coverts black, prominently edged green to greenish-yellow, flight-feathers and tertials black, narrowly edged pale green; deep rufous of throat bordered below by narrow inconspicuous band of turquoise, and broad black band across chest to mid-breast and extending downwards somewhat onto side of body, rest of sides and flanks deep blue; centre of breast and belly white, often becoming tinged with yellowish to buff on thigh and undertail-coverts; iris dark brown; bill black; legs dusky neutral grey. Female is essentially similar to or very slightly duller than male; crown may show dusky flecking, and white of underparts slightly more extensive. Juvenile is very dull and featureless, above mostly smoky green to grey with greenish tinge, below dingy whitish, throat sometimes tinged with yellow, sides and flanks greyish-buff to olive. Race *centralis* differs from nominate in having cheek, except posterior border, deep blue; *franciscae* is very like previous, but violet-blue of cheek paler; *fanny* differs from nominate in having back of crown, hindneck and throat paler, similar to last in cheek colour, but with pale edging on primaries and wing-coverts reduced or absent, and flanks turquoise (not deep blue). Voice. Calls include high, sharp "tsit" and "chik" notes with hard metallic or gravelly quality, much like those of *T. nigrocincta*; these notes often given in bursts of ticking notes or in accelerating trills and twitters. At dawn a rapid series of dry "tick" notes repeated for a few seconds or up to several minutes, appears to comprise song.
Habitat. Inhabits humid-forest borders, second growth of various ages, and clearings and pastures with scattered trees and shrubs; primarily an edge species in forested regions, occasionally in top of canopy of tall humid forest. Lowlands up to c. 750 m from Mexico to Nicaragua; up to 1200 m, to occasionally 1500 m, in Costa Rica and Panama; up to 1100 m, occasionally 1800 m, in Colombia.
Food and Feeding. Fruits and arthropods. In W Colombia study, fruit accounted for 68% of 180 foraging observations; more than 19 species of fruit eaten, and 62% of all fruit taken were of melastome species, while other important fruit in diet included 13% *Cecropia* catkins, and 10% figs (*Ficus*); seen also to peck at flowers and possibly to eat petals (or immature ovaries). Other fruit items included five species of arillate fruit in Costa Rica and mistletoes berries (Loranthaceae) in Panama. Contents of a single stomach seeds and plant matter. Occurs mainly in scattered pairs or small family parties foraging alone in Colombia, although reported in groups in Costa Rica; infrequently or only transitory in mixed-species flocks along wooded borders, but regularly joins feeding assemblages at fruiting trees. Mostly at middle levels or higher, but may descend as low as eye level to small fruiting shrubs. In W Colombia foraged lower for fruit than for insects, on average

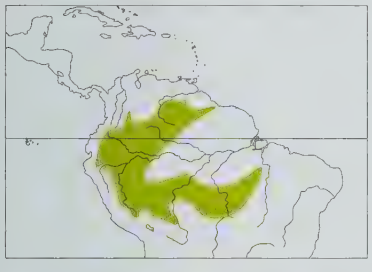
13·7 m up; 12% of all recorded foraging attempts were below 3 m. Single individuals or pairs often sit in treetops, where flutter in foliage or sally awkwardly short distances (less than 0·5 m) for flying insects, including termites (Isoptera), or sometimes reach up and snap nearby flying insects without leaving perch, then fly off to distant fruiting tree or shrub to fill up on fruit; 73% of 52 insect-foraging records involved sallying. Takes fruit mostly while perched upright, but seen to hang downwards from some larger fruits to remove pieces, and clung to catkins.
Breeding. Season Mar–Sept in Costa Rica, Feb–Aug in Panama and Jan–May in W Colombia; two, rarely three, broods sometimes attempted in a season. Occasionally (at least in Costa Rica) one or two helpers from earlier brood attend active nest. Compact open cup-nest of fibres, dry leaves, spider webs and black fungal fibres, in Costa Rica placed 1·5–28 m above ground in fork of tree or bush, sometimes near large trunk; nests reported also as placed among stalk of bananas, in dried corn plant, even in old nest of oropendola (*Psarocolius*). Clutch 2 eggs, dull white or pale grey, thickly flecked with brown, especially at large end; incubation by female alone, may be fed irregularly by male, period 13–15 days; chicks fed by both sexes, sometimes accompanied by one or two helpers, nestling period 14–15 days. Success rate: c. 29% of nests produced at least one fledgling.
Movements. Resident. Minor local movements may occur in response to varying fruit availability.
Status and Conservation. Not globally threatened. Fairly common to common. Widespread on Caribbean slope of Middle America and Pacific slope of Colombia and NW Ecuador. In Ecuador, recent records S only to Pichincha. Occurs in numerous parks and reserves throughout its range; tolerates, and may even profit from, moderate forest disturbance. Range has contracted in face of extensive deforestation in lowland Middle America, but this species is unlikely to face any immediate risks.
Bibliography. Anon. (1983), Bertagnolio (1968), Binford (1989), Burns & Naoki (2004), Davis (1972), Dunning (1982), Echeverry-Galvis & Córdoba-Córdoba (2007), Eisenmann (1957, 1961), Garrigues & Dean (2007), Hartman (1955), Hartman & Brownell (1961), Hellmayr (1936), Hilty (1997, 2009a), Hilty & Brown (1986), Howell, S.N.G. & Webb (1995), Howell, T.R. (1957), Ingels (1971a), Jahn *et al.* (2002), Land (1970), Leck (1971b, 1972c), Meyer de Schauensee (1966, 1970a), Miller (1963), Monroe (1968), Naoki (2003c), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Russell (1964), Salaman *et al.* (2008), Salvin & Godman (1883), Sedano & Burns (2010), Skutch (1954, 1961, 1976, 1980a), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984), Willis (1980), Zimmer (1943b).

142. Masked Tanager

Tangara nigrocincta

French: Calliste masqué **German**: Schwarzbrusttangare **Spanish**: Tangara Pechinegra
Other common names: Blue-headed/Black-banded Tanager

Taxonomy. *Aglaia nigro-cincta* Bonaparte, 1838, locality uncertain, north-eastern Peru.
Formerly regarded as conspecific with *T. larvata*, but molecular-genetic data indicate that latter is more closely related to *T. cyanicollis* than to present species; *T. larvata* is sister-species to both present species and *T. cyanicollis*. Monotypic.
Distribution. SE Colombia (from Meta and E Vichada) S to E Peru and N & E Bolivia (to NW Santa Cruz) and E to S Venezuela (S of R Orinoco), Guyana and N Brazil (N & W Roraima) and, S of R Amazon, to SC Pará and W Mato Grosso.



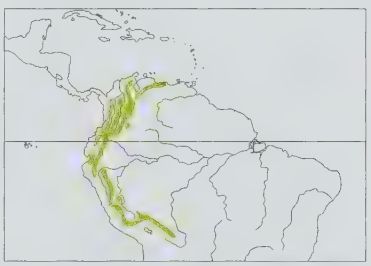
Descriptive notes. 12 cm; 15–17·8 g. Small, mostly bluish and black tanager with plumage that looks somewhat faded. Male has head, neck and throat mostly pale lavender-blue, black lores and black ocular ring forming small mask, bluish-green patch on ear-coverts, often extending onto malar area and upper throat; mantle and upper back black, lower back, rump and uppertail-coverts glistening pale turquoise-blue; tail black, faint blue edgings on most of feathers; shoulder (bend of wing) and lesser upperwing-coverts violet-blue (often partially or completely hidden), median coverts edged and broadly tipped greenish to bluish-green, greater coverts blackish, narrowly edged and more broadly tipped bluish-green; primary coverts mostly black (or with faint blue edges), flight-feathers blackish, primaries narrowly edged greenish and secondaries and tertials narrowly edged greenish to bluish-green; broad black band across chest continuing narrowly across lower side of neck to black of mantle; sides and flanks bright blue, centre of breast, belly and undertail-coverts white; iris dark brown; bill black; legs dusky. Female is similar to male, but duller, with breast dusky (not black), and sides and flanks dusky bluish-grey (not black). Juvenile is almost featureless and with little evidence of adult pattern, mainly smoky grey to greyish-olive above, paler below, whitish on median underparts, may have slightly paler head; immature resembles adult but much duller, acquires black first on back (may be mottled) and chest, and has obviously paler head tinged blue. Voice. Calls include bursts of high, staccato ticking notes, also "tsit" or "chit", with hard, gravelly quality; excited birds in E Ecuador emitted a series of "chit" notes accelerating into a chattery trill (possibly song). Song heard infrequently, in SE Venezuela (900 m) a weak complex of jumbled notes followed by a very high-pitched buzzy or sibilant trill, not far-carrying; in Peru described as a high "tseeew-tseeew", similar to double-buzz of song of Pectoral Sparrow (*Arremon taciturnus*) but not so lisping and without introductory "tik" note; song possibly often overlooked, because it is so weak and brief.
Habitat. Humid-forest borders, patches of forest, overgrown clearings with scattered trees and shrubs, and edges of riverine forest; in Amazonian lowlands found also across top of canopy (uses canopy top as horizontal "edge" habitat) in both *várzea* and *terra firme* forest. Lowlands locally to c. 1400 m (most records below c. 600 m) in foothills along base of Andes; to 950 m in Venezuela, 500 m in Colombia, 1000 m in E Ecuador and 1350 m in Peru.
Food and Feeding. Diet mostly fruit (especially small berries) from wide variety of melastomes and other forest-edge species; also arthropods. Five stomachs contained only fruit pulp and seeds. Occurs mainly in pairs or in family groups of 3–4 individuals, which travel and forage alone; associates only infrequently and for short periods of time with mixed-species flocks at forest borders, but readily gathers briefly with congeners and other tanagers and manakins (Pipridae) at fruiting trees. Forages mainly in canopy, occasionally dropping low to feed at fruiting shrubs. Spends relatively little time searching for arthropods, but does often sit on high exposed perches and sallies or flutters short distances upwards after flying insects.
Breeding. Two birds in breeding condition in Jan in NW Brazil. In captivity: built cup-nest; eggs white, heavily spotted brown; incubation by female alone, period 13 days; young fledged in 17 days. No data on breeding in the wild.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon, generally found in small numbers; widespread across W Amazonia. Occurs in Canaima, Duida-Marahuaca, Jaua-Sarisariñama and Yapacana National Parks (Venezuela), Nakuk Natural Reserve and Cahuinarí, Chiribiquete, La Puya and Amacayacu National Parks (Colombia), Cuyabeno Wildlife Reserve, Limoncocha Biological Reserve and Yasuni National Park (Ecuador), Pacaya-Samiria National Reserve and probably Cordillera Azul National Park (Peru) and Serra do Divisor National Park (Brazil). Most of the Venezuelan parks have little protection, but are in largely unpopulated areas. This species is unlikely to face any risks in the near future, being buffered from forest loss, to some extent, by its preference for edge habitat.
Bibliography. Bertagnolio (1968), Burns & Naoki (2004), Dunning (1982), Gilliard (1941), Hellmayr (1910, 1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Miller (1973), Moore *et al.* (2009), Naoki (2003c), Norgaard-Olesen (1973), O'Neill & Pearson (1974), Phelps & Phelps (1963), Remsen & Traylor (1983), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Snethlage (1914), Snyder (1966), Souza (2002), Terborgh & Weske (1969, 1975), Willis (1976a), Zimmer (1943b).

143. Beryl-spangled Tanager

Tangara nigroviridis

French: Calliste béryl **German**: Silberfleckentangare **Spanish**: Tangara de Lentejuelas

Taxonomy. *T.[anagra] nigro viridis* Lafresnaye, 1843, "Bogotá".
Molecular-genetic data indicate that this species, *T. dowii*, *T. fucosa* and *T. vassorii* form a species group, with last-mentioned basal to the other three. Races rather weakly differentiated; *lozanoana*, in particular, seems barely distinguishable from *cyanescens* and should perhaps be synonymized with latter. Proposed race *consobrina* (described from San Pablo, Túquerres, in SW Colombia) is synonymized with *cyanescens*. Four subspecies tentatively recognized.
Subspecies and Distribution.
T. n. cyanescens (P. L. Sclater, 1857) – N & W Colombia (W & C Andes, and W slope of E Andes S from Norte de Santander) and W & SW Ecuador (W slope S to Pichincha; also El Oro and W Loja); also N Venezuela (Sierra de Aroa, in Yaracuy, and coastal cordillera from Carabobo E to Miranda).
T. n. lozanoana Aveledo & Pérez, 1994 – Sierra de Perijá (Colombia–Venezuela border) and Andes of NW Venezuela (S Lara S to Táchira).
T. n. nigroviridis (Lafresnaye, 1843) – E slope of E Andes of Colombia (from Casanare and Boyacá S to Nariño) and entire E slope in Ecuador.
T. n. berlepschi (Taczanowski, 1884) – E slope of Andes in Peru (S from Amazonas) and Bolivia (S to Cochabamba).



Descriptive notes. 12 cm; 14–19·5 g. Small tanager with heavily spotted (spangled) appearance. Nominate race has forehead, chin and lores black, forming rather narrow black mask extending back through and behind eye to a blunt point on nape side; crown and nape shining opal, tinged bluish-green, often some black feather bases showing (especially on rear crown and nape); mantle and back black, rump and uppertail-coverts shining opalescent greenish-blue; tail black, all feathers narrowly edged blue (blue of central pair often obscure); shoulder deep cobalt-blue (usually hidden), lesser upperwing-coverts bright shining medium blue, median coverts tipped shining pale greenish-blue, greater coverts blackish, edged and tipped pale blue to greenish-blue, flight-feathers black, narrowly but sharply edged dark blue, tertials very narrowly edged pale greenish-blue; feathers of side of head broadly tipped pale greenish-blue with black bases, the black often showing prominently and lending spotted appearance to side of head and neck; throat black mixed with shining blue (darker than underparts), breast, belly and undertail-coverts black, heavily spotted opalescent bluish-green; iris dark brown; bill black; legs dark grey to black. Sexes similar. Juvenile is almost entirely dull brownish-grey with dusky wings, back somewhat darker, underparts obscurely mottled and spotted with black; immature and subadult gradually acquire adult plumage but much duller, both usually with dusky to dull blackish rear crown, mantle and back, wings black with at least greater coverts edged and tipped dull bluish (greenish in some races), flight-feathers and tertials narrowly edged blue (to greenish), feathers of rump and uppertail-coverts broadly edged pale opalescent blue (to bluish-green), tail with weak blue-green edging, facial mask as on adult but dusky (not black), side of head and entire underparts mainly dull yellowish-buff, heavily speckled with dusky (feather tips dusky) and with a few pale bluish to greenish spangles showing through on older birds. Race *cyanescens* differs from nominate in bluer upperparts, dull black (not deep cobalt-blue) shoulder, and bluer (less greenish) spangles on underparts; *lozanoana* differs from previous in having wing edgings bluish-green (not dark blue), shoulder deeper black (not dull black), lesser coverts more greenish (less blue), throat lighter blue, underparts slightly brighter greenish, somewhat more spotted on lower underparts; *berlepschi* differs from all others in being darker and more heavily tinged greenish, including on lesser and median wing-coverts and tail. Voice. Calls high-pitched "sit" and "chit" notes or "czee'czet", given in pairs or excited bursts, much as with many others of genus. Song a high, thin "see, sit-sit, see-ee, tzle'tzle'tzeet", weak, easily overlooked, and not heard often.
Habitat. Humid and wet montane forest, along forest borders, second growth and trees in overgrown pastures. At 900–3000 m; most numerous c. 1400–2500 m.
Food and Feeding. Takes wide variety of small fruits and berries, especially of melastomes, i.e. *Miconia*; also some arthropods. Of eight stomachs examined, seven contained only vegetable matter and one only animal matter; contents included fruit pulp, seeds, and beetles (Coleoptera). Of 92 observations of foraging in Valle del Cauca, in Colombia, 85% involved insect-seeking (although this probably overestimates importance of insects in diet). Strikingly social, occurs in pairs when breeding but otherwise usually in small to large groups, occasionally of up to 25 individuals, that forage with, and are often dominant in, mixed-species flocks; also regularly gathers with other small frugivores in fruiting trees and shrubs. Forages from about eye level to high in canopy, more often high, but occasionally even down amid ferns and plants near ground. Forages rapidly, almost running outwards along branches, then pausing for a few seconds to peer with head down, first at one side of branch and then at the other, behaviour similar to that of many congeners. Typically searches small to very small, bare outer branches and twigs, especially those that hang down; occasionally examines moss tufts on twigs, even ends of bare twigs.
Breeding. In Colombia, fledgling in Nov and three birds in breeding condition Mar–Jul in W Valle, and ten birds in breeding condition May–Jul in mountains of N; in Ecuador, nest construction in

Jun, nestlings Jul and fledglings Sept in NW, and nest-building in SW (Tambo Negro, in Loja) in early Mar. One nest an open cup 10·5 cm wide and 6·5 cm tall, inner cup 5 cm wide and 5 cm deep, made from small fern leaves and rootlets, lined with dead *Chusquea* bamboo leaves and rootlets, placed 6·5 m above ground in moss atop a shaded diagonal branch. No information on clutch size; eggs creamy white or pale green, thickly marked with brown and lilac, especially at large end; no information on duration of incubation and nestling periods; at one nest, chicks fed by both adults, usually arriving more or less together, rate c. 7·2 feeds per nestling per hour, highest in morning (11·6 per hour during first hour), diurnal brooding ceased 6 days before departure from nest, nocturnal brooding may have continued throughout nestling period.

Movements. Largely resident. Minor seasonal or erratic movements to lower elevations reported in W Andes of Colombia, and almost certainly occur elsewhere.

Status and Conservation. Not globally threatened. Generally numerous, and widespread. Occurs in many protected areas, including Henri Pittier, Macarao, Yacambú, Guaramacal, Sierra Nevada and Tamá National Parks and the Palmichal Reserve (Venezuela), Chingaza, Cueva de los Guácharos and Farallones de Cali National Parks and Reinita Cielo Azul, Arrierito Antioqueña, Loro Orejiamarillo, Tambito and Río Blanco de Manizales Nature Reserves (Colombia), Cotocachi-Cayapas Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador), Tingo María and Manu National Parks (Peru) and Madidi National Park (Bolivia). This species' range also includes considerable unprotected but suitable habitat that is at relatively low risk in the foreseeable future.

Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (2000), Aveledo Hostos & Pérez Chinchilla (1994), Best *et al.* (1996), Burns & Naoki (2004), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Hilty (1997, 2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Miller (1963), Moore *et al.* (1999), Naoki (2007), Ogilvie-Grant (1912), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sedano & Burns (2010), Sheldon & Greeney (2007), Walker (2001), Willis (1966a), Zimmer (1943c).

144. Spangle-cheeked Tanager

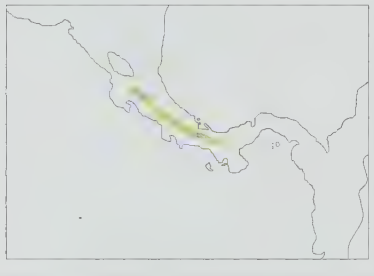
Tangara dowii

French: Calliste pailleté **German**: Glanzfleckentangare **Spanish**: Tangara Caripinta

Taxonomy. *Calliste dowii* Salvin, 1863, San José, Costa Rica.

Molecular-genetic data indicate that this species, *T. nigroviridis*, *T. fucosa* and *T. vassorii* form a species group, with last-mentioned basal to the other three. Present species has been considered conspecific with *T. fucosa*, the two being similar in vocalizations, behaviour and habitat preference. Monotypic.

Distribution. Mountains of Costa Rica (from E Guanacaste and S Alajuela) E to W Panama (Chiriquí and Veraguas).



Descriptive notes. 12 cm; 20 g. Small tanager with rather "unkempt", spangled appearance. Male has head to throat and back dull black, with rufous spot on central hindcrown; nape, side of neck, and lower and rear ear-coverts thickly spangled with bluish-green, breast spotted bluish-green, spangles and spotting often more chartreuse-yellow or lime-green, sometimes buffy-white; small central crown spot golden-rufous; rump pale green, uppertail-coverts mixed tawny and light blue; upperwing-coverts, flight-feathers and tail black, feathers edged dark blue; lower breast and belly rich tawny, underwing-coverts buffy white; iris dark brown; bill black; legs dark grey. Female is similar to male, but slightly less spotted on neck and breast. Immature is much duller than adult, spotting less distinct, lacks crown patch. Voice. Calls include high, thin "tsip" or "seek", often accelerating into fast twitter. No song described.

Habitat. Mossy humid and wet forest, forest edges, and second growth and taller trees in clearings adjacent to forest. At 800–3000 m, most numerous at 1200–2750 m.

Food and Feeding. Fruits and insects. Observed to take wide variety of small fruits and berries, including *Gaiadendron* (Loranthaceae), several species of melastome, Ericaceae, *Urera* (Urticaceae) and *Fuchsia* (Onagraceae). Occurs in pairs or small groups throughout year, and often with small mixed-species flocks containing *Chlorospingus* species and other mostly fruit-eating birds. Forages from low to high, but more often at middle levels or higher. Rapidly works outwards along branches, often pausing to lean head down and examine first one side and then the other of mossy branches for insect prey.

Breeding. Breeding reported Apr–Aug in Costa Rica. Nest a bulky cup of green liverworts and mosses mixed with variety of dry fibres, sometimes decorated with pieces of fern, placed amid epiphytes 3·5–10 m up on stump, branch or fork of branch, often at or near forest edge. Clutch 2 eggs, apparently undescribed. No other information.

Movements. Resident. Some minor seasonal elevational movements may occur in response to fruit availability.

Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Fairly common to locally common in Costa Rica; decidedly less numerous and more local in W Panama. Occurs in several parks and other reserves, among them Arenal, Poas, Irazú, Braulio Carrillo and Chirripó/La Amistad National Parks and Monteverde Cloud Forest and Santa Elena Cloud Forest Reserves (Costa Rica) and La Amistad and probably Volcán Barú National Parks (Panama). Vulnerable to deforestation, which has substantially reduced the species' distributional range. At present only relatively small tracts of intact unprotected forest remain (mostly as fragmented patches) within its small range, a problem especially acute in W Panama.

Bibliography. Anon. (1998), Blake (1956), Burns & Naoki (2004), Buskirk (1976), Davis (1972), Eisenmann (1955), Garrigues & Dean (2007), Isler & Isler (1999), Powell (1979), Ridgely & Gwynne (1989), Salvin (1870), Sedano & Burns (2010), Slud (1964), Stiles & Hespenheide (1972), Stiles & Skutch (1989), Wetmore *et al.* (1984), Wheelwright *et al.* (1984), Wolf (1976).

145. Green-naped Tanager

Tangara fucosa

French: Calliste à nuque verte **German**: Grünnackentangare **Spanish**: Tangara Nuquiverde

Taxonomy. *Tangara fucosus* Nelson, 1912, Mount Pirre, 5000 feet [c. 1520 m], Panama.

Molecular-genetic data indicate that this species, *T. nigroviridis*, *T. dowii* and *T. vassorii* form a species group, with last-mentioned basal to the other three. Present species has been considered conspecific with *T. dowii*, the two being similar in vocalizations, behaviour and habitat preference. Monotypic.

Distribution. Mountains of E Panama on Cerro Pirre, the Serranía de Jungurudó, and Cerro Malí (near Cerro Tacarcuna), and Panama–Colombia border on Cerro Tacarcuna; one sight record in NW Colombia on Cerro Tacarcuna (R Tigre).



Descriptive notes. 12 cm; 18–23 g. Small tanager with "unkempt", spangled appearance. Plumage is mainly blackish above, with pale greenish spangles on crown and nape, small bluish-green central crown spot (inconspicuous); greenish rump, becoming light blue on uppertail-coverts; upperwing-coverts dusky, edged blue, flight-feathers dusky, edged paler blue; chin and throat dull black, feathers of foreneck with blue scaling, breast and sides with dull black spots, edged bluish-green to brownish-yellow, rest of underparts cinnamon-buff; iris dark brown; bill black; legs dark grey. Differs from very similar *T. dowii* in overall duller appearance, the blackish areas less intense, bluish-green (not rufous) crown patch, blue scaling on foreneck, black spots extending farther onto sides, and lower underparts paler and duller. Sexes similar. Juvenile undescribed. Voice. Calls high-pitched "tsit" notes and longer "tseet", uttered singly, in combination, or in rapid ticking series; apparently much like (if not identical to) those of *T. dowii*. Song apparently undescribed.

Habitat. Humid pre-montane and montane forest and forest borders. Mostly above 1350 m, but recorded down to 550 m near Cana, in Darién (E Panama).

Food and Feeding. Has been observed to take berries of *Miconia* and an epiphytic vine. Contents of three stomachs were fruit. Reported in groups of 3–4 individuals with mixed-species flocks, especially with *Chlorospingus inornatus*. Seen to forage in crowns of trees in elfin forest, inspecting small leaves and mosses on slender branches.

Breeding. One nest reported in Aug in Serranía de Jungurudó. Nest appeared ball-shaped, was located c. 15 m up between palm-frond leaflets and atop main palm vein; as all known nests of this genus are cup-nests (though sometimes built inside moss clump on side of branch, or suspended in moss beneath branch), further confirmation of nest structure of this species needed. No further information available.

Movements. No information.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Darién Highlands EBA. Fairly common within its extremely limited global range. Occurs in Darién National Park, in Panama. In Colombia, known from a single sight record that may fall within Los Katíos National Park, but status in Colombia uncertain. There is, at present, minimal human impact within its tiny range. Gold-mining at elevations below those at which this species occurs present a potential problem. More importantly, the possible extension and completion of the Pan-American highway link through Darién could be environmentally disastrous for this species because of the deforestation and human settlement that would inevitably follow.

Bibliography. Anon. (1998, 2010a), Burns & Naoki (2004), Butchart & Stattersfield (2004), Christian (2001), Davis (1972), Eisenmann (1955), Isler & Isler (1999), Ridgely & Gwynne (1989), Ridgely & Tudor (2009), Robbins *et al.* (1985), Salaman *et al.* (2008), Sedano & Burns (2010), Stattersfield & Capper (2000), Wetmore *et al.* (1984).

PLATE 16 ➤

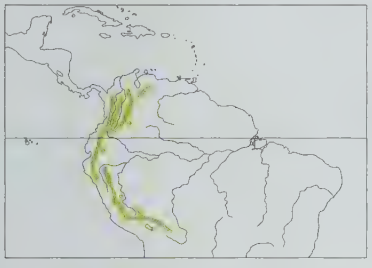

ssp branickii
ssp atrocoerulea
146
ssp vassorii
147
148
149
ssp viridicollis
ssp fulvigula
150
ssp argyrofenges
ssp caeruleigularis
151
ssp cyanoptera
ssp whitelyi
ssp velia
ssp cyanomelas
152
ssp iridina
153
154
variants
PLATE 16
inches 2
cm 5

146. Blue-and-black Tanager

Tangara vassorii

French: Calliste bleu et noir **German**: Vassoritangare **Spanish**: Tangara Azulinegra
Other common names: Tamiapampa Tanager (*branickii*); Buff-naped Tanager (*atrocoerulea*)

Taxonomy. *Tanagra* (*Euphone*?) *Vassorii* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
Molecular-genetic data indicate that this species, *T. nigroviridis*, *T. dowii* and *T. fucosa* form a species group, with present species being basal to the other three. Taxonomic status of the two S races, which differ markedly from nominate N race, may merit investigation. Three subspecies currently recognized.
Subspecies and Distribution.
T. v. vassorii (Boissonneau, 1840) – Andes in Venezuela (Trujillo S to Táchira) and throughout Colombia S to Ecuador and E slope in N Peru (S to Piura and Cajamarca N of R Marañón).
T. v. branickii (Taczanowski, 1882) – E slope of Andes in Peru S of R Marañón (Amazonas and La Libertad).
T. v. atrocoerulea (Tschudi, 1844) – E slope in Peru (S from Huánuco) and Bolivia (S to W Santa Cruz).



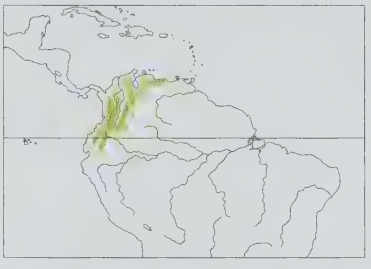
Descriptive notes. 13 cm; 15–21 g. Beautiful dark blue high-elevation tanager with rather short bill and relatively short tail. Nominate race is mostly shining deep cobalt-blue; lores, very narrow line over bill and chin black; greater upperwing-coverts black, tipped cobalt-blue (forming single dark blue wingbar), flight-feathers, tertials and tail black, sometimes narrowly edged blue; bases of feathers of body plumage dusky, occasionally showing through as dusky mottling or faint barring (more prominent on younger birds); iris dark brown; bill black; legs greyish-black. Sexes similar. Juvenile is almost entirely grey to brownish-grey with contrasting dusky wings and tail, sometimes faint bluish tinge on mantle and back, bill dusky horn, gradually acquires more bluish in plumage with age; immature dull greyish, usually with blue tinge, and both upperparts and underparts mottled, and variably spotted and barred with dusky blue, upperwing-coverts as on adult but duller, loral area blackish as on adults but duller, wings and tail dull dusky black. Race *branickii* differs from nominate in having crown and side of head dull greenish-blue; *atrocoerulea* differs from nominate in having duller bluish head, conspicuous opalescent-buff patch on hindcrown, solidly black lower mantle and back, and underparts spotted and scaled black. Voice. Calls include high-pitched, thin "tsit" and "chip" notes, none very distinctive, during foraging. Infrequently heard song a notably high, thin "tsiit, tsiit, tsiit, tsiit", forceful but not loud or far-carrying; song in Colombia (Bogotá) a series of sharp notes that rise slightly and end in weak trill, "tseu, tseu, tseu ti'ti'ti'ti'ti'ti'ti'ti'ti".
Habitat. Humid and wet, often mossy montane forest, forest edges, second growth and trees and shrubs in partly cleared highland pastures. At 1800–3200 m (most records above 2000 m) in Venezuela, 1900–3400 m in Colombia, mostly 2000–3300 m (rarely to 3600 m) in Ecuador, and c. 2000–3400 m (once to 1580 m) in Peru; has been recorded as low as 1300 m in Bolivia. No congener regularly occurs at such high elevations; at many high-lying sites the only member of genus present.
Food and Feeding. Fruit; also, in far smaller quantity, arthropods. Of 17 stomachs examined, 14 contained only vegetable matter and three contained both vegetable and animal matter; contents included fruit pulp, seeds, berries, and insects. Other stomachs contained seeds of melastome fruits. Rather social, occurring in pairs or small groups up to about six individuals, infrequently more, and most often in association with highland mixed-species flocks of frugivores and insectivores such as woodpeckers (Picidae), ovenbirds (Furnariidae), *Conirostrum* conebills and mountain-tanagers; readily joins frugivores at fruiting trees and shrubs. Active and usually on the move. Foraging behaviour more variable than that of many congeners. Usually seen at middle levels or higher, hopping and peering in outer foliage and on small outer twigs, mostly for fruit; less often, works quickly outwards along branches, peering head down to inspect first one side and then the other. Also checks various epiphytes, including small bromeliads, and may hang downwards to examine substrates.
Breeding. In Colombia, two nests in Jun and begging juveniles in Jan in W Valle, fledglings in May in E Cauca, and nine birds in breeding condition in Feb–Aug in C & E Andes. Nest an open cup of plant fibres, located 3–6 m above ground near end of branch. Clutch 2 eggs, greenish with dark spots. No other information.
Movements. Generally resident. Some seasonal elevational movements may occur.
Status and Conservation. Not globally threatened. Uncommon to fairly common; seldom numerous. Occurs in a number of protected areas, among them Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), Chingaza, Cueva de los Guácharos, Las Orquídeas, Farallones de Cali and Puracé National Parks and Tambito, Río Blanco de Manizales and probably El Mirador Nature Reserves (Colombia), Cotocachi-Cayapas and Cayambe-Coca Ecological Reserves and Sangay, Las Cajas and Podocarpus National Parks (Ecuador), Tingo María and Manu National Parks (Peru) and Madidi National Park (Bolivia). Within this species' range substantial intact habitat exists outside protected areas, although deforestation continues to diminish the area available, especially in upper end of its range, where deforestation and firewood-cutting are severe.
Bibliography. Anon. (2000), Burns & Naoki (2004), Carriker (1941–1954), Donegan & Dávalos (1999), Dunning (1982), Fjeldså & Krabbe (1990), Goodfellow (1901), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Mazar Barnett *et al.* (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Parker & O'Neill (1980), Phelps & Phelps (1963), Remsen *et al.* (1987), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Taczanowski (1884), Terborgh & Weske (1975), Walker (2001), Zimmer (1943c).

147. Black-capped Tanager

Tangara heinei

French: Calliste à calotte noire **German**: Heinetangare **Spanish**: Tangara Coroninegra

Taxonomy. *P.*[*rocnias*] *Heinei* Cabanis, 1851, Colombia.
Molecular-genetic data indicate that this species, *T. phillipsi*, *T. viridicollis* and *T. argyrofenges* form a species group, and that *T. cyanoptera* is sister to this group. Present species and *T. phillipsi* sometimes thought to form a superspecies; has been suggested that the two might be better treated as conspecific, but most authors argue that, because of the wide geographical distance between them, as well as plumage differences, they are best regarded as separate species. Monotypic.
Distribution. Colombia in Santa Marta Mts, all three Andean ranges (including E slope of E Andes), and on W slope in Ecuador, also Sierra de Perijá (Colombia–Venezuela border) and mountains of N Venezuela (including coastal cordillera E to Distrito Federal, interior cordillera in N Guárico, Cerro El Cerrón on Falcón–Zulia–Lara border, and Andes from S Lara S to Táchira).



Descriptive notes. 13 cm; 18–22·8 g. Bluish to greenish tanager, male with black cap. Male has forehead, crown and upper nape to loral area and below eye black, tailing down behind rear ear-coverts; upperparts, including upper-tail-coverts, shining silvery bluish-grey; upperwing-coverts dull bluish-grey, obscurely edged dull blue, primary coverts black with dull blue on outer edges, flight-feathers black, edged dull blue (edging paler than wing-coverts), tertials black with dull blue outer web; throat, side of head to eye, side of neck and chest shining aquamarine-green, feather tips lanceolate, with black bases showing at edges (imparting slightly streaked or scaled appearance); rest of underparts uniformly dull grey-blue, except undertail-coverts, which have blackish centres and broad white margins; iris dark brown; bill and legs black. Female has crown dusky green, each feather with dusky base and weak pale green edges (giving slightly scaled appearance), upperparts shining pale green, tail dull green to olive-green; lesser and median upperwing-coverts mainly greenish with dusky bases, greater coverts dusky with outer half of each feather dull green (wing-coverts look mainly green), primary coverts dusky with dull green on outer edges, flight-feathers dusky, edged blue-green, tertials with dull green outer half of feather; below, similar to male but much duller and greener, with throat, side of neck and chest dull glaucous green with slightly scaled or mottled appearance (due to dusky feather bases), lower breast and belly grey, sides and flanks olivaceous yellow-green, undertail-coverts similar to those of male. Juvenile male is essentially like female, but with pale blue primary edges; immature of both sexes like female but even duller, although usually with pattern of respective adult faintly indicated; subadult male resembles female, but with early stages of adult male plumage, including dull dusky-green crown mixed black, pale green mantle and back mixed silvery blue, greater coverts and secondaries strongly edged green, but flight-feathers edged blue-green, and throat showing shining green feathers mixed dusky and underparts mixed greyish and greenish. Voice. Calls include high, nasal "zheet" and high "tsit", neither especially distinctive. Unlike most congeners, does sing frequently, although song no more likely to be heard at dawn that at various times during day: song, from high and sometimes exposed position, rather low-pitched, remarkably long (up to 10 seconds), mechanical-sounding, and very fast "t'kling-t'kling-t'kling...", not loud but with peculiar ringing quality (as if two birds singing simultaneously), may be repeated a few times in space of a few minutes.
Habitat. Humid and wet forest, forest borders, older second growth, and trees and shrubs in clearings. At 1000–2800 m, most records c. 1500–2200 m; once down to 700 m in Colombia; 1100–1900 m in Ecuador.
Food and Feeding. Generally much fruit, especially melastome berries, in diet; some arthropods. Pairs and family groups wander along forest borders and disturbed areas, more often away from mixed-species flocks than with them; sometimes with other species in fruiting trees. Forages predominantly high up, seldom down to eye level. Inspects branches with stereotyped lean-down movement as it peers at alternate sides of mossy or bare branches; behaviour like that of numerous other members of genus, but movements shallower, briefer, and not likely to be long-sustained. Also hops and peers in outer foliage.
Breeding. In Colombia, nesting activity in Jan, Apr and Aug in Andes and 15 birds in breeding condition in Jan–Sept in N; nest in May in Venezuela; in Ecuador, season probably Jan–Jun, with peak Mar–Apr (rainiest months), in NE and breeding activity reported elsewhere in Dec and Jul. Nest built by both sexes (Colombia) or by female (Ecuador), or male reported as helping to rear-range nest material but not bringing it (Venezuela); nest a grassy cup with moss and lichens on outer surface, in Ecuador outer material lichens (c. 55–65%), pale rootlets (15–25%) and moss (less than 15%), external width c. 9·2 cm, height 7 cm, placed 1·2–8 m above ground (1–3 m in Colombia) and supported by three or more forking stems or *Chusquea* bamboo shoots, anchored with spider web, in second-growth vegetation (e.g. overgrown pasture, road cut). Clutch 1–2 eggs (generally 2), dull blue to pale greenish-white, heavily blotched and spotted reddish-brown; incubation by female alone, occasionally fed on nest by male, female sits for c. 63% of time (average 14·7 minutes per session), incubation period c. 13·5–14 days; chicks brooded only by female, fed by both parents, at one nest male made 53% of food deliveries and directly fed nestlings on 73·4% of occasions, at other times passed food to mate and she then fed chicks, each nestling fed 5·95 times per hour; no information on duration of nestling period. Of seven nests observed, only two produced fledged young.
Movements. Mainly resident. Some seasonal descent to lower elevations (as low as 1000 m) during rainiest months in N Venezuela; similar movements may occur elsewhere.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Usually found in low numbers. Occurs in numerous protected areas, including Henri Pittier, Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), Sierra Nevada de Santa Marta, Las Orquídeas, Tatamá and Farallones de Cali National Parks and Tambito Nature Reserve and others (Colombia), and possibly Cotocachi-Cayapas Reserve (Ecuador). The species' range also includes some intact habitat that is unprotected, but much has already been lost to deforestation. Ability of this species to utilize middle-age and older second growth buffers it somewhat from long-term risks.
Bibliography. Anon. (2000), Arcos-Torres & Solano-Ugalde (2007), Burns & Naoki (2004), Donegan & Dávalos (1999), Dunning (1982), Ewert (1975), Fjeldså & Krabbe (1990), Freeman & Greeney (2009), Freile (2004), Greeney & Nunnery (2006), Greeney, Freeman *et al.* (2008), Hilty (2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Moore *et al.* (1999), Ogilvie-Grant (1912), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Stiles *et al.* (2002), Schäfer & Phelps (1954), Sclater & Salvin (1879), Sedano & Burns (2010), Todd & Carriker (1922), Willis (1966a).

On following pages: 148. Sira Tanager (*Tangara phillipsi*); 149. Silver-backed Tanager (*Tangara viridicollis*); 150. Straw-backed Tanager (*Tangara argyrofenges*); 151. Black-headed Tanager (*Tangara cyanoptera*); 152. Opal-rumped Tanager (*Tangara velia*); 153. Opal-crowned Tanager (*Tangara callophrys*); 154. Swallow Tanager (*Tersina viridis*).

148. Sira Tanager

Tangara phillipsi

French: Calliste de Phillips **German**: Siratangare **Spanish**: Tangara del Sira
Other common names: Siara Tanager

Taxonomy. *Tangara phillipsi* G. R. Graves and Weske, 1987, Cerros del Sira, 1300 m, Huánuco, Peru.
Molecular-genetic data indicate that this species, *T. heinei*, *T. phillipsi*, *T. viridicollis* and *T. argyrofenges* form a species group, and that *T. cyanoptera* is sister to this group. Present species and *T. heinei* sometimes thought to form a superspecies; has been suggested that the two might be better treated as conspecific, but most authors argue that, because of the wide geographical distance between them, as well as plumage differences, they are best regarded as separate species. Monotypic.
Distribution. Cerros del Sira (E of E base of Andes in E Huánuco), in Peru.



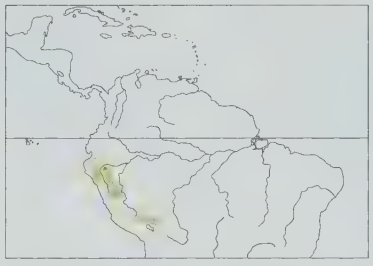
Descriptive notes. 13 cm; 16·8–21·7 g. Male has black crown to hindneck, black extending down behind ear-coverts onto rear side of neck and to chest, enclosing blue-green throat (throat feathers black with glossy, metallic bluish-green tips); lower nape, mantle, back and rump shining opalescent greenish-blue (colour varies with angle of light); tail black, outer feathers edged and tinged greyish-blue; upperwing-coverts and flight-feathers black, edged slate-blue; central area of breast and belly mostly black, with broad area of prominent opalescent blue (this can look green, depending on light) across sides and flanks; undertail-coverts bluish-grey, underwing-coverts white; iris dark brown; bill and legs black. Differs from *T. heinei* in having black of crown connecting to black central lower underparts, and central underparts black, not blue-grey. Female has top of head dusky green (feather bases dusky, with pale green edges); upperparts, including uppertail-coverts, shining pale green, upperwing-coverts mainly greenish with dusky bases, primary coverts dusky, flight-feathers dusky, edged blue-green, tertials dull green with dusky inner webs, tail dull green to olive-green; much duller than male below, has throat, side of neck and chest dull glaucous green with dusky feather bases and paler tips (slightly scaled and mottled appearance), breast, centre of belly and undertail-coverts dull greenish-grey to grey, brighter on sides and flanks, undertail-coverts dull pale greyish-white, tinged green; much like female of *T. heinei*, differing primarily in having breast and belly greyish, and throat feathers less bifurcated and more pointed. Juvenile undescribed. Voice. No information; apparently undescribed.
Habitat. Canopy and edges of tall, mossy, pre-montane wet forest on isolated outlying ridges; 1300–1570 m.
Food and Feeding. Not well known. Mixed diet of fruits and insects, apparently much like that of congeners. Regular member of canopy mixed-species flocks containing other members of genus and other tanagers, and also small frugivores and insectivores; often outnumbers congeners in mixed flocks. Observed in forest at heights of 11–25 m above ground, and commonly 3–10 m up in ridgetop scrub.
Breeding. No information. Birds in Jul were not in breeding condition.
Movements. Resident; some minor seasonal elevational movements possible.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Peruvian East Andean Foothills EBA. Locally fairly common to common. Because of its remote range, this species is believed not to be at any immediate risk; an expedition that visited this area in 2000 found its habitat to be largely untouched. Known global distribution, however, extremely small, estimated breeding range c. 720 km², and gold-mining and copper-mining, as well as small-scale logging operations, have been underway nearby at base of Cerros del Sira for some time. Logging operations possibly increasing along W base of the Sira in R Pachitea.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Clements & Shany (2001), Graves & Weske (1987), Mee *et al.* (2002), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Vuilleumier *et al.* (1992).

149. Silver-backed Tanager

Tangara viridicollis

French: Calliste argenté **German**: Silbertangare **Spanish**: Tangara Dorsiplateada
Other common names: Silvery(-backed) Tanager; Tambillo Tanager (*fulvigula*)

Taxonomy. *Calliste argentea viridicollis* Taczanowski, 1884, Huiro, 4800 feet [c. 1460 m], Cuzco, Peru.
Molecular-genetic data indicate that this species, *T. heinei*, *T. phillipsi* and *T. argyrofenges* form a species group, and that *T. cyanoptera* is sister to this group. Nominate race apparently intergrades with *fulvigula* in N Peru (vicinity of R Marañon) where examples tend to be intermediate in plumage. Two subspecies recognized.
Subspecies and Distribution.
T. v. fulvigula (Berlepsch & Stolzmann, 1906) – Andes in S Ecuador (W slope in El Oro and W Loja, also old record from Azuay; E slope in extreme S Zamora-Chinchipe) and N Peru (adjacent E slope in S to Lambayeque and Cajamarca, and on both slopes of dry W Andes).
T. v. viridicollis (Taczanowski, 1884) – E slope of Andes of Peru S of R Marañón (Amazonas S, discontinuously, to Puno) and W Bolivia (near Tokoaque, in La Paz).
Descriptive notes. 13 cm; c. 18–24 g. Sexually dimorphic tanager, male unusual in having most of underparts much darker than upperparts. Male nominate race has dark peach-coloured to golden throat and side of head, bordered by black crown and upper nape down to chin and below eye, black continuing narrowly around rear side of neck and forward onto breast and mid-belly; upperparts silvery blue-grey to silvery opal (varying with angle of light); tail black, edged blue-grey; lesser and median upperwing-coverts mostly black, variably edged greenish-blue, greater coverts black, narrowly edged greenish-blue; flight-feathers dusky, edged greenish-blue, tertials mostly dull greenish-blue with dusky inner webs; sides and flanks silvery blue-grey; iris dark brown; bill blackish; legs dark grey. Female has crown dusky brown, faintly tinged green, nape to uppertail-coverts shining light green, throat and side of head glistening straw-yellow with variable coppery sheen, slightly streaked greenish-copper, and becoming mixed dusky and pale aquamarine on chest



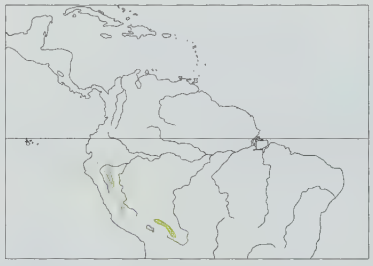
and pale green on breast; sides and flanks pale green, tinged yellowish, lower breast and median underparts dingy ash-grey with hint of greenish. Juveniles is extremely dull and dingy, and almost devoid of strong colour or pattern; immature resembles adult, but duller. Race *fulvigula* male is paler than nominate, back more silvery opaline to silvery green (depending upon light), and throat darker, female has more golden-brown crown and brighter, more copper-coloured throat than nominate. Voice. Weak "chit" and "tsit" notes, much like those of congeners but perhaps slightly more husky; also high wheezy, descending "tseer" and thin "pit". Song, in Peru, described as a series of rapid descending notes. True song heard only infrequently.
Habitat. Borders of humid and wet forest, woodlots, remnant forest patches and heavily cut-over second growth; in NW Peru occurs in fairly dry scrub (where may be the only member of genus present) and degraded habitats, including overgrown pastures, dry scrubby hillsides, and landslide regrowth. At 1450–3050 m; most common in lower third of this belt, at c. 1500–2000 m.
Food and Feeding. Of four stomachs examined, one contained only vegetable matter and one only animal matter and two contained both fruit and arthropods. Seen to feed on *Miconia* berries near Machu Picchu (S Peru), and regularly takes nectar (or possibly immature flower ovaries) from *Inga* flowers, often moving steadily from one to the other. Occurs mainly in pairs, less often in small family groups of 3–5 individuals, foraging alone or with mixed-species flocks contain other members of genus and other small frugivores; often gathers with other birds at fruiting trees and shrubs. Found from about eye level to canopy of tall trees, mostly at middle levels or higher. Foraging behaviour recalls that of *T. heinei*. Examines small (diameter less than 12 mm), mostly bare twigs within canopy by hopping from one to another, pausing to lean forwards and downwards to inspect sides of twigs; may spend considerable time insect-hunting in this manner.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common; generally occurs in low numbers. Present in Machu Picchu World Heritage Site and probably Cordillera de Colán and Tingo Maria National Parks, in Peru. Fairly common resident in Machu Picchu Pueblo Hotel grounds (outside Aguas Calientes), at a site that is heavily modified and includes second growth and horticultural plantings; fairly common locally in dry-scrub hillside habitat in the Piura and Cajamarca region, e.g. Abra de Porculla, in NW Peru. Because this species occurs mainly in, or is more easily seen in, forest fragments, second growth and dry scrub, rather than in undisturbed forest, it is protected somewhat from the risks of deforestation and human settlement.
Bibliography. Burns & Naoki (2004), Clements & Shany (2001), Coopmans *et al.* (2004), Fjeldså & Krabbe (1990), Hennessey & Gomez (2003), Hilty (2009a), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Rasmussen *et al.* (1996), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sibley & Monroe (1990), Taczanowski (1884), Walker (2001), Zimmer (1943c).

150. Straw-backed Tanager

Tangara argyrofenges

French: Calliste à gorge verte **German**: Grünkehltangare **Spanish**: Tangara Dorsipajiza
Other common names: Green-throated Tanager

Taxonomy. *Calliste argyrofenges* P. L. Sclater and Salvin, 1876, Yungas, La Paz, Bolivia.
Molecular-genetic data indicate that this species, *T. heinei*, *T. phillipsi* and *T. viridicollis* form a species group, and that *T. cyanoptera* is sister to this group. Sympatric with very similar *T. viridicollis* at Panguri, in S Ecuador. Most of the characters ascribed to race *caeruleigularis* appear to have little or no value, and species may be better treated as monotypic. Two subspecies tentatively recognized.
Subspecies and Distribution.
T. a. caeruleigularis Carriker, 1935 – extreme SE Ecuador (S Zamora-Chinchipe) and N & C Peru (E slope of Andes in Amazonas and San Martín, also a few scattered records Junín and Pasco).
T. a. argyrofenges (P. L. Sclater & Salvin, 1876) – E slope of Andes in Bolivia (La Paz, Cochabamba and W Santa Cruz).



Descriptive notes. 13 cm; 18–20 g. Male nominate race has throat, side of head and throat to foreneck shiny pale aquamarine to opalescent green, enclosed by black on rest of head to upper nape and wrapping narrowly around on rear side of neck and down to black breast, belly and undertail-coverts; upperparts, including most of uppertail-coverts, shining pale yellow-buff, longest uppertail-coverts black; tail and entire upperwing and its coverts jet-black; sides and flanks yellow-buff, like back; iris brown; bill black; legs dark grey. Female has throat, side of head and chest dull opalescent green, as on male but considerably duller; crown and nape dusky, mixed greenish, back and rump dull straw-yellow, tinged green, uppertail-coverts more strongly greenish-tinged, wing and tail blackish, feathers edged pale green; breast and lower underparts mostly grey to greenish-grey with yellow tinge, sides and flanks yellowish-green. Juvenile undescribed. Race *caeruleigularis* is very similar to nominate, male differing in having the yellowish feathers rather paler straw-yellow, and throat slightly bluer. Voice. Song, in Peru, described as a high, wheezy series of lisping notes and a long, even, *Chlorophonia*-like "weee". Calls include high, descending "tsew" and dry "tip".
Habitat. Humid montane forest and forest borders, less often in adjacent mature second growth. At 1350–1600 m in Ecuador and 1100–2200 m in Peru; 1200–2700 m, most numerous at 1600–1900 m, in Bolivia.
Food and Feeding. Fruit and insects; noted as eating *Cecropia* catkins. One stomach contained small berries. Pairs forage with mixed-species flocks, especially those containing other members of genus, and occasionally occur in same mixed flocks as does *T. viridicollis* (in N Peru). Forages mostly at middle levels or higher in trees, generally staying well hidden. Inspects leaves, bark and slender branches.

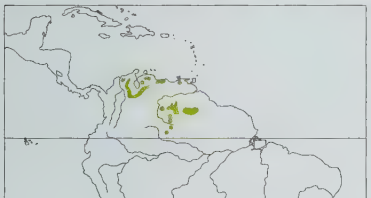
Breeding. No information.
Movements. No information.
Status and Conservation. Not globally threatened. Restricted-range species: present in Ecuador-Peru East Andes EBA, Peruvian East Andean Foothills EBA and Bolivian and Peruvian Lower Yungas EBA. Rare in Ecuador; uncommon and local in Peru. Throughout range found in small numbers. S population probably occurs in Madidi National Park, possibly also Isiboro Sécure and Amboró National Parks, in Bolivia; N population may occur in or near Podocarpus National Park, in Ecuador, and Cordillera de Colán in Amazonas, in Peru. Little information exists on the current status of any population of this species.
Bibliography. Burns & Naoki (2004), Clements & Shany (2001), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Niethammer (1956), Parker *et al.* (1982), Rasmussen *et al.* (1996), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Sedano & Burns (2010), Taczanowski (1884), Zimmer (1943c).

151. Black-headed Tanager

Tangara cyanoptera

French: Calliste à tête noire **German**: Blauflügeltangare **Spanish**: Tangara Cabecinegra
Other common names: Whitely's Tanager (*whitelyi*)

Taxonomy. *A.*[*glaia*] *cyanoptera* Swainson, 1834, no locality = Caracas, Venezuela.
Molecular-genetic data indicate that this species is sister to a species group formed by *T. heinei*, *T. phillipsi*, *T. viridicollis* and *T. argyrofenges*. Races are geographically isolated from each other and differ somewhat in plumage and habitat; possible separate species status merits investigation. Two subspecies currently recognized.
Subspecies and Distribution.
T. c. cyanoptera (Swainson, 1834) – N Colombia (Santa Marta Mts, and both slopes of E Andes at N end), Sierra de Perijá, and W & N Venezuela (Andes from Lara S to Táchira, mountains of C Falcón and Yaracuy, and N cordilleras from Carabobo E to Sucre and Monagas).
T. c. whitelyi (Salvin & Godman, 1884) – tepuis of S Venezuela (in Amazonas and Bolívar), and adjacent N Brazil (Uei-tepui) and Guyana (Twek-quay).



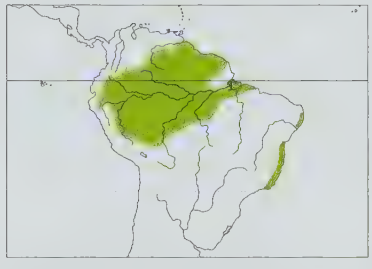
Descriptive notes. 13 cm, one female 18 g (nominate); 14 cm, 21·5–24·5 g (*whitelyi*); male 17·1–24·5 g and female 18–27·5 g (Venezuela, race unspecified). Male nominate race has head to upper nape and throat black, with narrow white feathering on lores, submoustachial area and chin, rest of plumage shining yellowish to greenish opal (depending on light), usually faint dusky mottling on chest; mantle generally more yellowish opal, rump faintly tinged with green, may show variable amount of blackish mottling (or none) on back and rump; upperwing-coverts black, greater coverts prominently edged blue, flight-feathers and rectrices blackish, narrowly edged bright blue; iris deep brown; bill blackish; legs dark grey. Female is very different from male, has crown and side of head greyish-green, fading to light greenish-yellow on lower mantle and rump, duller and darker olivaceous-green on uppertail-coverts, primary coverts dusky with narrow dull green edges, rest of upperwing-coverts dusky with broad and diffuse dull green edges, flight-feathers and rectrices dusky with blue-green edges, more olivaceous-green and broader on outer web of tertials; throat to mid-breast dingy greyish-white with obscure dusky streaking, lower underparts pale yellow, brightest yellow on centre of belly, greener on flanks, undertail-coverts dull olive. Juvenile is brownish-grey above, wing-coverts pale-edged, underparts dingy whitish with hint of diffuse streaking; immature male similar to adult but duller, with more dusky mottling and flecking above and below. Race *whitelyi* male differs from nominate in overall dark yellowish-opal coloration, underparts more obviously and extensively mottled with black, wing uniformly black with no blue edgings, female differs from nominate in having upperparts duller and darker, underparts with more ashy spotting. Voice. Variety of very high-pitched, buzzy and lisping notes, e.g. "djeet", during foraging, but otherwise not very vocal. Song (nominate race), seemingly given only infrequently, an extremely high-pitched "weeu-weeu-weeu-weeu", 3–5 notes, weak and easily overlooked. Another vocalization described as a quavering squeal lasting 1–2 seconds, repeated at intervals.
Habitat. Nominate race occurs in moist to moderately humid woodland, mainly along borders, scattered trees in clearings, shade trees in coffee plantations and lightly wooded areas. S race *whitelyi* in mossy, humid and wet forest borders, and especially stunted melastome-dominated second growth. At 600–2000 m in N Colombia; in Venezuela, 450–2200 m (mostly above 800 m) N of R Orinoco, and 1100–2250 m S of R Orinoco (on tepuis).
Food and Feeding. Variety of small fruits, e.g. recorded as taking melastome berries and *Cecropia* catkins; some arthropods. Usually seen singly or in pairs or families, seldom in groups of more than 3–5 individuals; associates with mixed-species flocks and forages independently of them about equally, and regularly gathers with other small frugivores at fruiting trees. Generally forages in canopy or remains fairly high; seldom descends low to fruiting shrubs. Foraging behaviour less structured (stereotyped) than that of many members of genus, and includes hopping and peering in outer foliage, and occasionally making short sallies or flutters for flying insects; may work outwards and peer, head downwards, at sides of branches, alternately on one side and then on other, but movements shallow and less persistent than those of many congeners. Race *whitelyi* may employ lean-down foraging motions more frequently than nominate. In moist park-like areas, nominate race frequently checks tufts of *Usnea* lichen on high branches, but seems not to dedicate much effort to searching for arthropods.
Breeding. Nine birds in breeding condition in Mar–Jun in N Colombia. Eggs white, marked with shades of brown and grey. No other information.
Movements. Predominantly resident. Some local movements, especially within drier habitats favoured by nominate race, seem likely.
Status and Conservation. Not globally threatened. Fairly common locally. Utilizes disturbed woodland, woodlots, small forest fragments, coffee plantations, and borders of more mature forest, which buffers this species, to some extent, from effects of deforestation. Occurs in, among others, Canaima, Henri Pittier, Guatopo, Yacambú, Terepaima, Dinira and Sierra Nevada National Parks (Venezuela); probably also in Perijá National Park (also Venezuela), although this does not receive significant protection. This species' range includes considerable suitable habitat that is not protected, but appears unlikely to face serious risks in the near future.
Bibliography. Ascanio (2009), Burns & Naoki (2004), Dunning (1982), Gilliard (1941, 1959), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Nehrkorn (1899), Ogilvie-Grant (1912), Phelps & Phelps (1963), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Sedano & Burns (2010), Snyder (1966), Souza (2002), Thomas (1982).

152. Opal-rumped Tanager

Tangara velia

French: Calliste varié **German**: Rotbauchtangare **Spanish**: Tangara Velia
Other common names: Silver(y)-breasted Tanager (*cyanomelas*)

Taxonomy. *Motacilla Velia* Linnaeus, 1758, Suriname.
Formerly placed with *T. callophrys* in a separate genus, *Tanagrella*. Molecular-genetic data indicate that the two are sister-species, and that *T. chilensis* is sister to both. Geographically isolated race *cyanomelas* differs somewhat from others in plumage, and may merit treatment as a separate species; review warranted. Four subspecies recognized.
Subspecies and Distribution.
T. v. iridina (Hartlaub, 1841) – E Colombia (from NW Meta and S Vichada) S to E Ecuador, E Peru and extreme N Bolivia (Beni), E to S Venezuela (Amazonas and Bolívar) and W Amazonian Brazil (E to R Negro, lower R Tapajós and NW Mato Grosso).
T. v. velia (Linnaeus, 1758) – the Guianas and N Brazil N of R Amazon (from R Negro E to Pará).
T. v. signata (Hellmayr, 1905) – NE Brazil (NE Pará).
T. v. cyanomelas (Wied, 1830) – coastal region of E Brazil from Pernambuco S to Rio de Janeiro.



Descriptive notes. 12–14 cm; 19–23 g. Dark tanager with marked geographical variation in plumage. Nominate race has crown and nape to back and scapulars deep velvety black, rump glistening opalescent yellowish to straw to greenish (varies with light), uppertail-coverts opalescent blue; tail black, feathers narrowly edged blue; lesser upperwing-coverts glistening pale greenish-blue, remaining wing-coverts and flight-feathers deep black, feathers of median coverts rounded and broadly tipped greenish-blue, greater coverts prominently edged greenish-blue, primary coverts, flight-feathers and tertials narrowly edged greenish-blue; forehead, side of head and side of neck medium blue, black band across throat and upper chest; mid-breast and sides shining violet-blue, lower breast, belly and undertail-coverts contrasting rich dark chestnut; iris dark brown; bill black; legs dark grey to blackish. Sexes similar, or female slightly duller than male. Juvenile dull and essentially featureless; immature recalls adult, but duller. Race *signata* is like nominate, but with small band of opal between blue forecrown and black of mid-crown; *iridina* has forecrown, side of head, side of neck and throat dark glistening violet-blue, much darker than nominate, rather ill-defined wreath of black spots mixed dark violet-blue across base of throat and upper chest, also wing edgings darker, dark cobalt-blue (not contrasting strongly); *cyanomelas* has silvery-green band across forehead (like *signata*) and face, throat and side of head deep blue, underparts silvery blue with irregular necklace of black spotting across chest, central lower underparts chestnut. Voice. Calls during foraging high, thin, rapid bursts of "sit" and "sit" and "tschip" notes, often c. 5–6 in a series. Weak song, in S Venezuela (Amazonas) a series of high, thin notes, quickly rising in pitch, then falling, "tiz-tiz-tiz-ti'ti'ti-é'é'ti-ti-ti-tz", c. 1–1·5 seconds in duration; song in E Peru described as a rising and falling broken series of high, wiry squeaks, "psi-psi-psi-psi-pis-psi"; song in E Ecuador a high-pitched, complex jumble of thin tinkling notes and then several high notes on same pitch, ending with slightly lower-pitched short jumble of notes, duration c. 3 seconds.
Habitat. Treetops in humid *terra firme* and *várzea* forest, less often forest borders, tall second growth, and trees in clearings. Lowlands to c. 500 m along E base of Andes; once to 1200 m in Venezuela; as high as 1075 m in Ecuador, and to 750 m (seldom higher) in Peru.
Food and Feeding. Fruits and arthropods; three stomachs contained only fruit. Pairs or small groups move in and out of canopy mixed-species flocks, often leaving to join faster-moving associations of *Cyanerpes* and other *Tangara* at fruiting trees, or to rest in emergent trees. May spend longer periods of time with mixed flocks containing insectivores during midday, then searching for arthropod prey by hopping along large canopy branches and peering, head down, first on one side and then on other in almost mechanical manner as it progresses outwards, or checking epiphytes or debris accumulated on limbs in canopy or subcanopy. Occasionally hitches around large canopy limbs and trunks, almost in manner of Black-and-white Warbler (*Mniotilta varia*). Rarely descends low to fruiting shrubs along forest borders (unlike many congeners). Single individuals, or sometimes two or three together, often perch on high open branches above canopy early in morning.
Breeding. Begging juvenile followed three adults on 18th Sept in Colombia (NE Guainía); eggs reported as being greyish-white, thickly dotted with darker shades of grey. No further information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common in Amazonia, where widespread; isolated E race *cyanomelas* uncommon and very localized. Occurs in numerous protected areas in Amazonia, where also extensive pristine habitat that is unprotected but at little immediate risk. In coastal E Brazil, *cyanomelas* reduced in numbers because of widespread deforestation; population confined largely to protected parks and reserves, e.g. Sooretama Biological Reserve, and may require listing as Near-threatened.
Bibliography. Athanas (2010a), Burns & Naoki (2004), David & Gosselin (2002a), Diamond & Lovejoy (1985), Gilliard (1941), Haverschmidt & Mees (1994), Hellmayr (1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Kleefisch (1991), McCarthy (2006), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), Nehrkorn (1899), Pearson (1971), Penard & Penard (1910), Phelps & Phelps (1950), Pinto (1944a, 1944b), Remsen & Traylor (1983), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977), Zimmer (1943a).

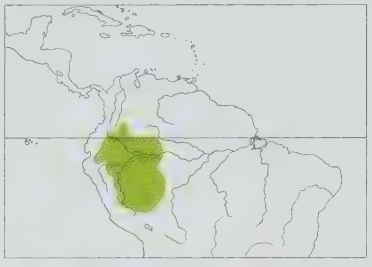
153. Opal-crowned Tanager

Tangara callophrys

French: Calliste à sourcils clairs **German**: Opalscheiteltangare **Spanish**: Tangara Opalina

Taxonomy. *H.*[*ypothlypis*] *callophrys* Cabanis, 1848, no locality = River Solimões, Brazil.

Formerly placed with *T. velia* in a separate genus, *Tanagrella*. Molecular-genetic data indicate that the two are sister-species, and that *T. chilensis* is sister to both. Monotypic.
Distribution. SE Colombia (E from lowlands of Caquetá and Putumayo) S through E Ecuador and E Peru (S to Puno), and W Brazil S of R Amazon (E to middle R Juruá and middle R Purús).



Descriptive notes. 14 cm; c. 21–24 g. Dark tanager with conspicuous opal brow. Has forecrown and broad supercilium glistening opal to opalescent yellow, hindcrown to back deep black, contrasting glistening opal to opalescent-yellow rump usually with tinge of bluish on some feathers; tail black, feathers obscurely edged dark blue; upperwing black, bend of wing and lesser and median coverts with feathers broadly tipped glistening dark blue, greater coverts broadly edged dark blue, flight-feathers and tertials narrowly edged dark blue; a band of black feathers around base of bill, side of head and underparts dark glistening blue with black feather bases (black showing through in a few places), centre of belly and undertail-coverts black; iris dark brown; bill black; legs black. Sexes similar. Immature undescribed. Voice. Call a high, thin "zit", often several times or accelerated into rapid twittering resembling that of *T. mexicana*. Song in E Ecuador a high-pitched, thin "sits-a-teak-a-te-te-te-te-te, seek, a", duration c. 1·5 seconds, slower and less complex than song of allied *T. velia*.
Habitat. Tall humid *várzea* and *terra firme* forest, and occasionally forest borders; infrequently in tall trees away from forest. Lowlands to c. 600 m at E base of Andes; locally (especially S Peru) to 1000 m.
Food and Feeding. Mixed diet of fruit and insects, probably not differing greatly from that of many others of genus. Three stomachs contained only fruit. Usually seen singly, in pairs or in trios, less often up to about seven together, associating with *Cyanerpes*, *Dacnis* and other *Tangara* in top of canopy and emergent trees early in morning, and may fly off to visit fruiting trees or vines. Later in morning and through midday often with canopy mixed-species flocks, foraging along large limbs, leaning down to inspect alternately one side and then the other in manner common to many congeners.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon; widely distributed across W Amazonia. Occurs in several large protected areas, including La Paya and probably Amacayacú National Parks (Colombia), Cuyabeno Wildlife Reserve, Limoncocha Biological Reserve and Sumaco Napo-Galeras and Yasuní National Parks (Ecuador), and Pacaya-Samiria National Reserve and Manu National Park (Peru); also in Serra do Divisor National Park (Brazil). Much of the habitat within this species' range is Amazonian lowlands is unprotected, but at little risk in near or intermediate term because of extremely low human population pressure.
Bibliography. de Bont (2003), Burns & Naoki (2004), Dunning (1982), Goodfellow (1901), Hellmayr (1936), Hilty & Brown (1986), Isler & Isler (1999), Moore *et al.* (2009), Munn (1985), O'Neill (1974), Pearson (1972), Phelps & Phelps (1950), Pinto (1944a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sedano & Burns (2010), Sick (1985, 1993), Snethlage (1914), Souza (2002), Terborgh & Weske (1969), Zimmer (1943a).

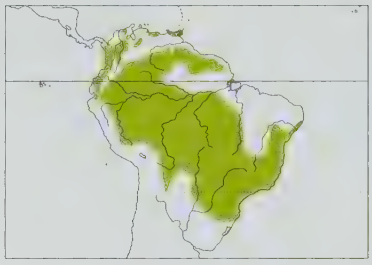
Genus *TERSINA* Vieillot, 1819

154. Swallow Tanager

Tersina viridis

French: Tersine hirondelle **German**: Schwalbentangare **Spanish**: Tangara Golondrina

Taxonomy. *Hirundo viridis* Illiger, 1811, Sandwich Island; error = eastern Brazil.
This species has in the past been placed in its own family, Tersinidae, and in a subfamily Tersininae of present family. Molecular-genetic data indicate that it is embedded within present family, and forms a monophyletic group with *Dacnis* and *Cyanerpes*; all three genera have sexually dimorphic plumage, but present genus differs in broad flat bill, skeletal elements of palate and tongue, long wing, hole-nesting behaviour, and migratory habits. Three subspecies recognized.
Subspecies and Distribution.
T. v. grisescens Griscom, 1929 – Santa Marta Mts, in N Colombia.
T. v. occidentalis (P. L. Sclater, 1855) – E Panama (Darién), Colombia (except Santa Marta Mts), N Venezuela, Trinidad, the Guianas, W & E Ecuador, N & E Peru, N & W Brazil, NW & E Bolivia (except extreme SE) and NW Argentina.
T. v. viridis (Illiger, 1811) – E & S Brazil (from Pernambuco, Bahia, Goiás and S Mato Grosso S to Rio Grande do Sul), NE Bolivia, Paraguay and NE Argentina (Misiones).
Descriptive notes. 14 cm; 25·9–35 g. Short-tailed tanager with wide flat bill and short legs. Male nominate race has base of forehead, lores, ocular area (to just above eye) and throat black; rest of plumage mostly glistening bright turquoise-blue above and below, sometimes much bluer overall; primary coverts and flight-feathers black, narrowly edged turquoise-blue, tips of primaries black, tertials black, edged turquoise, tail feathers black with turquoise edges; centre of lower breast, belly and undertail-coverts white, turquoise flanks coarsely barred black, undersurface of tail greyish (turquoise edging visible); iris reddish-brown; bill black; legs dusky horn-grey. Female is mainly bright grass-green; base of forehead, face (to just above eye) and throat dingy grey, somewhat scaled and mottled with dusky brown, wing-coverts green, flight-feathers black, outer feathers narrowly edged green, inner ones and tertials more broadly edged and tinged green; centre of lower breast, belly and undertail-coverts pale yellow, sides and flanks yellow, coarsely barred green. Juvenile male is like female for first year, thereafter shows blue mottling in plumage but lacks black face mask; subadult male mainly blue above, with wing-coverts green, flight-feathers edged green, and



mostly green below, with yellowish lower underparts and dusky barring as on female; reports that male requires up to four years to acquire for full adult plumage need verification. Race *occidentalis* is essentially identical to nominate in plumage, but decidedly smaller (both wing and tail measurements); *grisescens* male is similar to previous, female differs in being mainly greyish-green (not bright grass-green). Voice. Often heard call a high, slightly blurred or buzzy and metallic "tza-link" or "tz'sink" (distinctive once learned), sometimes repeated at short intervals. Male's song is somewhat variable, in general a fairly rapid series of c. 10–15 shrill or squeaky notes and similar to that of *Thraupis episcopus*, e.g. in NE Peru "szuee, szuee, zoo-see-see-sue'le'ze-zoo-se-zu-weet", with rising and falling, sing-song pattern, and in Venezuela a more or less similar shrill series, "tzeet, whée-chee whée-chee whée-chee-zuwee".
Habitat. Dry, moist and humid forest borders, older second-growth woodland, shade trees over coffee, and partly cleared areas with scattered trees in clearings; also in or on top of canopy of humid forest and in tall riparian woodland. In NW parts of range occurs (or at least breeds) mainly in mountains, but farther S occurs widely across lowlands of S Amazonia S to N Argentina and SE Brazil. Sea-level to c. 1800 m in Venezuela, and mainly 50–1600 m (recorded to 2100 m) in Colombia; to 1400 m in Ecuador; and to 1500 m in Peru.
Food and Feeding. Fruits and arthropods; proportions of fruit and insect matter in diet believed to vary seasonally. Feeds heavily on fruit, especially fat-rich and protein-rich arils and larger ones, less often small berries but takes those of mistletoe (Loranthaceae), as well as some *Cecropia* catkins; frequently consumes *Michelia champaca* (Magnoliaceae) in S Brazil. Also reported eating moths (Lepidoptera) and larvae. Of 35 stomachs examined, 12 contained only vegetable matter and one only animal matter, and 22 contained both; contents mostly flying insects, e.g. flies (Diptera), ants (Formicidae), termites (Isoptera), and grasshoppers (Caelifera), also soft beetles (Coleoptera), seeds of Magnoliaceae and Araliaceae, and fruit pulp. Nestling diet insects for first few days, and again towards end of period (at 15–20 days, when feather growth occurs), otherwise up to 40% fruits. Notably sociable, occurring in small, loose single-species groups, even when breeding, and infrequently is loosely associated with mixed-species flocks or feeding associations around fruiting trees. Individuals or groups perch well up in trees, or in open on high exposed treetop perches, in distinctive upright posture, often for extended periods of time. Takes fruit while perched, or plucks fruit during short sallies followed by brief hovering; unlike *Tangara*, does not hang downward or upside-down to reach fruit. Most fruits, even large ones, swallowed whole, large seeds then discarded or regurgitated a short time later. Also sallies extensively for flying insects, especially swarming termites and ants, typically flying out 3–10 m in swift flight, often catching more than one insect, before returning to perch.
Breeding. Season mainly Feb–Jun in Colombia and Apr–May in Venezuela; in Brazil, Sept–Oct in Minas Gerais and various localities in SE, also birds in breeding condition in Jul, Aug and Oct in upper R Xingu and Mato Grosso. Solitary and loosely colonial, several pairs may nest in close proximity in favourable sites; male may defend small territory or guard nesting hole, but classic territoriality almost non-existent. Pair formation includes extended bowing, sometimes accompanied by bouncy hopping and chasing, with female believed to initiate pairing, male then accompanying her; breeding males also bow extensively to each other. Nest built by female, a weak shallow cup of various fibrous materials, apparently always lined with fine black palm fibres, placed in hole in old stone building, hole in cliff, riverbank or stone wall, cavity under bridge, or hole in tree or in dirt bank; uses existing hole, but can dig own hole in soft earth. Clutch typically 3 eggs, occasionally 4, white; incubation by female, period 13–17 days, nestling period c. 24 days; male largely ignores mate during incubation, but becomes attentive at hatching and sometimes helps with feeding of young. Male will breed while in subadult plumage.
Movements. Resident and short-distance migrant, possibly also nomadic. Local and seasonal in many regions, especially in N of range. Over much of its Amazonian range, may be either resident or nomadic when not breeding. N populations in Venezuela, Colombia and Ecuador undertake elevational migrations, some also moving considerable distances geographically, but timing and precise distances of movements unknown; how much of this movement represents wandering, as opposed to true migration, is not known. In Venezuela, present in N cordilleras Feb–Jul (breeding) and absent remainder of year, and present S of Orinoco mainly Jul–Feb but numbers erratic and somewhat inconstant; migratory (or possibly nomadic) flocks of 20–125 individuals seen in NE Venezuela in late Aug. In E lowlands of Ecuador, numbers highest in Oct–May and species scarce or absent during remainder of year. Those in extreme S of range, in N Argentina and S Brazil, also migratory, moving N during austral winter. Groups of 100 or more reported in Brazil, e.g. in Minas Gerais appearing in Mar–May/early Jun in Viçosa and in Jun–Aug in metropolitan centre of Belo Horizonte.
Status and Conservation. Not globally threatened. Widespread but local; in some areas seasonally common, although numbers highly variable. Possibly only a non-breeding visitor in E Panama. Occurs, at least seasonally, in numerous protected areas, among them Henri Pittier and Yacambú National Parks (Venezuela), and El Paujíl Reserve and Farallones de Cali, Sierra Nevada de Santa Marta (or close to it) and Chiribiquete National Parks (Colombia); also across much of Amazonia in both protected and unprotected areas, and in SE Brazil in Itatiaia and Iguaçu National Parks, among others. Only a few areas within its extensive range are threatened with deforestation, and the species appears to prosper in partially disturbed areas if fruit resources reliable and suitable holes or cavities for nesting available.
Bibliography. Allen (1891), Alvarez-Rebolledo *et al.* (2003), Belton (1985), Berla (1944), Bledsoe (1988), Burns (1997a, 1997b), Burns *et al.* (2002, 2003), Darrieu (1994), Dunning (1982), Euler (1900), ffrench (1991), Fry (1970), George (1964), Goeldi (1894), Haverschmidt & Mees (1994), Hellmayr (1936), Hilty (1999, 2003), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Meyer de Schauensee (1966, 1970a), Mitchell (1957), Moojen *et al.* (1941), Moore *et al.* (2009), Narosky & Di Giacomo (1993), Negret & Negret (1981), Pacheco *et al.* (2007), Parker & Goerck (1997), de la Peña & Rumboll (1998), Raikow (1978), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ruschi (1979, 1981), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer (1953), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sibley (1973), Sick (1985, 1993), Sick & Pabst (1968), Snyder (1966), Souza (2002), Todd & Carriker (1922), Tostain *et al.* (1992), Yuri & Mindell (2002), Zimmer (1943a).

PLATE 17 ➤


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♂
♀
ssp *baudoana*
ssp *cayana*
PLATE 17
inches
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cm
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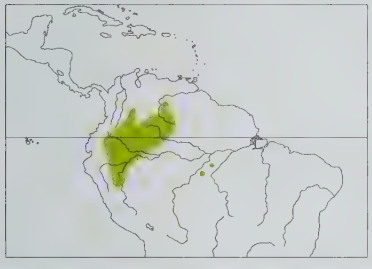
Genus *DACNIS* Cuvier, 1816

155. White-bellied Dacnis

Dacnis albiventris

French: Dacnis à ventre blanc **German**: Weißbauchpitpit **Spanish**: Dacnis Ventriblanco

Taxonomy. *Pipraeidea albiventris* P. L. Sclater, 1852, "Bogotá".
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species was formerly placed in a monotypic genus, *Hemidacnis*. Monotypic.
Distribution. Very locally from C & S Colombia (Meta, Guainía and Putumayo) and S Venezuela (Amazonas) S to E Ecuador (Napo and Pastaza) and NE Peru (Loreto and Ucayali); also SW Pará, in C Brazil.



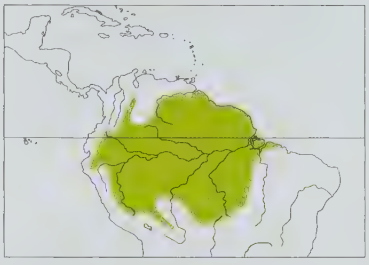
Descriptive notes. 11 cm; two birds 11 g and 11·5 g. Conical and pointed bill among the shortest of genus. Male has conspicuous broad black mask from base of forehead, lores and back through eye to rear ear-coverts, where it abruptly turns downwards slightly to sharp point (imparts distinctive appearance); otherwise mainly rich cobalt-blue above, scapulars and back with variable amount of black, tail black, outer feathers narrowly edged blue; lesser upperwing-coverts mostly cobalt-blue, median and greater coverts black, broadly edged and tipped dark cobalt-blue, primary coverts and flight-feathers black, edged blue, outer web of tertials blue, inner web mostly dusky; throat to mid-breast rich cobalt-blue like upperparts, rest of underparts white (sharply and squarely demarcated from blue of upper breast), flanks somewhat clouded and mottled bluish; iris golden-yellow; bill blackish; legs grey. Female is plain and rather confusing; brownish olive-green to yellowish olive-green above, including side of head to below eye, lores darker, with foreface and side of head slightly scaly; lower back, rump and uppertail-coverts strongly tinged olivaceous, flight-feathers and tail dusky brown; throat to belly dull yellowish, side of throat, side of breast, and flanks and undertail-coverts clouded greyish-brown; iris light brown to greyish-brown. Immature male is like female, but flight-feathers contrastingly blackish; older immature male also has greyish-yellow eyes and whitish belly, thus beginning to look like adult. Voice. In S Venezuela, gives a soft, silky "seeeee" in flight; in Peru, recorded calls include a high, descending "tseew", a rising "tee" and a thin "tu", often delivered in series. Song, noted in Peru, is a high, lisping "seee-suleee", mixed with a trilled "tip-tu'tee't't't't" and various call notes; it can alternatively be described as a rather slow series of short, high-pitched notes and phrases, "tzet tza'leet saleet..." and similar, these separated by intervals of 1–3 seconds.
Habitat. Canopy of tall humid *terra firme* forest and forest borders in Venezuela; has been reported in canopy of gallery forest in Brazil, and in forest and in trees and shrubs at lake edges and in clearings in E Peru. Its range, as well as scattered known localities, suggests an association with nutrient-poor soils and heavily weathered soils in *terra firme* forest. Lowlands to 400 m; to 200 m in Venezuela.
Food and Feeding. Not well known. Small berries taken; observed to return repeatedly to a medium-height *Miconia* tree at edge of forest in Venezuela. In Venezuela, pairs and small groups of 3–10 containing males, females and immatures follow rapidly moving mixed flocks of *Tangara* species and other forest-treetop birds. Gleans insects from high outer foliage, especially from pinnately compound foliage of large legume trees. Often hangs upside-down or uses acrobatics to glean and inspect foliage, then flies off in straggling groups or pairs to distant fruiting trees and shrubs, where associates briefly with manakins (Pipridae), small tyrant-flycatchers (Tyrannidae) and other tanagers as they forage for small berries.
Breeding. No information.
Movements. No information.
Status and Conservation. Not globally threatened. Rare and poorly known; possibly occurs mainly in regions of sandy-soil forests. Widely distributed, but presence recorded at only a small number of sites within its range. May occur in some protected areas, but is found also within vast area of intact but unprotected forest that is unlikely to be at risk.
Bibliography. Hellmayr (1936), Hilty (1999, 2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), O'Neill & Pearson (1974), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sick (1960), Zimmer (1942a).

156. Black-faced Dacnis

Dacnis lineata

French: Dacnis à coiffe bleue **German**: Maskenpitpit **Spanish**: Dacnis Carinegro

Taxonomy. *Motacilla lineata* J. F. Gmelin, 1789, French Guiana.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species often treated as conspecific with *D. egregia*, but the two differ in plumage and are geographically isolated from each other; further investigation required. Monotypic.
Distribution. E base of Venezuelan Andes (extreme SE tip of Táchira), E Colombia (Norte de Santander S along base of Andes to W Meta, then generally from C Meta and Guainía) S to E Ecuador, E Peru and N Bolivia (S to Beni and Cochabamba), E to S & SE Venezuela S of R Orinoco (S & C Amazonas; Bolívar except NE), the Guianas and most of Amazonian Brazil (E to NE Pará and EC Mato Grosso).



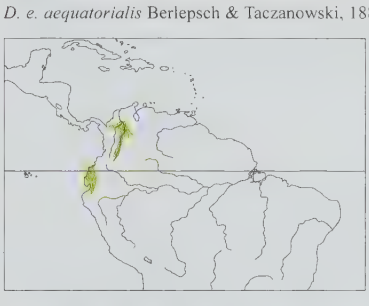
Descriptive notes. 11 cm; 9·5–13 g. Bill thin and sharply pointed. Male has crown turquoise-blue, broad, sharply defined black mask extending from forehead and lores through eye and straight back to hindneck, where continuous with black of nape and back (looking like "bandit's mask" tied around head); scapulars, rump, uppertail-coverts, and most of underparts bright turquoise; lesser upperwing-coverts turquoise, median and greater coverts black, flight-feathers and tertials black, tertials edged turquoise, tail black; centre of lower breast, belly, undertail-coverts and underwing-coverts white; iris yellow; bill black; legs blackish. Female is uniformly brownish-olive above, underparts similar but paler, becoming buffy white on belly; underwing-coverts white; iris yellow, like that of male. Juvenile undescribed. Voice. Call, in Ecuador, a thin, high "tzlip"; in Peru, call described as modulated, high "trree", distinctive once learned. Song, in Pará (Brazil), a rather feeble series of blurry trills, e.g. "bze'e-bu'u'u't, pzip, bz'e'e...tr'e'e'e, tzzz-teee...", and so on, delivered in rambling, irregular sequence.
Habitat. Canopy of tall, humid *terra firme* and *várzea* forest, at forest borders, scattered trees in forest clearings, and occasionally along gallery or riverine forest. Lowlands to c. 1100 m, smaller numbers to 1400 m.
Food and Feeding. Fruits and insects. Observed to eat small berries of melastomes, and to take bits of *Cecropia* catkin. Of 19 stomachs examined, 17 contained only vegetable matter and two contained both vegetable and animal matter, including fruit, seeds, berries, and insects. Usually occurs singly, in pairs or, less often, in small groups; rarely (or possibly seasonally), groups of up to 20 or so individuals reported in Brazil. Regularly follows mixed-species flocks for variable periods of time, then often flies off to rest with other tanagers and flock-members in high vine tangle; joins fruit-eating species at fruiting trees. Forages actively in canopy, only occasionally dropping lower, and rarely down to c. 10 m above ground. Forages for insects in outer foliage and in vine tangles, and may hang downwards or employ other acrobatics to obtain insects from undersurfaces of leaves. Seen to take pieces of *Cecropia* catkin by making short aerial sallies.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common to common. Occurs in many protected areas across vast Amazonian range, among them Nukak Natural Reserve and Cahuinarí, La Paya, Chiribiquete and Amacayacu National Parks (Colombia), Cuyabeno Wildlife Reserve and Yasuní National Park (Ecuador), Manu, Pacaya-Samiria and Tambopata National Reserves and Tingo Maria, Cordillera Azul and Manu National Parks (Peru), Madidi National Park (Bolivia), and Serra do Divisor and Pacaas Novos National Parks (Brazil). This species' range also includes vast areas of unprotected habitat that is considered to be at little risk.
Bibliography. Beebe (1916), Brosset (1964), Burns (1997a), Dick *et al.* (1984), Fry (1970), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee & Phelps (1978), Moore *et al.* (2009), Munn (1985), Naumburg (1930), Novaes (1969), Pacheco *et al.* (2007), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Storer (1969), Terborgh & Weske (1975), Tostain *et al.* (1992), Willis (1977), Zimmer (1942a).

157. Yellow-tufted Dacnis

Dacnis egregia

French: Dacnis à plumets jaunes **German**: Gelbsteißpitpit **Spanish**: Dacnis Egregio

Taxonomy. *Dacnis egregia* P. L. Sclater, 1855, "Bogotá".
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species often treated as conspecific with *D. lineata*, but the two differ in plumage and are geographically isolated from each other; further investigation required. Two subspecies recognized.
Subspecies and Distribution.
D. e. egregia P. L. Sclater, 1855 – N Colombia in S Córdoba (upper R Sinú), Antioquia (lower R Cauca and Nechí Valley), and middle and upper Magdalena Valley from Santander S to Tolima and Huila.
D. e. aequatorialis Berlepsch & Taczanowski, 1884 – W Ecuador (Esmeraldas S to El Oro).



Descriptive notes. 11 cm. Bill sharply pointed. Male nominate race has crown turquoise-blue, conspicuous broad black mask extending from forehead and lores through eye and rearwards, where continuous with black of rear crown nape and back; lesser upperwing-coverts, rump and uppertail-coverts, as well as throat and most of underparts, turquoise with slightly greenish tinge; tail black; pectoral tuft and bend of wing bright yellow; mid-breast, middle of belly, undertail-coverts and underwing-coverts bright yellow; iris bright yellow to orange-yellow; bill black; legs blackish. Differs from similar *D. lineata* in having yellow pectoral tuft and bend of wing, centre of lower breast and belly bright yellow (not white), underwing-coverts yellow (not white), also blue areas slightly greenish-tinged, less blue. Female is uniformly greyish-olive above, sometimes with faint bluish tinge; throat and breast greyish-olive, rather well demarcated from rich deep yellow of centre of lower breast, belly and undertail-coverts; pectoral tuft (visible at bend of wing) bright yellow, underwing-coverts yellow; very like female of *D. lineata*, but more greyish and less brownish above, yellower below. Race *aequatorialis* has plumage more turquoise-green, less blue, than nominate, female differs in having slightly contrasting greyish head (uniform in nominate). Voice. Call, in W Ecuador, a thin, high-pitched "tsrrip". Song not described.

On following pages: 158. Yellow-bellied Dacnis (*Dacnis flaviventer*); 159. Turquoise Dacnis (*Dacnis hartlaubi*); 160. Black-legged Dacnis (*Dacnis nigripes*); 161. Scarlet-thighed Dacnis (*Dacnis venusta*); 162. Blue Dacnis (*Dacnis cayana*); 163. Viridian Dacnis (*Dacnis viguieri*); 164. Scarlet-breasted Dacnis (*Dacnis berlepschi*).

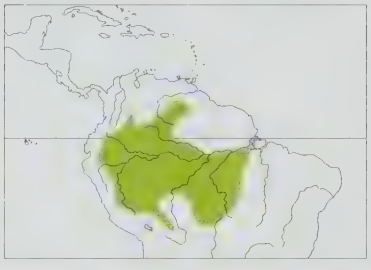
Habitat. Broken forest and hill forest, plantations, second growth, and scattered trees in gardens and overgrown clearings; to lesser extent in canopy of dry and humid forest. Lowlands to c. 900 m.
Food and Feeding. Fruits, presumably also some arthropods; seen especially at fruiting *Miconia* and trees with small berries. Occurs singly, in pairs, and occasionally in family groups, regularly with mixed-species flocks in forest canopy. Sometimes lower at fruiting trees and shrubs at forest edges and in clearings and gardens. Restless and active, foraging in canopy, occasionally lower; may hang downwards to reach insects on undersides of leaves. Foraging behaviour much like that of *D. lineata*.
Breeding. No information.
Movements. Apparently resident.
Status and Conservation. Not assessed. Probably not globally threatened. Both populations generally uncommon and somewhat local. Occurs in a few protected areas, including El Paujil Reserve (Magdalena Valley, in W Boyacá), in Colombia, and seen with some regularity near Tinalandia Eco-Lodge, in Ecuador; other protected sites where it possibly occurs include Cayapas-Mataje and Cotocachi-Cayapas Ecological Reserves, in NW Ecuador. Within this species' range deforestation is extensive, although it appears able to survive in broken habitat with patches of forest and second growth.
Bibliography. Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Storer (1969).

158. Yellow-bellied Dacnis

Dacnis flaviventer

French: Dacnis à ventre jaune **German**: Gelbbauchpitpit **Spanish**: Dacnis Ventriamarillo

Taxonomy. *D.[acnis] flaviventer* d'Orbigny and Lafresnaye, 1837, Yuracares, Bolivia.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Monotypic.
Distribution. Lowlands of SE Colombia (from W Caquetá and Vaupés) S to E Ecuador, E Peru and Bolivia (W Santa Cruz), E to S Venezuela (Amazonas and W half of Bolívar) and W Brazil (E to approximately R Negro, SC & WC Pará and N half of Mato Grosso).



Descriptive notes. 11 cm; 12–14 g. Bill thin and sharply pointed, and iris bright red in both sexes. Male is distinctive, has narrow black mask extending from base of forehead and lores rearwards to meet black of nape and back, crown rather dark moss-green, small throat patch black; scapulars, side of back, rump and uppertail-coverts bright yellow; tail and upperwing-coverts, flight-feathers and tertials deep black; malar area to side of neck and underparts, including undertail-coverts, rich yellow; iris bright red; bill black; legs grey. Female is plain and undistinguished, except for red eyes; pale brownish-olive above, wing and tail darker, dusky brown; dingy yellowish-buff below, obscurely mottled olive on breast and sides and slightly more yellowish on lower underparts and undertail-coverts. Juvenile evidently undescribed. Voice. Calls high and thin, e.g. "zeet", and slightly more buzzy "zrret", also as "tzueEET", given frequently during foraging. A series of well-separated single "p'tzeeEEep" notes (about 3–4 seconds apart) may represent a type of song.
Habitat. Humid *várzea* and low-lying forest, forest borders and taller second growth, especially along river borders, on river islands, and in canopy and emergent crowns of trees in humid *terra firme* forest. Lowlands to c. 350 m in Venezuela; to 500 m (probably higher) in Colombia, to c. 700 m (smaller numbers to at least 1150 m) in Ecuador, and to c. 1000 m in Peru.
Food and Feeding. Fruit and arthropods; also nectar. Of nine stomachs examined, two contained only vegetable matter, six only animal matter and one both; contents included fruit, homopterans, and caterpillars. In all lowland areas regularly observed to take nectar from upper-level and canopy-height flowering *Combretum* vines. Usually observed singly or in pairs, seldom in groups, although groups of up to 15 individuals reported; regularly with mixed-species flocks, often only for brief periods of time. Readily comes to fruiting trees with others frugivores to eat fruit and berries, and may visit small fruiting trees in shrubby clearings and gardens. In Peru, observed when foraging for insects on new leaves 15 m up. Generally forages and perches high, infrequently below c. 10 m except at fruiting shrubs in clearings.
Breeding. One nest described, in Dec in NE Ecuador. A frail shallow open cup, rather thin and sparse, slightly oblong, external diameter c. 61 × 70 mm, internal diameter 45 × 53 mm, external surface wrapped with vine-like fern (*Microgramma*) and spider webs (much as nest of *D. venusta*), lined with soft, thin rootlets, dry grasses and moss, well concealed within clump of mistletoe (Loranthaceae) 6·5 m up on upper branch in 7-m Lauraceae tree, supported by five branches (one from tree, four from mistletoe), and c. 5 m from a river; contained two nestlings. No further information available.
Movements. Mainly resident. Possibly some seasonal elevational movements associated with birds that occur in higher part of range.
Status and Conservation. Not globally threatened. Uncommon to fairly common, and widespread across W & C Amazonia. Found in many protected areas, including Yapacana National Park (Venezuela), La Paya and Amacayacu National Parks (Colombia), Cuyabeno Wildlife Reserve and Yasuni National Park (Ecuador), Pacaya-Samiria National Reserve and Manu National Park (Peru), Madidi National Park (Bolivia), and Serra do Divisor, Jaú and Amazonica National Parks (Brazil). In addition, there are within its range vast amounts of intact but unprotected forest that is considered to be at little risk.
Bibliography. Dunning (1982), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Moore *et al.* (2009), Munn (1985), Remsen *et al.* (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sheldon & Greeney (2008), Sick (1985, 1993), Snethlage (1913), Souza (2002), Spencer (2009), Storer (1969), Taczanowski (1884), Zimmer (1942a).

159. Turquoise Dacnis

Dacnis hartlaubi

French: Dacnis de Hartlaub **German**: Türkispitpit **Spanish**: Dacnis Turquesa
Other common names: Turquoise Dacnis-Tanager, Pseudodacnis

Taxonomy. *Dacnis hartlaubi* P. L. Sclater, 1855, La Cumbre, Valle del Cauca, Colombia.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species has been placed in a separate genus, *Pseudodacnis*, in part because its bill is heavier than others of genus; plumage and eye colour similar to those of *D. lineata*, although foraging behaviour closer to that of some *Tangara*; further study, including molecular-genetic analysis, required. Monotypic.
Distribution. W & C Colombia: both slopes of W Andes in Valle, and W slope in Risaralda; C Andes in Antioquia and Quindío; W slope of E Andes in Santander (above San Vicente), Boyacá and Cundinamarca (R Bogotá); and head of Magdalena Valley in Huila.



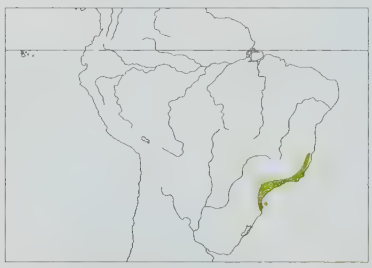
Descriptive notes. 11 cm. Bill heavier than that of other members of genus, and nearly as heavy as bill of *Tangara*. Male has turquoise crown enclosed by narrow black mask extending from base of forehead and lores straight back through eye and expanding to join black of nape and back; scapulars, side of back, rump and uppertail-coverts turquoise-blue, wing and tail black, tertials edged and tipped blue; small and rather narrow black throat patch; broad malar area to side of neck and underparts, including undertail-coverts, turquoise-blue; iris bright yellow; bill blackish; legs dark grey. Female is plain, mainly dull brown above, wing-coverts and flight-feathers edged buff (no wingbars), pale greyish-buff below, more yellowish-white on centre of belly; iris orange-yellow, paler and duller than male's. Juvenile undescribed. Voice. High-pitched, undistinctive calls include flat "tsit" and "sic", mostly singly; also a high-pitched, thin and buzzy "tzzleeet". Possible song, by male, consists of 3 high thin introductory notes followed by thin trill.
Habitat. Humid forest, forest borders, second-growth borders, and scattered trees in highland clearings and shade trees over coffee, especially *Inga* and *Cordia alliodora*. Mainly in humid regions with fairly high rainfall, but most records (especially recent sightings) in partly to heavily disturbed regions with scattered trees. Generally c. 1350–2200 m; recorded at 300–1700 m on Pacific slope of W Andes (Valle del Cauca) and c. 1500 m in C Andes (Quindío).
Food and Feeding. Fruits; also some arthropods. One stomach contained fruit. Most often seen singly, foraging fairly high and in outer foliage; also singles follow mixed-species flocks in forest canopy, especially along borders. Works actively in foliage and on small outer twigs, where it gleans insects and reaches up, out and downwards in manner of *Hemithraupis*; both sexes observed also to work sluggishly along mossy branches, inspecting bromeliads with foraging movements that suggest *Tangara*.
Breeding. One male in breeding condition in Aug in Cundinamarca (E Andes). No other information.
Movements. Probably resident; believed not to make seasonal movements, but further information needed.
Status and Conservation. VULNERABLE. Restricted-range species: present in Colombian East Andes EBA, Colombian inter-Andean Slopes EBA and Chocó EBA. Rare, very local and declining. Has almost certainly disappeared from many areas where it formerly occurred. Prior to c. 1980 had been recorded in Valle del Cauca, Huila, Quindío, Antioquia, Risaralda, Cundinamarca and Boyacá; since c. 1980 has been reported in Santander (Reinita Cielo Azul Reserve), Boyacá (Serranía de las Quinchas), WC Cundinamarca (R Bogotá area), Antioquia (two areas near Támesis) and one site in Risaralda (W Andes). At present, largest surviving population may be in Serranía de las Quinchas (in Santander–Boyacá). Loss of suitable humid forest to agricultural activities and human settlement has been the most significant threat; colonization and subsequent deforestation probably reached a peak in late 1970s to early 1980s, however, and some areas are now abandoned and in various stages of regrowth. The ability of this species (apparently) to utilize secondary habitats may enable it, to some extent, to avoid becoming more seriously threatened. It occurs in Reinita Cielo Azul Reserve, in Santander, and close to Farallones de Cali National Park, in Valle del Cauca; Serranía de las Quinchas at present remains largely unprotected.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Botero & Verhelst (2001), Butchart & Stattersfield (2004), Cortes (2009b), Hellmayr (1936), Hilty (1985, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Munves (1975), Quevedo *et al.* (2006), Remsen *et al.* (2010), Salaman *et al.* (2008), Stattersfield & Capper (2000), Stiles *et al.* (1999), Storer (1969).

160. Black-legged Dacnis

Dacnis nigripes

French: Dacnis à pattes noires **German**: Schwarzfußpitpit **Spanish**: Dacnis Patinegro

Taxonomy. *Dacnis nigripes* Pelzeln, 1856, Rio de Janeiro, Brazil.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Monotypic.
Distribution. Coastal region of SE Brazil from C Espírito Santo S to Rio de Janeiro, São Paulo, E Paraná and NE Santa Catarina, including Santa Catarina I.



Descriptive notes. 11 cm; 11–15·5 g. Small, short-tailed dacnis. Male has lores and small area around eye black (forming small mask), narrow central throat patch black; rest of head and nape greenish-blue to pale turquoise-blue; mantle black (forming obvious triangle-shape), scapulars and back to uppertail-coverts pale turquoise or greenish-blue; tail black, with some outer feathers obscurely edged blue; upperwing-coverts black with turquoise-blue fringes, flight-feathers black, innermost ones with turquoise edges; underparts from chest to undertail-coverts pale turquoise; iris dark reddish-brown; bill black; legs dusky to blackish. Distinguished from very similar *D. cayana* mainly by blackish (not pinkish) legs, slightly smaller black throat patch, black of upperparts more restricted and confined to mantle, primaries and secondaries all black with essentially no blue edgings, usually no pale colour at bill base, shorter wing and tail, also blue areas more greenish-tinged, less blue (this often difficult to deter-

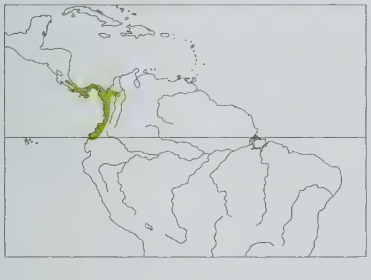
mine). Female is dull brownish with olive tinge above, crown, side of head, rump, uppertail-coverts and often part of scapulars strongly tinged turquoise-blue, uniform pale sandy-buff below, legs dusky. Subadult male plumage, retained for first year, is much like female, but with irregular patches of greenish-blue or turquoise on underparts. Voice. No information.
Habitat. Humid forest borders, second growth, and forest clearings. Lowlands to c. 850 m, in decreasing or seasonal numbers to 1700 m.
Food and Feeding. Feeds on insects, small fruits, also nectar of flowers and a few seeds. Six stomachs contained animal and vegetable matter, including *Miconia* berries, dry seeds of *Xylopia* (Annonaceae), and other unidentified fruits, beetles (Coleoptera), flies (Diptera), hymenopterans, and small caterpillars. Observed to eat berries of *Trema micrantha*, *Miconia*, arillate seeds of *Xylopia*, *Clusia* and *Schinus*, as well as bananas from feeding station at Ubatuba, in São Paulo. Nectar from flowers of *Erythrina* believed to be an important food resource; other nectar resources documented as being exploited include *Mabea brasiliensis* (Euphorbiaceae), the introduced bottlebrush tree (*Callistemon rigidus*), and *Spirotheca passifloroides* (Malvaceae) flowers at Canavieiras, in Paraná. Seen to visit flowers (for nectar or insects) of introduced eucalypt (*Eucalyptus*); at Intervales State Park, observed while feeding in yellow flowers of large *Schizolobium parahyba* (Fabaceae) trees; fed at flowers of unidentified tree in Itatiaia National Park in late Oct. Nestling diet at one nest was fruit of *Pouteria ramiflora* (Sapotaceae) and *Rapanea ferruginea* (Myrsinaceae), probably also small arthropods. Recorded in single-species groups of 2–5 individuals early in morning, and has been reported with *D. cayana* and other species in mixed flocks; has been noted also as feeding at nectar resources with *D. cayana*. May concentrate locally in small groups during certain periods of year (mainly in austral winter). Searches for small insects by gleaning from leaf and branch surfaces well up in trees (mainly above 25 m); may occasionally sally short distances for flushed insects.
Breeding. Nests found Dec to mid-Feb, and nest-building recorded Oct–Dec. Nests sometimes in relatively close proximity (in one case as close as 15 m), with no aggression between pairs, and has been suggested that the species may nest in loose "groups" close to favourable food resources. Nest built by both sexes, a cup made from almost entirely of lichen, especially *Usnea*, or *Tillandsia* sometimes the principal material, usually well camouflaged 3–20 m (mostly c. 5–12 m) above ground and suspended beneath branch or woven into hanging *Usnea* or *Tillandsia*, in usually lightly foliaged tree with high density of epiphytes (including lichens, bromeliads, orchids and moss) on branches and trunks, e.g. one nest a partially concealed basket-like cup c. 5–8 cm in diameter and suspended from epiphytes 20 m up and half-way out on limb in large *Schizolobium parahyba* tree in cacao plantation, another 5·5 m up in large (18 m tall) fig tree (*Ficus*) in pasture 200 m from second-growth forest; all reported nests were in medium to fairly large isolated tree or in tree in patch of second growth near large tract of forest. Few other data: at one nest clutch 2 eggs, incubation by female, period 14 days, chicks fed by male alone for first five days, thereafter by both sexes, nestling period 13–14 days.
Movements. Apparently wanders widely, and is an irregular seasonal and altitudinal migrant in some areas. Records around Rio de Janeiro and other coastal areas are mostly from winter months (i.e. Jul), when observed in small groups. Erratic seasonal concentrations occur at fruiting and flowering trees, but these not constant from year to year. Seasonal movements, and possible patterns, require further documentation.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Atlantic Forest Lowlands EBA. Rare to uncommon within small global range. Often confused with very similar *D. cayana*, making accurate estimates of population difficult. Only five certain records from Paraná (some possibly involving escaped cagebirds). Specimen supposedly from Lago Santa, in C Minas Gerais, regarded as involving a labelling error, but the species may occur in extreme S Minas Gerais. Recent records (possibly even breeding in mountains) around Caetés, in Espírito Santo, suggest that its range may be larger than was previously known. Occurs in many tracts of protected Atlantic Forest in SE Brazil, including Desengaño, Intervales, Alto do Ribeira, Ilha do Cardoso and Serra do Tabuleiro State Parks, Itatiaia, Serra dos Órgãos and Tijuca National Parks, Tinigua Biological Reserve, Ubatuba Experimental Station, Cananéia–Iguape–Peruíbe Environmental Protection Area, and Artex and Spitzkopf Ecological Reserves. Greatest threats are deforestation and trapping for cagebird trade (which is illegal); because of its rarity, it is greatly prized in captivity. Encouraging recent evidence indicates that the species does not require separate elevational ranges for breeding and wintering.
Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Gonzaga (1983), Ihering (1900), Isler & Isler (1999), Parker & Goerck (1997), Parrini & Raposo (2008), Piacentini *et al.* (2006), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Souza (2002), Stattersfield & Capper (2000), Storer (1969), Whittaker *et al.* (2010), Zimmermann (1995).

161. Scarlet-thighed Dacnis

Dacnis venusta

French: Dacnis à cuisses rouges **German**: Rotschenkelpitpit **Spanish**: Dacnis Muslirrojo

Taxonomy. *Dacnis venusta* Lawrence, 1862, Panama Railroad, Panama.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Two subspecies recognized.
Subspecies and Distribution.
D. v. venusta Lawrence, 1862 – both slopes of mountains in Costa Rica (from Guanacaste and Alajuela) S to C Panama (Canal Zone).
D. v. fuliginata Bangs, 1908 – E Panama (Caribbean slope in Darién) E across N base of W & C Andes of Colombia to lower Cauca Valley and middle Magdalena Valley in Antioquia, and S on Pacific coast and slope to NW Ecuador (Pichincha).



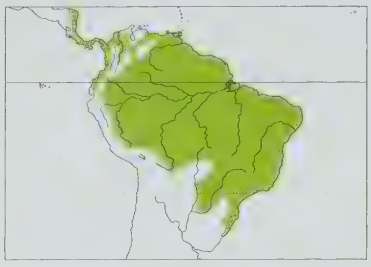
Descriptive notes. 12 cm; 15–17 g. Small dacnis with red eyes and sharp-pointed bill; male unusual in having very dark underparts. Male nominate race has forecrown, lores, ocular area, small post-ocular point, narrow gular stripe and entire breast, belly and undertail-coverts deep greenish-black; rest of crown, nape and sides of head and neck turquoise (looking like a blue "half-hood"), centre of mantle, back, rump and uppertail-coverts also bright turquoise-blue, longest uppertail-coverts black, side of back black, scapulars turquoise-blue; tail and upperwing and its coverts are deep black; thighs red (distinctive, but frequently concealed); iris deep red; bill black; legs dark grey. Female has side of head and upperparts dull dark bluish-green, brighter and more bluish on side of neck and malar area, dullest on side of back, and becoming bluish to turquoise on rump; wings and tail dusky; throat mostly greyish, changing to dull greyish-brown on chest, and to greyish-olive on breast, sides and flanks, breast faintly tinged blue, belly and undertail-coverts yellowish-buff; iris dark red, sometimes reddish-brown. Immature male is much like female, but duller and greyer on head; subadult male similar, but tinged blue on most of upperparts, chest sooty or mixed sooty and buff; more advanced immature male shows well-defined turquoise "half-hood", scapulars, back and rump, but small mask dusky (not black), and central throat and underparts dull greyish-white, undertail-coverts tinged buff, iris red; in Costa Rica young male shows some evidence of adult plumage by Sept (following early-year fledging), but remains duller than adult during first full breeding season. Voice. Calls include thin "woit" or "wheit" with upward inflection, and scratchy "bzik". Song, in Costa Rica, 2–3 scratchy trills ending in high squeaky notes, "bzeek, bzeek, bzeek"; song weak and infrequent, or easily overlooked.
Habitat. Mainly humid to wet forest, forest borders and young to old second growth, including canopy of mossy cloudforest vegetation. Post-breeders may wander well away from forest into scattered trees and woodlots where fruiting trees and shrubs present. In Costa Rica mainly 500–1200 m on Caribbean slope and c. 900–1500 m on Pacific slope, but often moving into lowlands after breeding. In Colombia mostly in or near foothills at 150–600 m, but regularly moving out on to coastal plain and in small numbers upwards to 1100 m.
Food and Feeding. Fruits and arthropods. In Costa Rica observed to eat wide variety of berries and arillate seeds, including those of *Clusia*, *Zanthoxylum*, *Sapium* and *Dendropanax*, and in Panama seen to inspect flower stems of *Pourouma*; in Colombia regularly took small berries from several species of *Miconia* and other melastomes, and often ate pieces from *Cecropia* catkins. Contents of two stomachs were vegetable matter, including fruit pulp and figs; five others contained no more than 30% insect matter. Occurs in pairs when breeding; at other times most often seen in small groups, frequently with mixed flocks that contain honeycreepers and other tanagers. Most recorded foraging activity above 6–9 m.
Breeding. Breeding reported Mar–May in Costa Rica. Nest a frail, shallow open cup composed of coarse and tough rootlets, tendrils and fern rachises, covered with pieces of green fern, placed 12–15 m up (two nests in Costa Rica) and saddled between two twigs amid foliage. One nest contained two nestlings. No other information.
Movements. Significant post-breeding dispersal to lower elevations in Costa Rica and Panama; on Pipeline Road in Panama, numbers fluctuate dramatically, in some months common, in others scarce or nearly absent. During 16-month study at 1000 m On Pacific slope in Colombia, recorded only in Dec, with main population centre at much lower elevation. Changing seasonal abundance of small berries has been suggested as a likely reason for the erratic movements of this species.
Status and Conservation. Not globally threatened. Uncommon to locally or seasonally common over much of range. Now greatly reduced through forest loss in montane regions of lower Central America. Two old, undated and now lost specimens were apparently from Guayas, in SW Ecuador, farther S than current S limit of range. Occurs in several protected areas, including Braulio Carrillo, Tapantí and Chirripó/La Amistad National Parks (Costa Rica), La Amistad, Soberanía, Chagres and Darién National Parks (Panama), Los Katíos and Farallones de Cali National Parks (Colombia) and the Río Palenque Scientific Centre (W Ecuador). Although the species' range includes some intact habitat that is not protected but at relatively low risk, forest loss in lowlands and foothills is extensive and ongoing; in areas such as W Ecuador, where loss of lowland forest outside protected areas is approaching 100%, this species is vulnerable.
Bibliography. Burns & Racicot (2009), Buskirk (1976), Carriker (1910), Davis (1972), Dunning (1982), Garrigues & Dean (2007), Greenberg (1981c), Greenberg & Gradwohl (1980), Hartman & Brownell (1961), Hilty (1997, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Skutch (1962b), Slud (1964), Stiles & Skutch (1989), Storer (1969), Strauch (1977), Wetmore *et al.* (1984), Wheelwright *et al.* (1984).

162. Blue Dacnis

Dacnis cayana

French: Dacnis bleu **German**: Blaukopfpitpit **Spanish**: Dacnis Azul

Taxonomy. *Motacilla cayana* Linnaeus, 1766, Cayenne, French Guiana.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Eight subspecies recognized.
Subspecies and Distribution.
D. c. ultramarina Lawrence, 1864 – Caribbean slope from extreme E Honduras S to Panama and NW Colombia (on W side of Gulf of Urabá).
D. c. callaina Bangs, 1905 – W Costa Rica and SW Panama (Chiriquí).
D. c. napaea Bangs, 1898 – N Colombia from Santa Marta region S to E side of Gulf of Urabá and across lower Magdalena Valley.
D. c. coerebicolor P. L. Sclater, 1851 – N Colombia (lower Cauca Valley and middle and upper Magdalena Valley).
D. c. baudoana Meyer de Schauensee, 1946 – Pacific coast of W Colombia (from Baudó Mts) S to W Ecuador (to at least Pichincha, perhaps formerly S to Guayas).
D. c. cayana (Linnaeus, 1766) – E Colombia (E from Meta and Arauca), Venezuela (in Maracaibo region, and generally E of Andes and S of R Orinoco), Trinidad, the Guianas, and Brazil (except S & E).
D. c. glaucogularis Berlepsch & Stolzmann, 1896 – S Colombia (Caquetá and Putumayo), E Ecuador, E Peru and N & E Bolivia.
D. c. paraguayensis C. Chubb, 1910 – E & S Brazil (Maranhão and Ceará S to C Mato Grosso and Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).
Descriptive notes. 11–12 cm; c. 15 g (*paraguayensis*), 10–15·5 g (other races). Small dacnis with thin and pointed bill. Male nominate race has lores and small area around eye black (forming small mask), narrow central throat patch black; rest of head and nape bright turquoise-blue; mantle and back black, narrowing to a point just above rump, with scapulars, side of back, rump and uppertail-coverts bright turquoise-blue; tail black, a few outer feather pairs obscurely edged blue; upperwing and its coverts black, median coverts narrowly tipped blue, greater coverts, primary coverts, flight-feathers and tertials prominently edged blue; entire underparts from chest to undertail-coverts turquoise; iris dark red to reddish-brown; bill dusky, basal half or more of lower mandible pale grey, gape pinkish; legs and feet pinkish. Female is mainly green, paler below, with dull bluish head and typically with greyish throat. Immature male is like female, but black areas of mask, throat and back much duller; more advanced immature has patches of black in plumage. Races differ mainly in tone of blue (lighter or darker) of male plumage, and in colour of head and back of female:



callaina differs from nominate in brighter cerulean plumage of male; *ultramarina* male differs from nominate in having medium-blue (not lighter turquoise) plumage; *napaea* male has plumage rich cobalt-blue, intermediate between previous (which slightly lighter) and next race (which even darker), female has bluish-violet head; *coerebicolor* male is darkest and most deeply coloured of all races, bluish-violet to purplish, female has bluish-violet head like previous; *baudoana* male has notably dark violaceous-blue plumage, blue colour more purple-tinged than previous, female with more extensive and brighter blue on head than female of next race; *glaucogularis* male differs from nominate in having blue colours lighter turquoise-blue and throat not so deep black, female has deep blue crown and side of head; *paraguayensis* is most similar to last, but paler blue. VOICE. Calls are high, thin "tsit" notes and a high "chit" or "chit-it" or "tseep"; weak, easily overlooked, and apparently not given often. Song, in NE Peru, an equally weak, high-pitched series of several thin lisping and buzzy notes, delivered slowly, "twéezze, twéezze, twéezze, ...", that seems to end inconclusively; sometimes a single note.

Habitat. Moist to wet *várzea* and *terra firme* forest, second growth, and semi-open areas with scattered trees and shrubs; also riverine or gallery forest. Lowlands to c. 750 m, locally or seasonally higher; recorded to 1200 m in Costa Rica, to 1000 m in Panama, and to 1400 m in South America, regularly to 2000 m in Urubamba Valley (Peru), and to 1650 m in Bolivia.

Food and Feeding. Fruits and arthropods. Of 28 stomachs examined, 17 contained only vegetable matter and seven only animal matter, and four contained both; contents included fruit, seeds, hymenopteran pupae, dung beetles (Scarabaeoidea), orthopterans, and spiders (Araneae). Of 267 recorded observations in Trinidad, 49% involved birds searching for insects, 44% of birds taking fruit, and 7% of birds at flowers (where may have taken insects or nectar); in Panama, percentages were 64% insects and 36% plant material. In Trinidad, 26 species of fruit taken, of which 39% were *Miconia* berries, 24% species in family Euphorbiaceae, and 10% species in Ulmaceae. In Costa Rica, arillate seeds of *Clusia* were an important food item. Elsewhere, has been reported at wide variety of plants, mostly those with small seeds, and flowers. Usually seen singly or in pairs or threes, seldom in small groups, although groups of up to twelve individuals reported; most often with mixed-species flocks, and regularly follows other birds to fruiting trees. Generally forages high, especially when searching for insects. In Trinidad 69% of all insect-hunting was done on leaves, 13% on branches and twigs and 12% on flowers and seedheads, and 6% were sallies to air. Insects usually taken from leaves, 70% of time from tops of leaves, often by leaning, reaching or hanging upside-down in acrobatic manner. Reported also as examining stems and slender branches, probing flowers and bromeliads, and lunging and sallying for insects. Foraging, at least locally, is evidently non-random, the birds flying directly to brownish areas of leaf damage.

Breeding. Breeding activity reported in May–Oct, with fledglings in Nov, in Costa Rica. Three adults observed to feed nestlings at one nest. Nest a deep, almost pouch-like cup of soft fibres and seed down, suspended between leafy twigs in outer part of tree, two nests in Costa Rica were 5·5 m and 8 m up in isolated trees. Clutch 2 eggs, white with dark markings. No further information available.

Movements. Predominantly resident. Some minor seasonal elevational movements; on Pacific slope (R Anchicayá) of Colombia, reported as high as 1050 m only in Dec, Jan, Apr and Jul.

Status and Conservation. Not globally threatened. Fairly common to common and widely distributed throughout its large range. Occurs in many protected areas, and vast areas of its range in the Guianas and Amazonia contain extensive intact habitat that is unprotected but at little immediate risk. The species is affected most by deforestation in Central America (races *callaina* and *ultramarina*) and in SE Brazil (*paraguayensis*). E & S Brazilian population of race *paraguayensis* occurs in numerous protected areas, among them Sooretama and Augusto Ruschi (Nova Lombardia) Biological Reserves, and Itatiaia, Tijuca and Iguaçu National Parks.

Bibliography. Allen (1891), Bangs & Noble (1918), Beebe (1909), Belton (1985), Burns (1997a), Burns *et al.* (2002, 2003), Davis (1972), Dick *et al.* (1984), ffrench (1991), Fry (1970), Garrigues & Dean (2007), Gonzaga (1983), Greenberg (1981b), Greenberg & Gradwohl (1980), Haverschmidt (1948, 1968), Haverschmidt & Mees (1994), Hilty (1997, 2003), Hilty & Brown (1986), Ihering (1900), Isler & Isler (1999), Layard (1873), McCarthy (2006), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Mitchell (1957), Moojen *et al.* (1941), Moore *et al.* (2009), Narosky & Di Giacomo (1993), Naumburg (1930), Novaes (1973), Parker & Goerck (1997), Pearson (1971), de la Peña & Rumboll (1998), Pinto (1944a), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sazima *et al.* (1993), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1962b), Slud (1964), Snow & Snow (1971), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Storer (1969), Strauch (1977), Terborgh & Weske (1969), Tostain *et al.* (1992), Walker (2001), Zimmer (1942a).

163. Viridian Dacnis

Dacnis viguieri

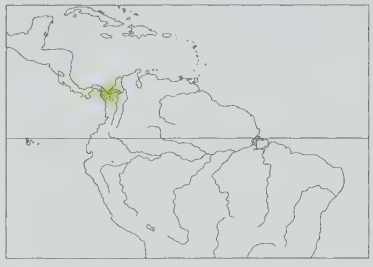
French: Dacnis vert **German**: Panamapitpit **Spanish**: Dacnis Verdoso

Taxonomy. *Dacnis viguieri* Oustalet, 1883, Isthmus of Panama, on shores of the Gulf of Darién.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Monotypic.

Distribution. E Panama (E Darién) and NW Colombia (N Chocó, NW Antioquia and SW Córdoba).

Descriptive notes. 10 cm. Small dacnis with sharp, pointed bill. Male has lores, mantle and tail black; rest of head, nape, side of back, rump, uppertail-coverts and throat and entire underparts mainly shining opalescent turquoise-green, rump brighter and bluer and underparts slightly paler; upperwing-coverts dull pale green, primary coverts and outer flight-feathers contrastingly black, secondaries increasingly edged green on outer webs, tertials broadly edged green; iris yellow; bill black above, paler below; legs greyish. Female is mainly dull olive above, with lores and tail dusky, outer primaries dusky, pale yellowish-green below, more yellowish on belly; bare parts as for male. Juvenile apparently undescribed. VOICE. No information.

Habitat. Humid forest and along forest borders, also in scrubby second growth; reports of individuals in dry forest and scrub may represent wandering or seasonal movements, but more information needed. Lowlands to 700 m; may wander to higher levels.



Food and Feeding. Little information. Has been seen in canopy of flowering *Erythrina* trees in E Panama.

Breeding. No information.

Movements. No information.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Darién lowlands EBA. Rare. Considerable number of specimens from both slopes of N end of Serranía de Baudó, in N Chocó (Colombia), suggests that this species was once numerous, at least locally in this region, but this area is rarely visited by naturalists and ornithologists, and current status of the species there is unknown. Much of the forest in R Sinú and Gulf of Urabá region has been converted to banana plantations and grassland for cattle ranches, and it is likely that the species occurred here, too, although there are apparently few old records and few or no recent records. Considerable amount of forest remains, however, in E Panama and in Baudó region of N Chocó, although these areas will be at risk if the Pan-American highway is eventually completed. Reasons for the species' apparent decline, even in forested areas, remain uncertain; seeming absence may be due, in part, to lack of research and fieldwork in appropriate habitats (e.g. foothill regions, rather than lowlands). Since about 1990, at least, fieldwork in suitable sites has been impeded, to some extent, by political instability and various illegal activities. Recent mapping of this species' range suggests that it might be more widespread than was believed, but the the mapping has been contested as overoptimistic; further study required.

Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Davis (1972), Haffer (1975), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Renjifo *et al.* (2002), Ridgely & Gwynne (1989), Salaman *et al.* (2008), Stattersfield & Capper (2000), Wetmore *et al.* (1984).

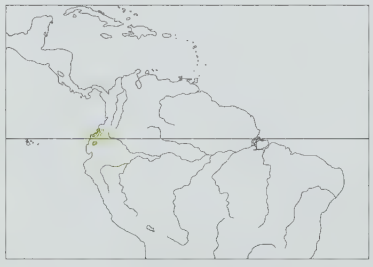
164. Scarlet-breasted Dacnis

Dacnis berlepschi

French: Dacnis à poitrine rouge **German**: Rotbrustpitpit **Spanish**: Dacnis Pechirrojo

Taxonomy. *Dacnis berlepschi* E. J. O. Hartert, 1900, Lita, north-western Ecuador.
This genus and *Cyanerpes* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Monotypic.

Distribution. SW Colombia (Pacific slope of Nariño) and NW Ecuador (S to Pichincha, but mainly in Esmeraldas).



Descriptive notes. 12 cm. Distinctive colourful dacnis with thin and pointed bill. Male has inconspicuous narrow black mask from base of forehead through lores and eye, somewhat variable; rest of head, throat and chest bright violaceous blue; mantle, back and scapulars deep violaceous blue with line-like silvery-blue streaks, rump paler unstreaked silvery blue; tail black; lesser and median upperwing-coverts violaceous blue, rather inconspicuously streaked silvery blue, greater coverts dusky, broadly edged pale blue; flight-feathers and tail black, narrowly edged pale blue, edging very inconspicuous on primaries and tail, more visible on tertials; broad band across breast scarlet, bleeding into yellow on lower breast and buff to white on centre of belly and undertail-coverts; iris yellow; bill black; legs dark grey. Female is mainly plain brown above, including wing-coverts and flight-feathers; paler, more buffy brown, below, becoming buffy white on centre of belly and undertail-coverts, with rather diffuse red wash forming broad band across centre of breast; bare parts as for male. Juvenile resembles female, but has brown (not yellow) eyes. VOICE. Song, in Ecuador, described as a very fast, evenly high-pitched series of thin notes, "tsit-tsitsitsitsitsitsitsitsitri".

Habitat. Canopy of humid and wet foothill forest, treefalls, and forest and river borders; less often older second growth and settled areas with scattered trees in clearings adjacent to forest. At c. 200–800 m; smaller numbers to 1200 m, possibly seasonally.

Food and Feeding. Poorly known. Feeds on fruit, insects and probably nectar, but diet not well documented. In Ecuador, singles, pairs and small groups seen, about equally with mixed-species flocks and independently of them. Sometimes forages or moves around high in canopy; at other times ranges much lower, especially at forest borders and in clearings and regrowth vegetation.

Breeding. Family groups with juveniles and immatures observed most often in Jun–Nov dry season. No other information.

Movements. Apparently resident.

Status and Conservation. VULNERABLE. Restricted-range species: present in Chocó EBA. Rare to uncommon; poorly known. Has extremely limited distribution in Colombia (vicinity of Ricaurte and Barbacoas) which is rapidly being lost to combination of oil palm (*Elaeis guineensis*) plantations, human colonization, logging, cattle-ranching, mining, hunting and other activities. Since c. 2000, forest loss estimated at 3·8% per year and an accumulated loss of c. 38% of all forest cover for this area. The bulk of the species' range lies in Ecuador, where its forest habitat has already almost entirely disappeared or, where it survives, is extremely fragmented. Protected areas include Río Nambí Community Nature Reserve (Colombia) and Biological Corridor Awacachi, Río Palenque Scientific Centre, Cotacachi-Cayapas Ecological Reserve, Gran Reserva Chachi, Canandé Reserve and Silanche Reserve (Ecuador), as well as the Mache-Chindul and Cayapas-Mataje Ecological Reserves (also Ecuador). Colombian protected areas have been beset by a variety of illegal activities, and most of the area where this species occurs in Colombia has been destabilized for more than a decade by political unrest and guerrilla activity, which has made enforcement of regulations in protected areas difficult.

Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Carriker (1959), Hartert (1901), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Rothschild (1901), Salaman *et al.* (2008), Stattersfield & Capper (2000), Storer (1969).

PLATE 18 ➤



PLATE 18

inches 2
cm 5

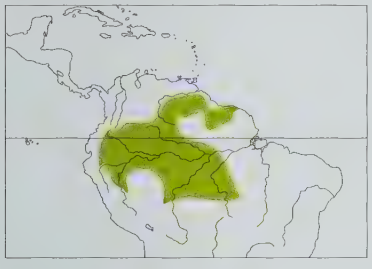
Genus *CYANERPES* Oberholser, 1899

165. Short-billed Honeycreeper

Cyanerpes nitidus

French: Guit-guit à bec court **Spanish**: Mielerito Piquicorto
German: Kurzschnabel-Naschvogel

Taxonomy. *Coereba nitida* Hartlaub, 1847, northern Peru.
This genus and *Dacnis* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Monotypic.
Distribution. SE Colombia (from E base of Andes in Caquetá, Vaupés, and Guainía) E to S Venezuela (Amazonas and NW & C Bolívar), Guyana, Suriname and possibly French Guiana, S through E Ecuador to NE Peru (S to Pasco, Huánuco and Ucayali) and W Brazil (E to E Amazonas and, S of R Amazon, to N Rondônia and extreme NW Mato Grosso).



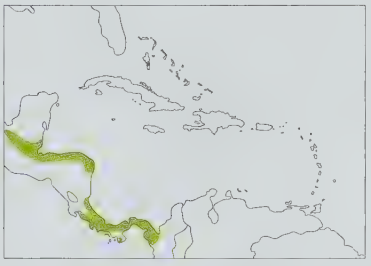
Descriptive notes. 9 cm; 8–10·2 g. Small honeycreeper with short and slender bill only slightly decurved near tip, with lower mandible almost straight; bill shortest in genus, only c. 10 mm long (c. 14 mm for *C. cyaneus*). Male has lores, area around eye and short pointed postocular mark black, narrow black throat patch widening onto chest; rest of head and entire upperparts and underparts rich purplish-blue; short tail black; upperwing-coverts and flight-feathers black, underwing-coverts blackish; iris dark brown; bill black; legs reddish-pink. Female has loral area dusky, reaching back to short postocular streak, turquoise-green line above this, pale blue triangular patch from base of lower mandible nack to start of ear-coverts, narrow arc of blue below eye; crown to rump and uppertail-coverts bright green, tail dusky black, edged green; upperwing-coverts green, flight-feathers and tertials black, edged green; throat and centre of underparts buffy yellow, breast and sides green, streaked white, underwing-coverts yellowish-white; legs dull pink. Immature male is much like female, but duller. Voice. Call, in Peru, a short, high-pitched, rising "tsee"; in NE Brazil, "tsik tsik". No song has been identified.
Habitat. Humid *terra firme* forest and forest borders. In Venezuela occurs also in slightly less humid, lower-stature forest on nutrient-poor, reddish-soil, yellowish-soil and white-sand forests. Lowlands, to c. 500 m in Venezuela; to c. 400 m in Colombia and Ecuador, and to 1000 m in Peru.
Food and Feeding. Diet poorly known. Three stomachs contained only vegetable matter, including fruit and seeds. Shorter bill of this species may represent an adaptation for a more frugivorous and less insectivorous diet than in congeners. Regularly found with canopy-level and emergent-level mixed-species flocks containing other honeycreepers and other tanagers, and, unlike most congeners, is almost always seen singly or in pairs, rather than in groups. Singles or pairs also regularly forage in canopy with variably sized groups of *C. cyaneus* and *C. caeruleus*, irrespective of whether these two are with other species. Foraging behaviour poorly known. In Brazil observed to forage in canopy, mostly at heights of 15–30 m, where it was often in fruiting trees, and seen to search for insects on branches and in foliage.
Breeding. No information.
Movements. Resident. No evidence that this species wanders widely at some seasons, as does *C. cyaneus*.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common, and widespread at rather low density. Should occur in a number of protected areas in Venezuela, SE Colombia, and adjacent E Ecuador, Peru and NW Brazil. The species' range includes a vast amount of intact but unprotected lowland forest that is unlikely to be at risk in the foreseeable future.
Bibliography. Burns *et al.* (2003), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Novaes (1978), Ottema (2002), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sick (1985, 1993), Souza (2002), Spencer (2009), Storer (1969), Willis (1977), Zimmer (1942b).

166. Shining Honeycreeper

Cyanerpes lucidus

French: Guit-guit brillant **German**: Azurnaschvogel **Spanish**: Mielerito Reluciente

Taxonomy. *Coereba lucida* P. L. Sclater and Salvin, 1859, Guatemala.
This genus and *Dacnis* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species thought to form a superspecies with *C. caeruleus*; in the past sometimes treated as conspecific, but the two are sympatric in extreme E Panama and adjacent NW Colombia. Two subspecies recognized.
Subspecies and Distribution.
C. l. lucidus (P. L. Sclater & Salvin, 1859) – foothills of Gulf–Caribbean slope of S Mexico (E Chiapas) through NC Guatemala, Belize (Cockscomb Mts) and N Honduras to NE Nicaragua.
C. l. isthmicus Bangs, 1907 – Costa Rica (entire E slope, and Pacific slope in San José) S to E Panama and adjacent extreme NW Colombia.
Descriptive notes. 10 cm; c. 11 g. Small honeycreeper with slender and somewhat decurved bill c. 14–15 mm long (intermediate in length between bills of *C. nitidus* and *C. caeruleus*). Male nominate race is mainly bright purplish-blue, including scapulars, slightly paler blue on forehead; lores, orbital area, throat patch (extending to upper breast), median and greater wing-coverts, flight-feathers, tertials and short tail black; underwing-coverts dark; iris dark brown; bill blackish; legs bright yellow, claws black. Female has head dull greenish-blue, dark blue malar stripe, and buff smudges and streaks on forehead and side of head; upperparts, including long uppertail-coverts, pale green, tail dusky, tinged and edged green; lesser and median upperwing-coverts pale green,



greater coverts dusky, broadly edged pale green, flight-feathers dusky, narrowly edged pale green; throat buff, underparts buffy white, diffusely streaked dark blue and buff, sides and flanks pale green; legs and feet greenish-yellow. Immature male is like female, but head more greenish (less blue) and streaking on breast mainly greyish and buff; immature male moults into adult plumage Nov–Jan (when slightly less than one year of age) in Costa Rica. Race *isthmicus* male is similar to nominate, but smaller, with shorter and more slender bill, also blue colour of head slightly paler than that of body (more or less concolorous in nominate), female duller green on back and with greener, less blue-tinged, head. Voice. Generally rather quiet. Most vocalizations high and not especially distinctive, e.g. high, sharp chittering notes, a high, thin "seee seee seee seeuu", and other high, trilled or insect-like notes; also reported is a dry "tsip" and slightly rattling "tsrrrp". Male delivers a high, thin "pit pit pit pit-pit, pit-peet pit pit-peet pit pit..." from top of tree for long periods of time; this possible song often little more than repetition of a single note.
Habitat. Inhabits canopy of humid forest, and adjacent forest borders and tree-shaded clearings, pastures and second growth; in all areas is most numerous in humid regions. Occurs from sea-level up to 1500 m (mainly foothills) in Mexico, to 1200 m in Costa Rica; c. 300–1000 m, rarely to 1600 m, in Panama and c. 100 m in Colombia. This species favours humid and wet regions, where seasonal swings in resource availability less pronounced than those in drier habitats favoured by *C. cyaneus*.
Food and Feeding. Fruits, seeds and arthropods. Of 15 observations of foraging in Panama, 44% were of fruit-eating, 37% were of insect-hunting, and 19% were at flowers. Eats a variety of fruits, but arils of several trees, shrubs and vines, especially *Clusia*, apparently favoured. Nestling diet believed to be mostly insects at first, thereafter fruit material. Forages alone, in pairs and in little family groups, only occasionally gathering in larger groups; associates with mixed-species flocks, especially those consisting of other honeycreepers and other tanagers, or forages independently of them. Often seen at fruiting and flowering trees with such species as *Dacnis cayana* and *C. cyaneus*; feeding then occurs with little evidence of aggression, but sometimes aggressive towards *C. cyaneus*, and may displace it from food sources. Limited data suggest that foraging is much like that of congeners. Uses long slender bill to extract arils; swallows small seeds, and perches beside flowers and probes, presumably for nectar. Gleans insects and spiders (Araneae) from thin bare vines, and may hop nervously and actively along large canopy branches, leaning downwards to peer at sides. Often hovers, sallies to air, or flutters for insects; may hover to pluck arils from fruit, and probes small curled dead leaves.
Breeding. In Costa Rica peak season thought to be Apr–Sept, but may breed regularly as late as Oct, and fledglings observed in May, Jul and late Oct. Nest built by female alone, a shallow, very thin cup (eggs may be visible from below) composed of slender fibrous strands, resembling nest of a manakin (Pipridae), rim attached with spider webs to slender twig fork, and usually well hidden within foliage (especially terminal foliage) 6–9 m up in tree in clearing by forest. Clutch 2 eggs (colour apparently undescribed); incubation by female, constancy of two females 70% and 81%, respectively, incubation period 12–13 days; chicks fed by both adults, female feeding more than male, nestling period 13–14 days.
Movements. Resident. Limited seasonal movements, presumably in response to changing fruit or nectar resources, reported by some authors, but not by others.
Status and Conservation. Not globally threatened. Uncommon to fairly common in Mexico; farther S, mostly a common resident in foothills and to lesser extent in lowlands in wetter portions of range. In Panama local on Pacific slope, with apparently few records from Veraguas and none from Chiriquí, but more numerous E of Canal Zone, extending E in small numbers to E Darién; in Canal Zone much more numerous on Caribbean slope, local or erratic (possibly seasonal) on Pacific slope. In general, less numerous than *C. caeruleus*. Occurs, or should occur, in numerous protected areas, including Palenque National Park (Mexico), Tikal National Park (Guatemala), Cockscomb Basin Forest Reserve (Belize), Capiro–Calentura National Park (Honduras), Indio-Maíz Biological Reserve (Nicaragua), Braulio Carrillo National Park (Costa Rica) and Soberanía, Chagres, Metropolitan and Darién National Parks (Panama). This species' range also includes considerable intact habitat that is unprotected. Loss of lowland and foothill forest has reduced its range dramatically in some areas.
Bibliography. Beehler (1980), Cherrie (1892a), Davis (1972), Edwards (1972), Garrigues & Dean (2007), Greenberg (1981c), Hartman & Brownell (1961), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Moynihan (1962c), Ridgely & Gwynne (1989), Russell (1964), Salaman *et al.* (2008), Skutch (1972), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Storer (1969), Wetmore *et al.* (1984).

167. Purple Honeycreeper

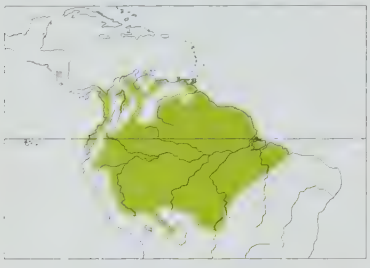
Cyanerpes caeruleus

French: Guit-guit céruléen **German**: Purpurnaschvogel **Spanish**: Mielerito Cerúleo
Other common names: Yellow-legged Honeycreeper

Taxonomy. *Certhia caerulea* Linnaeus, 1758, Suriname.
This genus and *Dacnis* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Present species thought to form a superspecies with *C. lucidus*; in the past sometimes treated as conspecific, but the two are sympatric in extreme E Panama and adjacent NW Colombia. Five subspecies recognized.
Subspecies and Distribution.
C. c. chocoanus Hellmayr, 1920 – extreme E Panama (Darién) and Pacific coast of Colombia (from Chocó) S to W Ecuador (S to El Oro).
C. c. caeruleus (Linnaeus, 1758) – Colombia (on E slope of E Andes in Boyacá), Venezuela (mountains of Falcón, coastal range from Carabobo E to Sucre, N Monagas, Delta Amacuro, also W Amazonas and Bolívar), Suriname, French Guiana (probably also lowlands of Guyana), and NC Brazil (S to R Tapajós and NW Maranhão).

On following pages: 168. Red-legged Honeycreeper (*Cyanerpes cyaneus*); 169. Green Honeycreeper (*Chlorophanes spiza*); 170. Golden-collared Honeycreeper (*Chlorophanes pulcherrimus*).

C. c. longirostris (Cabanis, 1851) – Trinidad.
C. c. hellmayri Gyldenstolpe, 1945 – Potaro Highlands, in Guyana.
C. c. microrhynchus (Berlepsch, 1884) – Venezuela (W & S Zulia, W base of Andes in Táchira and Mérida, E base S from SE Lara, and N & W Amazonas S of R Orinoco), and Colombia (N base of W Andes in R Sinú drainage and E to middle Magdalena Valley, also E of Andes from Meta and Caquetá) S to E Ecuador, E Peru, N Bolivia (S to Santa Cruz), and Amazonian Brazil (E to mouth of R Amazon and WC Mato Grosso).



Descriptive notes. 10 cm; 7·8–14 g. Small honeycreeper with long (14–23 mm), slender and usually distinctly decurved bill. Male nominate race is mainly bright purplish-blue, including scapulars; forecrown and side of head slightly paler, lores, area around eye and extending to short point behind eye, and narrow throat patch black; short tail black; upperwing-coverts and flight-feathers black, underwing-coverts dusky; iris dark brown; bill black; legs bright yellow, claws black. Female is plain green above, including wing-coverts; flight-feathers dusky, outermost feathers edged greenish-yellow, inner ones more heavily edged green, tertials mainly dull green with narrow dusky border on inner edges; forecrown somewhat mixed dull greyish and green, occasionally with a few inconspicuous streaks of blue, lores and ocular ring buff, side of head cinnamon-buff with whitish and dusky streaks, long narrow bright blue malar stripe; throat dark buff, underparts light whitish-buff to yellowish-buff with rather diffuse bluish-green streaks, centre of belly and undertail-coverts light yellow, underwing-coverts dull yellowish-white; legs dull greenish-grey. Juvenile resembles female, but paler and plainer below and generally lacks blue malar and blue streaking on underparts; immature male generally like female; subadult male retains greenish female-like plumage, but has black lores and throat, and black wings and tail, and may show dark purplish-blue mottling on body plumage. Races differ mainly in size and bill length: *chocoanus* is slightly smaller than nominate, bill shorter and forecrown slightly paler blue, female yellower below and with much less streaking; *longirostris* is very similar to nominate, but bill longer and body plumage tends to be more purple; *hellmayri* differs from nominate in larger size, significantly longer and heavier bill, male more violaceous blue in colour, female with darker, more cinnamon-buff, throat and more greenish (less bluish) tinge on side of body; *microrhynchus* is extremely similar to nominate, but msaller, with bill decidedly shorter. Voice. High-pitched vocalizations much like others of genus; gives high, buzzy or lisping "zree" or "zhree" and "psit" notes, often constantly. No song described.

Habitat. Canopy of tall humid *terra firme* and *várzea* forest, wooded borders, second growth, open woodland and tree-scattered clearings, river edges, plantations and gardens; mainly in humid lowland and foothill areas, perhaps only locally or seasonally in riparian woodland and other humid habitats within dry zones. In most areas common from lowlands up to c. 800 m; irregularly or locally to 1400 m in Colombia (once to 2300 m), regularly to 1200 m in Ecuador, to 1400 m in Peru; as high as 1800 m in tepuis of S Venezuela; in Potaro Highlands of Guyana (race *hellmayri*), found at c. 800 m.

Food and Feeding. Fruits and arthropods. Of six stomachs examined, four contained only vegetable matter and one only animal matter, and one contained both; contents were orchid seeds, fruit and insects. Spiders (Araneae) found in an additional stomach. Of 237 records of foraging in Trinidad, 40% were of insect-hunting, 31% of fruit-eating, and 29% at flowers where both insect-eating and nectar-feeding occurred; proportions of insects, fruit and nectar varied seasonally; only twelve species of fruit were taken, and of total fruit items 35% were *Trema micrantha*, 18% the arils of *Clusia* and 18% small fruits of Euphorbiaceae. Occurs in pairs, family units, and small to large single-species groups, either alone or in association with mixed-species flocks, but especially with other canopy-dwelling honeycreepers and tanagers. Not uncommonly, a dozen or more may forage with large mixed flocks in humid forest canopy, and often rest, along with other small frugivores and insectivores, on high open branches in tops of emergent forest trees at dawn. Like congeners, is restless, highly active and nervous, often wing-flicking and fidgeting as it hops along large canopy limbs, peering at bark surfaces, leaning down to check sides or undersides, hovering to pluck arils or small fruits, sallying or fluttering for flying insects, and quickly moving through foliage. Occasionally descends low, both within tall forest and along forest borders and in tree-shaded clearings, rarely even to ground. In Trinidad, average foraging height was 8 m; 63% of insect-seeking was done on branches and twigs, 17% in foliage, 15% in sallies to air, and 5% on flowers and seedheads; individuals often hung downwards to take insects from beneath twigs. Observations elsewhere generally agree with those in Trinidad.

Breeding. Breeding reported in Apr and Jun in Trinidad and Oct and Dec in Brazil (Pará); begging juvenile in Nov in C Peru (Pasco). Nest in Trinidad a small cup placed less than 2 m above ground in hollow of stump; two nests in Brazil were, respectively, 2 m and 3 m up, one at end of a branch. Clutch 2 eggs, white, blotched with dark reddish-brown and chocolate-brown, and with some ash-grey stains; nestlings fed by both adults. No other information.

Movements. Some local or seasonal movements, apparently in response to varying fruit and nectar resources, but pattern and seasonality of these poorly documented. On Pacific slope (R Anchicayá) of Colombia, recorded as high as 1050 m only in Apr.

Status and Conservation. Not globally threatened. Fairly common to common over most of range; locally distributed W & N of Andes. Occurs in many protected areas and, E of Andes, its range includes vast areas of intact habitat that is unprotected but at little risk. Areas of greatest habitat loss within this species' range are in N & W Colombia and W Ecuador.

Bibliography. Bazeries (1994), Beebe (1909), Belcher & Smooker (1937), Bond (1971), Burns (1997a), Burns *et al.* (2003), Ffrench (1991), Haverschmidt (1952), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (1997, 2003), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Novaes (1973), Olivares & Hernández (1962), Pinto (1944b), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Snow & Snow (1971), Snyder (1966), Souza (2002), Storer (1969), Terborgh & Weske (1975), Tostain *et al.* (1992), Zimmer (1942b).

168. Red-legged Honeycreeper

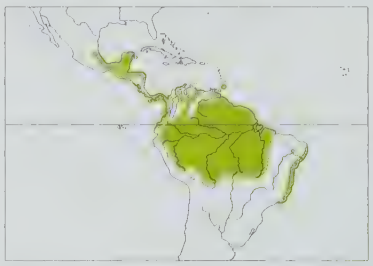
Cyanerpes cyaneus

French: Guit-guit saï **German**: Türkisnaschvogel **Spanish**: Mielerito Patirrojo
Other common names: Blue Honeycreeper

Taxonomy. *Certhia cyanea* Linnaeus, 1766, Suriname.

This genus and *Dacnis* were previously regarded as members of a separate family, Coerebidae, but later placed in present family on basis of similarities in skull anatomy; molecular phylogenies indicate that the two genera are sisters and form a monophyletic group with *Tersina*. Possible species status of race *holti* may merit investigation because of its geographical isolation. Geographical variation slight, and some races may not warrant recognition; proposed race *ramdseni* (described from Cuba, where probably introduced), subsumed into nominate. Eleven subspecies tentatively recognized.

Subspecies and Distribution.
C. c. carneipes (P. L. Sclater, 1860) – SE Mexico (from San Luis Potosí on Gulf slope and Oaxaca on Pacific slope) S, including Cozumel I (off NE Quintana Roo) to Panama, including Coiba I and Pearl Is, and NW Colombia (upper Sinú Valley, at N end of W Andes, in Córdoba).
C. c. gemmeus Wetmore, 1941 – Serranía de Macuira (Guajira Peninsula), in N Colombia.
C. c. eximius (Cabanis, 1851) – N Colombia (Santa Marta region, Sierra de Perijá, and W slope of E Andes in Santander) and W & N Venezuela (W Zulia, base of both slopes of Andes, mountains of N Falcón and Yaracuy, and coastal cordillera from Carabobo E to Sucre); also Margarita I.
C. c. cyaneus (Linnaeus, 1766) – E Venezuela (Monagas, Delta Amacuro and Bolívar E of R Caura); Trinidad; the Guianas and NW Brazil (S to R Negro and mouth of R Amazon).
C. c. tobagensis Hellmayr & Seilern, 1914 – Tobago I.
C. c. pacificus Chapman, 1915 – W Colombia (Pacific coast S from Baudó Mts) and W Ecuador (S to Pichincha).
C. c. gigas Thayer and Bangs, 1905 – Gorgona I, off W Colombia.
C. c. brevipes (Cabanis, 1851) – middle and lower R Amazon from at least Manacapurú E to middle R Tocantins.
C. c. dispar J. T. Zimmer, 1942 – Colombia E of Andes (from Meta and R Negro–R Guainía region) E to SW Venezuela (Amazonas), NW Brazil (E to R Negro and R Juruá), E Ecuador (rare), and NE Peru (S to Yarinacocha).
C. c. violaceus J. T. Zimmer, 1942 – SE Peru, N Bolivia, and W Brazil (E to Mato Grosso).
C. c. holti Parkes, 1977 – coastal E Brazil from Alagoas S to Rio de Janeiro.
Also Cuba, where probably introduced.



Descriptive notes. 11–13 cm; 11–18·3 g. The largest *Cyanerpes* honeycreeper, both sexes with long (13–25 mm), slender and usually distinctly decurved bill, and red legs (usually duller in female); tail short, but longer than those of other members of genus. Male nominate race breeding is mainly bright purplish-blue, including scapulars, with crown contrastingly azure-blue; lores and large triangular patch on mantle black; upperwing-coverts, upperside of flight-feathers, and tail black; underwing-coverts and undersides of remiges bright yellow (conspicuous in flight); iris dark brown; bill blackish, length rather variable; legs bright red. Male post-breeding ("eclipse" plumage) resembles female, except for black wing and tail feathers, which are not moulted; yellow of underwing also retained throughout year. (In Costa Rica, male acquires eclipse plumage mostly between about Jul and Oct, and for last few months of year almost all adult males are in eclipse; males in some stage of greenish "transition" plumage present in every month except Mar–May, when breeding). Female is dull olive-green above, including crown and nape to rump; dull whitish supercilium rather ill-defined, dusky green lores extending rearwards through eye to form narrow postocular line; tail dusky, tinged and edged olive-green, upperwing-coverts dusky, broadly edged olive-green, flight-feathers and tertials dusky, edged olive-green (tertials with broader pale green edges); side of head light yellow, smudged and narrowly streaked greenish and dusky; throat dull greyish-white, underparts dull light yellow, rather faintly and narrowly streaked greenish, undertail-coverts light yellow; legs dull reddish, brighter during breeding, especially feet. Juvenile male is initially olive-green (including wings and tail), indistinguishable from female except for shorter bill; in next plumage sequence, acquires black wings and tail but retains olive-green female-like plumage (may be retained for extended period of time, as much variation in moult sequence); by end of first year, male shows patches of blue, as do moulting adult males in eclipse plumage. Races differ only minimally, mainly in body size and bill length: *carneipes* is very similar to nominate, but pale blue area on crown of male smaller and more widely separated from black of back, female more yellowish below, especially throat and centre of breast to centre of belly; *gemmeus* is largest race, with heaviest bill, male differs from nominate also in darker blue crown, female greyer (less greenish) above; *eximius* male differs from nominate in decidedly longer, more decurved bill, and blue area on crown paler and slightly larger, extending to nape; *tobagensis* differs from nominate in larger size, including wing and tail (both longer), also bill heavier at base and less decurved, female also darker, less yellowish, below, with green streaking more clearly defined; *brevipes* is smaller than nominate; *dispar* differs in much shorter and thicker bill, pale blue crown shading gradually into darker nape; *violaceus* differs from nominate in wing and tail on average longer, bill on average shorter, and blue colour of male (except cap) more violaceous, female duller yellowish on inner margins of remiges; *pacificus* differs in smaller and darker blue crown patch, also much paler yellow underwing; *gigas* male is much like previous (including pale yellow underwing), but darker and more purplish, female darker and deeper yellow below; *holti* differs from nominate in having pale crown patch reduced in extent, underparts and rear upperparts darker and more intensely coloured. Voice. Rather noisy, often calls constantly, especially when in groups foraging high in trees, but most vocalizations weak, buzzy or lispy and not far-carrying. In Costa Rica, the two commonest calls are high, thin, piercing "tseet" and thin, weak, nasal "chaa", with buzzy meowing quality of a gnatcatcher (*Polioptila*). Scolds with thin, scratchy or buzzy "wee-peew". Rarely heard dawn song a weak "tsip tsip chaa, tsip tsip chaa", repeated over and over for several minutes at daybreak during Feb/Mar–Jun in Costa Rica.

Habitat. Dry to moist and humid areas, where fond of flowering trees at forest edges, coffee and cacao plantations, older second growth, and clearings with numerous tall shady trees; also gallery and riparian woodland, savanna woodland, flowering trees around habitations, and less frequently in canopy of tall moist to humid forest, usually in conjunction with canopy flowering trees. In general, favours drier or more strongly seasonal areas than those occupied by congeners. In Amazonia, commonest in forest and edge habitat on sandy, nutrient-poor soils; curiously rare in or absent from some humid lowlands forests (SE Peru), although presence or absence not always predictable. Sea-level to c. 1000 m in Costa Rica; to 1500 m N of R Orinoco and to 2000 m S of it in Venezuela; to 1100 m in Colombia, to 300 m in Ecuador, and to c. 1000 m in Peru.

Food and Feeding. Mainly fruits and arthropods. Of twelve stomachs examined, eight contained only vegetable matter and two only animal matter, and two contained both; contents included berries, fruit, seeds, caterpillars, ants (Formicidae), ichneumons (Ichneumonoidea) and spiders (Araneae). Other stomachs contained nectar and chalcid hymenoptera. Nestling diet largely fruit, supplemented by insects. In Trinidad, insect-searching accounted for 44% of observed searching,

fruit-eating 44% and nectar-feeding (presumably) at flowers 12%, but proportions may vary seasonally; tiny berries of *Miconia* species comprised 33% of all fruit taken, and arils of arillate fruits and vines accounted for an additional 35% of fruit material eaten in Trinidad. In pairs when breeding, but otherwise found in variably sized, usually single-species groups of up to c. 15 individuals, more rarely much larger groups; regularly forages with mixed-species flocks. Hyperactive, moving nervously through foliage, hopping, flying back and forth, constantly flicking wings, and frequently behaving aggressively towards conspecifics. Forages mostly at middle to upper levels in trees, infrequently descending quite low. In Trinidad, insect-searching occurred at slightly greater heights than did fruit-seeking and insect-hunting. Regularly hangs with head downwards or hangs upside-down to obtain fruit, and hovers to extract arils or to capture insects from foliage. Gleans insects from large branch surfaces by hopping nervously and leaning down to inspect sides or undersides of large branches. Regularly flutters or sallies to capture flying insects; in Trinidad, made up to 40% of insect captures in flight while hovering or sallying. Perches beside flowers and probes them with its bill. Regularly comes to feeders and restaurant dining tables in hotels, taking wide variety of fruit.

Breeding. Reported in May in Mexico, season Feb–Jun in Costa Rica, Feb in Panama, probably Mar–Jul in Trinidad; in Brazil, Sept and Dec in Pará and Oct in Mato Grosso. Nest a small, shallow, thin-walled cup of rootlets, fibres, grass and stems, woven and overlaid with spider webs, usually hidden in branch fork of dense outer foliage 2–14 m (average c. 5 m) above ground, mostly in isolated tree or shrub in pasture or garden, or in plantation or thicket. Clutch 2 eggs, less often 3, white to bluish, speckled with brown, speckling heaviest and forming wreath at large end (old published records of two nests from Trinidad and two from Guyana, described as black fibre pouches suspended above water and containing dark purplish-black eggs, are almost certainly cases of mistaken identity); in Costa Rica, incubation by female, period 12–13 days, chicks fed by both sexes (male participation irregular), nestling period c. 14 days.

Movements. Some local movements, both horizontal and elevational, apparently in response to availability of fruit and nectar, but extent and details of these require documentation. In lowland C Panama sharp swings in abundance of this species believed related to fruit availability. In Costa Rica regarded as a resident, but sporadic and seasonal, especially in areas with marked seasonal differences in rainfall. Seasonal movements occur in N of range, but timing needs documentation.

Status and Conservation. Not globally threatened. Generally common to locally abundant, at least seasonally, over most of range; widespread. Single record from Jamaica probably involved an escaped cagebird. Occurs in numerous protected areas, including Palenque National Park (Mexico), Tikal National Park (Guatemala), Cockscomb Basin Forest Reserve (Belize), Capiro–Calentura National Park (Honduras), Indio-Maíz Biological Reserve (Nicaragua), La Selva Biological Station and Braulio Carrillo and Tapantí National Parks (Costa Rica), Metropolitan, Chagres, Soberanía and Darién National Parks (Panama), Henri Pittier National Park (Venezuela), Los Katíos and Sanquianga National Parks (Colombia). Found widely across most of Amazonian Basin in both protected and unprotected areas, almost none of which is at risk. Isolated Atlantic coastal population is restricted, in large measure, to protected areas.

Bibliography. Allen (1891), Álvarez del Toro (1952), Beebe (1909, 1917), Belcher & Smooker (1937), Binford (1989), Bond (1961), Burns & Racicot (2009), de Carvalho (1958b), Clements & Shany (2001), Davis (1972), Delacour (1972a, 1972b), Dick *et al.* (1984), Dickey & van Rossem (1938), ffrench (1991), Garrido (2001), Garrigues & Dean (2007), Gibson (1979), Hartman & Brownell (1961), Haverschmidt (1948, 1952, 1968), Haverschmidt & Mees (1994), Hilty (1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Ibáñez-Hernández (2000), Isler & Isler (1999), Jahn *et al.* (2002), Klaas (1968), Kratter & Nice (2001), McCarthy (2006), McDiarmid *et al.* (1977), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Naumburg (1930), Pacheco *et al.* (2007), Parkes (1977), Paynter (1955), Penard & Penard (1910), Pinto (1944b), Raffaele *et al.* (1998), Restall *et al.* (2006), Ricklefs (1976), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Russell (1964), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1954, 1962b), Slud (1964), Smithe (1966), Snow & Snow (1971), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Storer (1969), Strauch (1977), Tashian (1953), Todd & Carriker (1922), Tostain *et al.* (1992), Wetmore *et al.* (1984), Willis (1987), Willis & Eisenmann (1979), Zimmer (1942b).

Genus *CHLOROPHANES* Reichenbach, 1853

169. **Green Honeycreeper**

Chlorophanes spiza

French: Tangara émeraude **German**: Kappennaschvogel **Spanish**: Mielerito Verde
Other common names: Purplish Honeycreeper ("*C. purpurascens*")

Taxonomy. *Motacilla Spiza* Linnaeus, 1758, Suriname.

Has been placed in family Coerebidae in the past, although more recently in present family on basis of skull morphology. Molecular-genetic data indicate that this species is embedded within the tanagers, but do not support a close relationship to *Dacnis* or *Cyanerpes*; genetic evidence does indicate close relationship to *C. pulcherrimus* (formerly placed variously in *Iridophanes* and *Tangara*). Described taxon *C. purpurascens*, known from one specimen from "Caracas" (Venezuela) and once regarded as a distinct species, now believed to be a hybrid *Chlorophanes* × unknown taxon. Race *guatemalensis* doubtfully distinct; retained pending review. Seven subspecies tentatively recognized.

Subspecies and Distribution.

C. s. guatemalensis P. L. Sclater, 1861 – S Mexico (Gulf–Caribbean slope from Oaxaca and Chiapas) S to E Guatemala, Belize and Honduras.

C. s. argutus Bangs & Barbour, 1922 – extreme E Honduras, E Nicaragua, and on both sides of Costa Rica and Panama S to NW Colombia (N Chocó S to Baudó Mts).

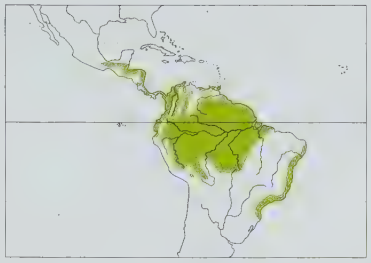
C. s. exsul Berlepsch & Taczanowski, 1884 – SW Colombia (Pacific coast from Valle del Cauca) S to SW Ecuador.

C. s. subtropicalis Todd, 1924 – Colombia (on slopes of all three Andean ranges), Sierra de Perijá, and W base of Andes in Venezuela (Táchira and Mérida).

C. s. spiza (Linnaeus, 1758) – Venezuela (coastal cordillera from Carabobo E to Sucre and N Monagas; E base of Andes from Barinas S to Táchira; and area S of R Orinoco), Trinidad, the Guianas, extreme E Colombia (R Negro–R Guainía) and N Brazil (E from R Uaupés and, S of R Amazon, from middle R Purús E to Pará and coast of Maranhão).

C. s. caerulescens Cassin, 1864 – Colombia (Cauca and Magdalena Valleys, and E base of E Andes from Arauca) S through E Ecuador and E Peru to C Bolivia, and E in WC Brazil to N Mato Grosso.

C. s. axillaris J. T. Zimmer, 1929 – coastal E & SE Brazil (Pernambuco S to Santa Catarina).



Descriptive notes. 13 cm; 14–23 g. Comparatively large honeycreeper with long, slightly decurved and pointed bill. Male nominate race has crown and side of head to point on rear cheek black, rest of plumage shining turquoise-green; upperwing and tail black, wing-coverts, flight-feathers and tail broadly edged greenish; underwing-coverts and thigh sooty black; iris dark red; upper mandible mostly dusky, lower mandible yellow; legs grey. Female is mostly dull green, paler below, throat and centre of belly yellowish; iris red to reddish-brown, lower mandible duller yellow than male's. Immature is much like female, but duller, belly greyish, iris reddish-brown; subadult male, when moulting, may show mottled or patchy plumage of dull green and turquoise, often with variable amount of black on head. Races differ mainly in coloration of male and in size: *guatemalensis* male differs from nominate (and all other races) in predominantly green colour, otherwise essentially identical to nominate, but with slightly shorter bill (some overlap in measurements); *argutus* is similar to previous, but less intensely green; *exsul* male is rather shining green, greener than nominate but not so intensely green as *guatemalensis*, differs from latter also in distinctly shorter bill (15 mm, as against 17·5 mm); *caerulescens* male differs from nominate in predominantly turquoise-blue plumage, more blue than other races; *subtropicalis* male is much like last, but black of crown extends farther rearwards, female differs from nominate in having throat and central underparts yellower; *axillaris* male is similar to nominate, but overall colour more greenish, less bluish, especially on belly, also hindneck lacks yellowish tone usually obvious in nominate, underwing-coverts and thigh paler, light grey (instead of sooty black). Voice. Variety of "tsip" notes and high, sharp "pseet", some calls weak, others loud and buzzy or hissing; may also give fast series of "chip" notes. In Costa Rica male repeats a sharp, dry "tsup" in series of up to 10 notes, possibly as a song.

Habitat. Humid and wet forest, second-growth woodland, wooded and shrubby borders, older second growth, and trees in gardens. Lowlands and foothills to c. 1000 m, smaller numbers higher; to 1400 m in Venezuela, and to 1200 m in Colombia; to c. 1100 m in Ecuador, 1600 m in Peru, and as high as 2300 m in Bolivia.

Food and Feeding. Fruit and arthropods; almost certainly also nectar from flowers and juice from fruits. Of 35 stomachs examined, 23 contained only vegetable matter and four only animal matter, and eight contained both, including fruit pulp, berries, seeds, and flies (Diptera). Stomachs from E Panama (Cana, in Darién) showed a diet fairly evenly balanced between plant and animal matter: one stomach contained bits of two species of *Aphodius* dung beetle, two or more short-tongued bees and fragments of small seeds of *Miconia*; other stomachs contained legs of a dipteran, fragments of a hymenopteran (ichneumonid), four seeds and fragments of drupes. A stomach of a female from C Panama (Cerro Azul) in Feb contained fruit and seeds of *Lasiacis* (a grass that produces berry-like seeds). Nestling diet insects and fruit, including arillate seeds of *Clusia*. In Trinidad, 63% of observed foraging events were for fruit, 22% at flowers, and 15% involved insect-hunting. Of a total of 22 species of fruit taken in Trinidad, c. 50% were of *Miconia* berries, 20% were Ulmaceae and 12% Euphorbiaceae; similar proportion of *Miconia* berries taken in Colombia. In Costa Rica, often noted as eating arils of *Clusia* and catkins of *Cecropia*. Usually observed singly or in pairs or small family groups; regularly comes to fruiting trees, especially when other small frugivores present, but often behaves aggressively and may chase other birds; visits feeding trays in some areas. Forages with mixed-species flocks, in some areas regularly, in other areas mainly as a transient or seasonal member. Restless and nervous-acting, often flicks wings and raises head to watch suspiciously as it forages. In Trinidad, most recorded foraging was 8 m up or higher; majority of insect-searching records were 15 m above ground. Consumes fruit while perched normally, also by hanging head downwards; occasionally in short sallies. Also searched high foliage (14%) and branches and twigs (10%) and sallied to air (20%) in Trinidad.

Breeding. Season Apr–Jul (peak activity May), occasionally as late as Sept, in Costa Rica, with one record of a fledgling being fed in early Nov; recorded May–July in Trinidad; in Panama (Barro Colorado), female gathering nest material in early Jul, and fledglings being fed Jun 11th and Jul 18th. Nest built by female, accompanied by male, a shallow, weakly constructed open cup mainly of small dry leaves, rachises, tendrils and fungal filaments, outer layer of leaves sometimes bound by spider webs (looks like a clump of leaves), one nest 8 cm in diameter and 5 cm in height, with interior dimensions of 5 cm and 2 cm, respectively; placed 1·5–12 m up in tree or shrub at or near edge of forest. Clutch 2 eggs, white, finely speckled with reddish-brown and more thickly marked at large end; incubation by female alone, average c. 80% of daylight hours on eggs, period c. 13 days; chicks fed by both sexes, much more by female (which made more than three times as many nest visits as did male), nestling period c. 12 days.

Movements. Resident. Some very local seasonal shifts may occur in response to availability of fruit and nectar.

Status and Conservation. Not globally threatened. Fairly common to common. Widespread, and found in many parks and other protected areas across its vast range. Populations of some Middle American races, as well as *axillaris* in SE Brazil, are much reduced in size and fragmented because of extensive deforestation, but the species overall is not at risk.

Bibliography. Beehler (1980), Belcher & Smooker (1937), Binford (1989), Burns (1997a), Burns *et al.* (2002, 2003), Burton (1975), Clements & Shany (2001), Collins & Watson (1983), Davis (1972), Dick *et al.* (1984), Donegan & Dávalos (1999), Eisenmann (1952), ffrench (1991), Fry (1970), Garrigues & Dean (2007), Hartman & Brownell (1961), Haverschmidt & Mees (1994), Hellmayr (1910), Hilty (1997, 2003), Hilty & Brown (1986), Howell, S.N.G. & Webb (1995), Howell, T.R. (1957), Jahn *et al.* (2002), McCarthy (2006), Meyer de Schauensee (1964, 1966, 1970a), Miller (1963), Moermond & Denslow (1985), Novaes (1969), Olivares & Hernández (1962), Parker & Goerck (1997), Paulson (1988), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sazima *et al.* (1993), Schäfer & Phelps (1954), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1962b), Slud (1964), Smithe (1966), Snow & Snow (1971), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Storer (1957, 1969), Strauch (1977), Tostain *et al.* (1992), Weske (1972).

170. **Golden-collared Honeycreeper**

Chlorophanes pulcherrimus

French: Tangara sucrier **German**: Halsbandtangare **Spanish**: Mielerito Collarejo
Other common names: Yellow-collared/Golden-bellied Honeycreeper, Yellow-collared Tanager

Taxonomy. *Dacnis pulcherrima* P. L. Sclater, 1853, "Bogotá".

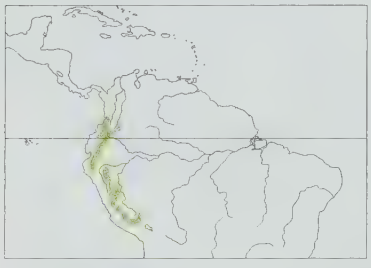
Has been placed in a monotypic genus, *Iridophanes*, and in *Tangara*, and near various "honeycreepers" because of bill shape and behaviour. Montane distribution mirrors that of many *Tangara* and plum-

age much like that of *Tangara cyanoptera*, although bill shape, bill colour and eye colour differ substantially. Molecular-genetic data indicate that it does not form a monophyletic group with other *Tangara* so far sampled, but is sister-taxon to *C. spiza*. Two subspecies recognized.

Subspecies and Distribution.

C. p. aureinucha (Ridgway, 1879) – Colombia (W slope of W Andes from Valle del Cauca) S to NW Ecuador (Carchi, Esmeraldas and Pichincha).

C. p. pulcherrimus (P. L. Sclater, 1853) – Colombia (head of Magdalena Valley in Huila, and E slope of E Andes from Caquetá) S on E slope through Ecuador and Peru (S to S Cuzco).



Descriptive notes. 11 cm; 14–17 g. Small honeycreeper with thin, sharply pointed bill, bill longer than that of *Tangara*. Male nominate race has head and throat black, sharply set off from narrow yellow-orange nuchal collar and pale underparts; mantle and scapulars black, central mantle blotched pale greenish-straw; lower back to uppertail-coverts pale greenish-straw, rearmost uppertail-coverts black; wing and tail black, upperwing-coverts heavily edged rich cobalt-blue, flight-feathers and tertials edged blue (more broadly on tertials), tail narrowly edged cobalt-blue; underparts shining pale yellowish to greenish opal, whitish on belly; iris red to dark red; upper mandible blackish, lower mandible yellow; legs dark grey. Female is rather different from male, head dull greyish-olive becoming slightly paler greyish-olive on back and rump, narrow yellow-orange nuchal collar inconspicuous; wing-coverts and flight-feathers prominently edged bluish-green; breast and lower underparts dull greyish to yellowish-buff, sides tinged olive. Juvenile dingy brownish-grey, with slightly darker crown and side of head, and weakly marked yellow nuchal collar; immatures recall respective adults, but duller. Race *aureinucha* male differs from nominate in being slightly paler above, with sooty (not black) on head and dark areas of back, nape collar deeper golden, sides and flanks more buffy, bill noticeably longer. Voice. Call a high lisping buzzy "czee" or "psee", sometimes doubled and often given over and over during foraging; call may be lengthened into buzz that rises, then falls, "czeeeéééeee". No song described.

Habitat. Canopy of humid and wet forest, mossy forest borders, older second growth and irregular or disturbed forest in landslides and forest openings. At 1000–1900 m in Colombia; mostly 1100–2000 m in Ecuador (recorded as low as 650 m), and 1100–2000 m in Peru.

Food and Feeding. Recorded as taking berries from *Miconia*, *Cecropia* catkins and nectar; also some insects, but non-quantitative observations suggest that it takes fewer insects than do *Tangara* species. Four stomachs contained vegetable matter, including fruit, seeds and flower petals. Captives accepted fruit, insects and nectar. A restless, nervous-acting species, usually seen singly or in pairs, occasionally in small family parties, seldom in larger groups. Typically, one or two associate with fast-moving mixed-species flocks containing *Tangara*, honeycreepers and other tanagers, and New World warblers (Parulidae). Forages mainly in upper levels of trees; rarely low, even along borders. Moves rapidly along branches and in foliage.

Breeding. In Colombia, male and female carrying food (nest not located) in May in Pialapi Valley (near La Planada, in SW Nariño), pair carrying food in May and another pair with food in Jun at La Planada Reserve; pair with dependent juvenile 26th Sept at Río Ñambí Nature Reserve (SW Nariño), but only female fed young (after foraging for berries in *Miconia* and for insects at *Clusia* flowers); fledgling at end May in W Valle del Cauca. In captivity, builds cup nest; clutch 2 eggs, pale bluish-grey, rusty-brown streaks forming patch at large end, only female incubated, both sexes fed insects to young.

Movements. Some seasonal elevational movements in Colombia, individuals reported down to 1000 m only in May and Jun in upper Anchicayá Valley (Valle).

Status and Conservation. Not globally threatened. Uncommon on E Andean slope; rare on Pacific slope of Colombia and Ecuador. Occurs in Farallones de Cali National Park, Tambito Natural Reserve and probably also Cerro Munchique National Park and El Pangan Nature Reserve (Colombia); may occur also in several protected areas on E slope in Ecuador, e.g. Sangay and Podocarpus National Parks and Cayambe-Coca Ecological Reserve; in Peru, present in Tingo Maria and Manu National Parks. Within this species' range there is also a considerable amount of intact forest that is unprotected, but relatively secure for at least the short term.

Bibliography. Burns (1997a), Burns *et al.* (2003), Donegan & Dávalos (1999), Hilty (1977), Hilty & Brown (1986), Ingels (1974a), Isler & Isler (1999), Lysinger *et al.* (2005), McEwen (1979), Mee *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Strewe (2001a).

PLATE 19 ➤


inches 3
cm 8
♂
♀
ssp xanthopygius
171
ssp berliozi
172
173
174
ssp flavicollis
ssp centralis
ssp peruana
ssp albigularis
175
ssp melanoxantha
ssp chrysomelas
ssp ocularis
176
177

Genus *HETEROSPINGUS* Ridgway, 1898

171. Scarlet-browed Tanager

Heterospingus xanthopygius

French: Tangara à sourcils roux **German**: Brauenschopftangare **Spanish**: Tangara Cejirroja

Taxonomy. *Tachyphonus xanthopygius* P. L. Sclater, 1855, "Bogotá".
Molecular data indicate genus is closest to *Hemithraupis* and *Chrysothlypis*. May form superspecies with *H. rubrifrons*; often considered conspecific, but differs in morphology and plumage. Two subspecies recognized.
Subspecies and Distribution.
H. x. xanthopygius (P. L. Sclater, 1855) – E Panama (E Darién, including Tuira valley, Cerro Pirre, Cerro Sapo, Jaqué valley, and Serranía de Jungurudó) and E through N Colombia (along N base of W & C Andes, and S in Magdalena Valley to Antioquia).
H. x. berliozi Wetmore, 1966 – Pacific coast of Colombia (from N Chocó) S to WC Ecuador (Pichincha and Chimborazo).



Descriptive notes. 17 cm; two males 38 g and 39·5 g (*berliozi*). Relatively large, dark tanager with heavy bill slightly hooked at tip. Male nominate race is mainly sooty-black above and below, with bright yellow rump; inconspicuous white line above eye broadens into prominent and slightly raised scarlet postocular tuft; lesser upperwing-coverts bright yellow (often hidden, but may show at bend of wing), rest of wing and tail sooty-black; lower underparts slate-grey; underwing-coverts white, and with elongated white pectoral tuft usually protruding slightly beneath wing; iris dark red; bill blackish; legs dark grey. Female is dark leaden grey from crown to back, rump bright yellow, uppertail-coverts dark grey, tail blackish; lesser wing-coverts yellow (invariably hidden), rest of wing-coverts dark grey, flight-feathers blackish; throat and underparts slightly paler grey than upperparts, white pectoral tuft often visible beneath wing, undertail-coverts tinged yellowish. Juvenile is like female; immature male has dark grey of upperparts gradually replaced by black. Race *berliozi* male differs from nominate in having body plumage slaty, rather than black, female darker than nominate, has white pectoral tufts reduced (less visible). Voice. Infrequently heard song, in W Colombia, a squeaky, twittering and somewhat rhythmic "cheero-bitty cheero-bitty cherro-pit-sup", or other variation consisting of disyllabic and trisyllabic notes repeated over and over, rather weak; sometimes longer song, lasting for several seconds; songs may be given repeatedly with brief pauses between them, or a few random single notes and louder calls interspersed between songs. Frequently heard call a loud, forceful "chip", nasal in quality and often repeated excitedly during foraging with mixed flocks; also thin high "tseet" notes.
Habitat. Tall humid and wet forest, forest borders and tall second growth of various ages, in lowlands and foothills; to c. 900 m in Panama, 1100 m in Colombia and 800 m in W Ecuador.
Food and Feeding. Noted eating *Cecropia* catkins and *Miconia* berries, and in Panama seen to forage around flowers. Contents of one stomach were vegetable matter, of another both vegetable and animal matter; items identified were beetles (Coleoptera), an ant (Formicidae), and seeds of an oleaceous plant. Encountered mostly in pairs, less often singly or in groups of 3–4 individuals that regularly follow mixed-species flocks, especially those with honeycreepers and other tanagers, in canopy and subcanopy; sometimes comes lower along forest borders. In nine observations in Colombia, height above ground of foraging individuals ranged from 5·5 m to 33·5 m. May sit motionless or move sluggishly, perch erect and exposed on treetops for short periods, then peer rapidly at tops of leaves, lunge or peck at prey, sally heavily to foliage, flutter-chase prey in foliage and, after short foraging bout, fly off some distance to another site, leaving slower-moving members of mixed flocks behind. Seen to take *Miconia* berries and *Cecropia* catkins from perch on branch, twigs and petioles.
Breeding. In Colombia, one bird building nest in mid-Dec in upper Anchicayá Valley, pair with begging juvenile on 19th Jan in lower Dagua Valley, and seven birds in breeding condition in Mar–May in NW. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common. Found in variety of second-growth habitats, as well as in humid primary forest. Occurs in several large protected areas, including Darién National Park (Panama), Los Katíos, Ensenada de Utría and probably Sanquianga National Parks (Colombia), and possibly also Awá Forest Reserve and Bilsa Biological Station (Esmeraldas, in Ecuador). Present also in privately operated Reserva El Paujíl (Boyacá), in Colombia. In Ecuador, locally still numerous in Esmeraldas, somewhat less so to S in W Pichincha. This species' range encompasses intact habitat which is not formally protected. Much of this, however, is at risk of deforestation and human settlement, and the species has suffered considerable range contraction and fragmentation in NW Colombia, along N base of W & C Andes, in SW Colombia, and in most of its range in W Ecuador, where it formerly occurred as far S as S Guayas.
Bibliography. Anon. (1983), Angehr *et al.* (2004), Bangs & Barbour (1922), Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Haffer (1975), Hellmayr (1936), Hilty (1997), Hilty & Brown (1986), Jahn *et al.* (2002), Quevedo *et al.* (2006), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Wetmore *et al.* (1984).

172. Sulphur-rumped Tanager

Heterospingus rubrifrons

French: Tangara à croupion jaune **Spanish**: Tangara Lomiazufrada
German: Schwefelbürzeltangare

Taxonomy. *Tachyphonus rubrifrons* Lawrence, 1865, Lion Hill Station, Panama.
Molecular data indicate genus is closest to *Hemithraupis* and *Chrysothlypis*. May form superspecies with *H. xanthopygius*; often considered conspecific, but differs in morphology and plumage. Monotypic.
Distribution. Caribbean slope from Costa Rica (Limón) E to NE Panama (E to Puerto Obaldía, in San Blas); locally on Pacific slope of Panama in Veraguas (sight) and Panamá (Cerro Jefe and Cerro Azul), possibly also in extreme W Darién.



Descriptive notes. 15 cm; 36–40 g. Rather large, dull, heavy-billed tanager, with long bill slightly hooked at tip. Male has head, neck and upperparts to back dark leaden grey, yellow rump (often hidden by folded wings); uppertail-coverts olive-green, tail and upperwing, including coverts, dusky; throat and underparts grey, somewhat paler than above, white pectoral tufts (usually protruding from beneath wing), undertail-coverts olive-green with some admixed yellow; axillaries and underwing-coverts white; iris dark red to reddish-brown; bill blackish; legs blue-grey. Female like male, but may lack olive on uppertail-coverts, and belly often tinged brownish. Immature is similar to adult, but duller, more sooty above and olive-tinged below, wing-coverts edged dull olive, yellow rump patch like adult's but smaller. Voice. Call a thin "tsip" or "tseet", singly or sometimes in rapid, squeaky or twittery series; in flight repeats a thin "seet" or "silt"; in Costa Rica a sharp, buzzy "dzeet", and a higher, thinner "tseet" in flight. Song not recorded.
Habitat. Humid lowland and foothill forest, and forest borders; to c. 700 m in Costa Rica and to c. 900 m in Panama.
Food and Feeding. Fruit, and large and small arthropods. Fruit includes *Cecropia*, *Hamelia*, and mistletoe berries (Loranthaceae). Occurs in pairs and in small family groups, rarely in larger groups (up to 14 seen together). May accompany mixed-species flocks, especially with groups of Black-faced Grosbeaks (*Caryothraustes poliogaster*) and *Tachyphonus delatrii*, and also with mixed groups containing *Tangara* species, honeycreepers and dacnises; also frequently forages away from mixed flocks, in part because of faster speed at which it travels when foraging. Forages in canopy and upper levels, also lower along forest borders. Of 98 observations of foraging, 42% were in treetops, 37% at middle heights and 21% low. Of 24 observed cases of insect-hunting, 50% were from foliage, all from the tops of leaves. Seen to lean downwards to examine sides of branches in Costa Rica.
Breeding. Pair in Nov carrying nest material to epiphyte-covered branch 20 m up. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Central American Caribbean Slope EBA and Darién Lowlands EBA. Uncommon. Inhabits lowlands and foothill regions in Costa Rica from R Reventazón watershed SE along entire Caribbean slope and lowlands to E Panama. Deforestation widespread in unprotected portions of the species' range, and it has disappeared from much of its former range in Costa Rica and W Panama E to Canal Zone area. Occurs in a number of protected areas, including Tapantí National Park and Chirripó/La Amistad International Park (Costa Rica) and portions of La Amistad, Santa Fé, Soberanía and Chagres National Parks and the Comarca Kuna Yala Indigenous Reserve (Panama). Considerable habitat remains along Caribbean slope in Panama E of Canal Zone, and so long as current protected areas are maintained the species' near-term future should be secure.
Bibliography. Carriker (1910), Davis (1972), Garrigues & Dean (2007), Greenberg (1981a, 1984), Greenberg & Gradwohl (1980), Haffer (1975), Hellmayr (1936), Isler & Isler (1999), Leck (1971b, 1972c), Ridgely & Gwynne (1989), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984), Willis & Eisenmann (1979).

Genus *HEMITHRAUPIS* Cabanis, 1851

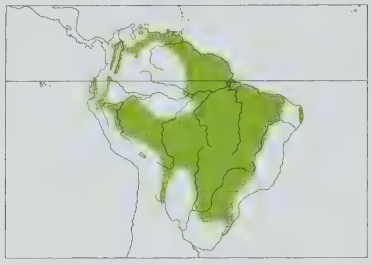
173. Guira Tanager

Hemithraupis guira

French: Tangara guira **German**: Guiratangare **Spanish**: Tangara Guirá

Taxonomy. *Motacilla Guira* Linnaeus, 1766, Pernambuco, Brazil.
Molecular data indicate that this genus and *Chrysothlypis* are closely related and probably sister-taxa, and that *Heterospingus* also is closely related to them. This species and *H. ruficapilla* hybridize to some degree in limited zone of contact in SE Brazil, but do not intergrade. Eight subspecies recognized.
Subspecies and Distribution.
H. g. nigrigula (Boddaert, 1783) – locally Venezuela (E of Andes) E to the Guianas and NE Brazil N of R Amazon.
H. g. roraimae (Hellmayr, 1910) – Cerro Roraima region of Venezuela and Guyana.
H. g. guirina (P. L. Sclater, 1856) – Colombia in Cauca Valley (Antioquia S to Valle, once on Pacific slope in Valle), Magdalena Valley and E Andes (W slope from Santander S to Huila, and E slope in at least Boyacá and Cundinamarca and probably S to Caquetá), also Ecuador (W of Andes) and NW Peru (NW Tumbes).
H. g. huambina Stolzmann, 1926 – S Colombia (Nariño), E Ecuador, E Peru and W Brazil (E to R Madeira).
H. g. boliviana J. T. Zimmer, 1947 – E Bolivia, NW Argentina; probably also Mato Grosso, in C Brazil.
H. g. amazonica J. T. Zimmer, 1947 – C Brazil S of R Amazon (between R Madeira and R Tapajós).
H. g. guira (Linnaeus, 1766) – EC Brazil from R Tocantins E to Ceará and S to Goiás and NW Bahia; also extreme NE Brazil from Paraíba to Alagoas.
H. g. fosteri (Sharpe, 1905) – E Paraguay, NE Argentina (Misiones), and interior SE Brazil from Minas Gerais S to Rio Grande do Sul.
Descriptive notes. 13 cm; 9·5–14 g. Rather thin-billed tanager; male resembles oriole (*Icterus*). Male nominate race has crown to nape olive-green, face and throat dark sooty-brown, bordered by long bright yellow supercilium that wraps around behind dark ear-coverts and extends forward to side of throat and narrowly across lower throat; upperparts olive-green (like crown), pale orange-rufous rump; tail dark olive; large patch of rich tawny-rufous across breast, lower underparts yellow, flanks tinged grey; iris brown; bill yellowish, culmen broadly dusky to black; legs leaden-grey. Female is mainly plain olive-green above, with short, weakly indicated yellowish supercilium, narrow yellow

On following pages: 174. Rufous-headed Tanager (*Hemithraupis ruficapilla*); 175. Yellow-backed Tanager (*Hemithraupis flavicollis*); 176. Black-and-yellow Tanager (*Chrysothlypis chrysomelas*); 177. Scarlet-and-white Tanager (*Erythrothlypis salmoni*).



eyering, yellowish rump; mostly yellow below, with flanks tinged grey. Juvenile recalls adult female, but duller, less yellow. Races differ mainly in intensity and extent of yellow surrounding mask of male: *nigrigula* has no yellow across bottom of dark throat, differs from nominate also in darker olive back, supercilium broadly separated from yellow area behind mask, yellow border behind throat patch broader, and breast darker; *roraimae* differs from nominate in having dark face and throat completely bordered by yellow, female darker above and with little yellow on uppertail-coverts; *guirina* differs from nominate in having supercilium narrower and more ochraceous, facial area and throat brownish with yellow border not extending across bottom of throat, and both wing and tail shorter; *huambina* has superciliary stripe brighter yellow than previous and only slightly separated from yellow border on rear of neck; *amazonica* differs from nominate in darker olive back, deeper brownish breast and rump, and usually more prominent yellow behind throat patch; *boliviana* similar to last but larger, back lighter green, rump paler, breast darker brown, yellow band bordering behind ear-coverts usually lacking (rarely pronounced); *fosteri* is most like *amazonica*, but upperparts paler, throat darker (blacker), and no yellow band below black throat. VOICE. Song may vary geographically, or individuals may sing several different songs. Song at dawn in N Venezuela (Aragua) 6–7 sharp, incisive notes, "sa-sit-sit-sit-sit-sit", rather weak; also a series of rapid squeaking and chipping notes reminiscent of *Coereba flaveola*. Dawn song elsewhere a longer, more complex and high "tit-de-de-dit tit tit, tit-de-de-dit tit"; day song a rapid series of nasal "chee" and "chut" notes accelerating into a trill of "chit" notes that may slow at end. Song in Brazil described as a series of high notes that rise slightly, "tsi, tsi, tsi-tseh, tseh, tseh".

Habitat. In Amazonia occurs in canopy of humid *várzea* and *terra firme* forest, as well as in scattered trees in clearings, second growth and older vegetation on river islands. Elsewhere, found in canopy of dry, moist and moderately humid deciduous to semi-deciduous forest, tall second growth and open woodland, shady coffee and cacao plantations, and scattered trees in clearings; also in tall *cerrado* scrub in Brazil, and reported in mangroves in NW Peru. Away from Amazonia, turns up in wide variety of mostly edge habitats and light woodland. Lowlands and hills; sea-level to c. 1450 m in Venezuela, locally to 2000 m in Colombia, to 1100 m in Ecuador and locally to c. 1500 m in Peru.

Food and Feeding. Variety of arthropods, also occasionally small fruits. Observed to consume *Miconia* berries and seen to examine flower corollas for insects. Of 14 stomachs examined, one contained only vegetable matter, eight held only animal matter and five contained both; contents included grasshoppers (Orthoptera), cockroaches (*Blattaria*), caterpillars, bugs (Hemiptera), spiders (Araneae), fruit, and seeds. Pairs or, more often, family groups of 3–7 individuals, rarely groups of up to 25, forage alone or with upper-level or canopy mixed-species flocks dominated by insectivores. Active in high outermost foliage as it hops, bends down, hangs, or flutters to inspect top and bottom surfaces of leaves or to peer beneath twigs for food items; behaviour reminiscent of that of a New World warbler (Parulidae).

Breeding. Reported as breeding in Sept and Oct in Paraguay. Nest a flimsy cup of plant fibres and lichen placed in high fork; eggs white, sprinkled with cinnamon-brown on larger end. No other information.

Movements. Mainly resident. Some may withdraw seasonally from extreme S portions of range in Argentina and S Brazil.

Status and Conservation. Not globally threatened. Widely distributed, but typically uncommon throughout most of range. Occurs in a large number of national parks and other protected areas; in addition, extensive unprotected habitat exists within its range. This species considered unlikely to face any serious threats, except locally where complete conversion of forest and lightly wooded habitats to grasslands.

Bibliography. Bankovics (2003), Belton (1985), Bertoni (1918), Cavalcanti & Pimentel (1988), Dick *et al.* (1984), Friedmann & Smith (1950), Fry (1970), Haverschmidt (1952, 1968), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Lysinger *et al.* (2005), McCarthy (2006), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Munn (1985), Narosky & Di Giacomo (1993), Naumburg (1930), Oren & Parker (1997), Pacheco *et al.* (2007), Parker & Goerck (1997), de la Peña & Rumboll (1998), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Stiles *et al.* (2002), Santos (1948), Schubart *et al.* (1965), Schulenberg *et al.* (2007), Short (1971), Sick (1985, 1993), Snyder (1966), Souza (2002), Taczanowski (1884), Weske (1972), Wetmore (1926), Zimmer (1947a).

174. Rufous-headed Tanager

Hemithraupis ruficapilla

French: Tangara à tête rousse **German**: Rostkappentangare **Spanish**: Tangara Cabecirrufa

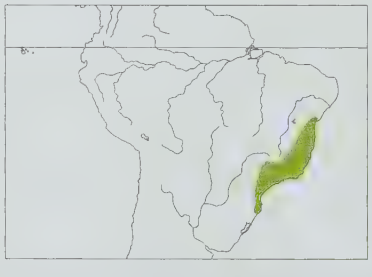
Taxonomy. *Nemosia ruficapilla* Vieillot, 1818, Rio de Janeiro, Brazil.

Molecular data indicate that this genus and *Chrysothlypis* are closely related and probably sister-taxa, and that *Heterospingus* also is closely related to them. This species and *H. guira* are sister-species; they hybridize to some degree in limited zone of contact, but do not intergrade. Races differ minimally, and species perhaps better treated as monotypic; review warranted. Two subspecies tentatively recognized.

Subspecies and Distribution.

H. r. bahiae J. T. Zimmer, 1947 – SE Bahia, in E Brazil.

H. r. ruficapilla (Vieillot, 1818) – SE Brazil from S Minas Gerais and Espírito Santo S to E Santa Catarina.



Descriptive notes. 13 cm; 11–13 g. Male nominate race has entire crown, side of head and throat rich deep reddish-chestnut, large patch behind ear-coverts and on side of neck bright yellow; large area on chest and spreading onto upper breast orange-rufous (paler than rufous-chestnut of head); nape to back olive with yellowish tinge, rump dark orange-rufous (like chest), uppertail-coverts yellowish, longer uppertail-coverts yellowish-olive; tail feathers dusky, broadly tipped and edged yellow-olive; upperwing-coverts with inner webs dusky, most of outer webs yellowish-olive (like back), rest of wing dusky, flight-feathers heavily edged olive-yellow; mid-breast to mid-belly pale yellow, undertail-coverts paler, sides and flanks olive-grey; iris dark brown; upper mandible blackish-brown, becoming paler near base, lower mandible mostly yellowish; legs dark grey. Female is plain olive-green above, with indistinct short yellowish supercilium, narrow yellow eyering, yellowish rump, mostly yellow below, flanks tinged grey; essentially indistinguishable from female of *H. guira*. Juvenile undescribed. Race *bahiae* is very similar to nominate, but chestnut of crown paler, breast colour paler (most individuals), and wing and tail on average longer. VOICE. Song a rhythmic series of rapid, rattling "chit" notes slowing at end, "chit-t-t-t-t-t-t chew chit-it?", or ending with "...chit, chit, chit", sometimes repeated a dozen times in a minute; similar to dawn song of *H. guira*. Calls are high, slightly grating "enk" and "chit" notes.

Habitat. Forest borders, light woodland, second growth, plantations and shady parks; survives in remnant woodlots as small as c. 250 ha. In area of slight range overlap with *H. guira* in São Paulo, tends to be found in wetter and more heavily forested habitat than that preferred by latter. Sea-level to c. 1500 m.

Food and Feeding. Mostly small arthropods, also small quantities of fruit. Stomachs contained insects. Occurs in pairs, families and small groups, often with mixed-species flocks. Forages in restless, active manner in canopy and upper levels of trees; behaviour like that of *H. guira*.

Breeding. Female carrying nest material into small hole (5 × 8 cm) in hanging clump of *Tillandsia* in Oct. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Locally fairly common. Poorly known race *bahiae* known mostly from Bahia trade skins (provenance of which uncertain). Occurs in many national protected areas in SE Brazil, including Itatiaia, Tijuca, Serra dos Órgãos, Serra da Canastra, Serra do Cipó, Caparaó and Grande Sertão Veredas National Parks, as well as Sooretama and Augusto Ruschi (Nova Lombardia) Biological Reserves. Outside these and other protected areas deforestation is widespread, and little suitable habitat remains. While this species is capable of surviving in small fragmented woodlots, Brazil's scattered reserves and protected areas appear critical as reservoirs for its long-term survival.

Bibliography. Berla (1944), Davis (1945a), Descourtilz (1852), Diamond & Lovejoy (1985), Hellmayr (1915), Isler & Isler (1999), McCarthy (2006), Mitchell (1957), Ridgely & Tudor (1989, 2009), Sazima *et al.* (1993), Sick (1985, 1993), Sick & Pabst (1968), Souza (2002), Willis (1979), Zimmer (1947a).

175. Yellow-backed Tanager

Hemithraupis flavicollis

French: Tangara à dos jaune **German**: Gelbbürzeltangare **Spanish**: Tangara Gorjigualda

Taxonomy. *Nemosia flavicollis* Vieillot, 1818, Cayenne, French Guiana.

Molecular data indicate that this genus and *Chrysothlypis* are closely related and probably sister-taxa, and that *Heterospingus* also is closely related to them. Some races of present species only weakly defined and possibly not worthy of retention, e.g. *insignis* perhaps not distinct from *melanoxantha*; thorough review required. Eleven subspecies currently recognized.

Subspecies and Distribution.

H. f. ornata Nelson, 1912 – Pacific slope from extreme E Panama (E Darién) S to N Chocó, in Colombia.

H. f. albigularis (P. L. Sclater, 1855) – N Colombia from R Sinú E to middle Magdalena Valley in Antioquia and Santander.

H. f. peruana Bonaparte, 1851 – E of Andes in Colombia (from Meta) S through E Ecuador to Peru N of R Marañón and R Amazon (Amazonas and Loreto).

H. f. aurigularis Cherrie, 1916 – SE Colombia, S Venezuela (S of R Orinoco), and N Brazil (in upper R Uaupés and R Negro).

H. f. hellmayri Berlepsch, 1912 – SE Venezuela (E Bolívar) and W Guyana (Merumé Mts).

H. f. flavicollis (Vieillot, 1818) – Suriname, French Guiana and NE Brazil (N of R Amazon).

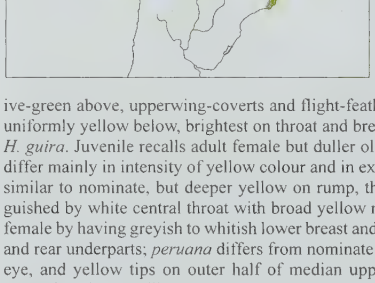
H. f. obidensis Parkes & Humphrey, 1963 – N bank of lower R Amazon in Brazil.

H. f. sororia J. T. Zimmer, 1947 – N & E Peru S of R Marañón.

H. f. centralis (Hellmayr, 1907) – SE Peru, N & C Bolivia and SC Brazil (E to N Mato Grosso).

H. f. melanoxantha (M. H. C. Lichtenstein, 1823) – coastal E Brazil (Pernambuco and Bahia).

H. f. insignis (P. L. Sclater, 1856) – SE Brazil (Espírito Santo and Rio de Janeiro).



Descriptive notes. 13 cm; 11–15 g. Relatively slender-billed tanager. Male nominate race is mainly brownish-black above, with bright yellow lower back, rump and uppertail-coverts, longer uppertail-coverts brownish-black; tail and almost entire wing brownish-black, narrow band of white on outer web of outer primaries (showing as small white patch at base of primaries); throat and foreneck bright yellow, underparts off-white, sides tinged grey (sometimes with small amount of black mottling on sides), undertail-coverts bright yellow; iris dark brown; upper mandible dusky, lower mandible pinkish to yellow; legs dark grey. Female is olive-green above, upperwing-coverts and flight-feathers darker, edged yellowish-green; more or less uniformly yellow below, brightest on throat and breast, with flanks tinged olive; similar to female of *H. guira*. Juvenile recalls adult female but duller olive above and duller, dingy yellow below. Races differ mainly in intensity of yellow colour and in extent of black mottling on sides of male: *ornata* is similar to nominate, but deeper yellow on rump, throat and undertail-coverts; *albigularis* is distinguished by white central throat with broad yellow malar, prominent black spotting on side of chest, female by having greyish to whitish lower breast and belly, with yellow only from throat to mid-breast and rear underparts; *peruana* differs from nominate in short yellow supraloral line, yellow arc below eye, and yellow tips on outer half of median upperwing-coverts (forming tiny yellow wingbar); *aurigularis* is much like nominate, but with more extensive black mottling on side of breast; *hellmayri* is distinguished by yellow on throat extending well down onto central breast, and with side of chest densely mottled black; *obidensis* differs from nominate in duller, more brownish-black, upperparts and in having yellow of rump, throat and undertail-coverts less intense, female paler and more greenish above and below; *sororia* is much like *aurigularis*, but male has throat paler yellow; *centralis* is much like nominate, but somewhat larger, side of chest more scalloped and barred, back deeper black, throat paler yellow (about the same as *peruana*); *melanoxantha* is slightly larger than nominate, but male otherwise essentially identical, female brighter, extensively yellow below; *insignis* is slightly larger than nominate, but male essentially identical to previous, female decidedly browner above than female of previous. VOICE. During foraging, often constantly repeats sharp, forceful and high-pitched "tsick" and "tsuk" and "tsu-dik"; in Peru described as a rich "chew" and a higher-pitched "tsew" and "seew". Song, in Brazil, "si, si, si, si...", insect-like; song, in E Ecuador (agitated bird) a rapid, almost frantic, buzzy "tissz, tz-tz-tz, tuck", fairly high-pitched, repeated over and over.

Habitat. Found mainly in tall humid *terra firme* and, to lesser extent, in *várzea* forest; somewhat less frequently along forest borders or in shady plantations and trees in clearings. Lowlands and

hills; to c. 950 m in Venezuela, to 1000 m in Colombia, and to c. 700 m and 750 m in Ecuador and Peru, respectively.
Food and Feeding. Arthropods and fruit. Reported to eat fruit of melastomes, myrtle (Myrtaceae) and *Urtica*. In Peru, at least 30% of observed foraging records involved fruit. Of twelve stomachs examined, three contained only vegetable matter, six held only animal matter and three contained both; contents included insect parts, a small orthopteran, berries and fruit. Contents of other stomachs were beetles (Coleoptera), cockroaches (*Blattaria*), caterpillars, and a leafhopper (Homoptera). In pairs and family parties, almost always with canopy or upper-level mixed-species flocks of insectivores and frugivores, with which, over much of range, it both forages and rests. Behaves as a nuclear species in mixed flocks in E Brazil; in SE Peru mainly a transient in mixed flocks. Like congeners, restless, active and alert. Forages in upper levels of canopy and in emergent trees, where it rapidly searches top and bottom surfaces of leaves, especially clusters of terminal foliage; techniques are perch-gleaning, less often reaching or hanging downwards, occasionally fluttering or hovering, or sallying short distances to air.
Breeding. In Colombia, pair building nest on 27th Sept in upper canopy on forested ridge at La Fiebre (middle Magdalena Valley), also ten birds in breeding condition in Apr–Jun and one in Jan in N. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common. Has a large range that includes portions of lowland E Panama and adjacent N Colombia, as well as much of the Guianan region and Amazonia, and isolated population along Atlantic coast of Brazil. Occurs in many protected areas, and vast areas of appropriate habitat lie in unprotected areas within its range. Populations inhabiting Panama–NW Colombia region (races *ornatus* and *albigularis*) and SE Brazil coastal corridor (*melanoxantha* and *insignis*) live in areas that are heavily deforested, and relatively little habitat in these regions has any kind of protected status. Establishment of additional protected reserves in these areas would benefit not only these populations, but also other species. Among the protected sites where this tanager occurs in SE Brazil are Sooretama and Poço das Antas Biological Reserves and Tijuca and Serra dos Órgãos National Parks.
Bibliography. Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Descourtilz (1852), Diamond & Lovejoy (1985), Greenberg (1981a), Haverschmidt & Mees (1994), Hennessey (1998), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Mitchell (1957), Moore *et al.* (2009), Munn (1985), Parker & Goerck (1997), Parkes & Humphrey (1963), Pearson (1971, 1975b), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914), Snyder (1966), Souza (2002), Stiles *et al.* (1999), Wetmore *et al.* (1984), Willis (1977), Zimmer (1947a).

Genus *CHRYSOTHLYPIS* Berlepsch, 1912

176. Black-and-yellow Tanager

Chrysothlypis chrysomelas

French: Tangara loriot **German**: Zitronentangare **Spanish**: Tangara Negriamarilla

Taxonomy. *Tachyphonus chrysomelas* P. L. Sclater and Salvin, 1869, Cordillera del Chucú, Veraguas, Panama.
Molecular data indicate that this genus and *Hemithraupis* are closely related and probably sister-taxa, and that *Heterospingus* also is closely related to them. Three subspecies recognized.
Subspecies and Distribution.
C. c. titanota Olson, 1981 – Caribbean slope of N Costa Rica from Alajuela (vicinity of Cerro Santa Maria) S along E base of Cordillera Central and Cordillera de Talamanca to area of Panama border.
C. c. chrysomelas (P. L. Sclater & Salvin, 1869) – W Panama (W Chiriquí E to vicinity of Cerro Campana, in W Panamá).
C. c. ocularis Nelson, 1912 – E Panama from Cerro Jefe (and Pacific slope in E Panamá and Darién) E to extreme NW Colombia (Cerro Tacarcuna).



Descriptive notes. 12 cm; 11–15 g. Small, parulid-like tanager with fairly thin, sharply pointed bill; male plumage distinctive. Male nominate race is bright yellow, except for narrow black ocular ring and jet-black hindneck and mantle, upper back, wing and tail; iris brown; bill black; legs blackish. Female has head and entire upperparts, including upperwing-coverts and tail, greenish-olive, flight-feathers dusky, edged greenish-olive; yellow below, sides and flanks tinged olive-green, undertail-coverts yellowish, underwing-coverts white, and may show tuft of white beneath wing; legs greyish-green. Immature male is much like female, but brighter yellow below, upperwing-coverts with paler edges. Race *ocularis* is very like nominate, but male loral area partly black (not entirely yellow), possibly has larger black ocular ring, female brighter, more uniform greenish-yellow below; *titanota* male is identical to nominate, female differs from nominate female in having greyish flanks, and throat and belly mainly white with only a diffuse yellowish band across breast. Voice. Call a sharp, sibilant "tsee" or "tseeeut" like that of a hummingbird (Trochilidae), singly, doubled or followed by several shorter notes, e.g. "tsew tsu-tsu-tsu"; often calls in flight. Song apparently unrecorded.
Habitat. Canopy of humid and wet foothill forest, forest borders and adjacent tall second growth; much less frequently in scattered trees in humid clearings or in low shrubs. At 350–1600 m.
Food and Feeding. Arthropods and fruit; noted as taking *Miconia* berries. Contents of 13 stomachs were vegetable matter only, three others included vegetable and animal matter; contents included fruit, *Cecropia* seeds, caterpillars, ants (Formicidae), and orthopterans. Occurs in pairs and in small groups of 3–6 individuals, typically associated with mixed-species flocks of insectivores and frugivores. Sprightly and restless, rapidly gleaning small arthropods from outer foliage of high trees. Foraging movements diverse, and include gleaning, sallying for and flutter-chasing after escaping prey, reaching or hanging from twigs, hovering at surface of large leaves, and probing dead leaves.
Breeding. One nest found in Jun in Costa Rica: a neat cup of fine rootlets, lined with black fungal rhizomorphs, with middle layer of small dead leaves and outer layer of green moss, placed 8 m up near tip of *Inga* branch. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Central American Caribbean Slope EBA and Darién Lowlands EBA. Uncommon to locally fairly common. Presence in Colombia (race *ocularis*) based on specimen from near Cerro Tacarcuna. Although this species has a fairly small range, its global population is believed to be well above the level applicable for inclusion on the Red List. Occurs in several protected areas, including Braulio Carrillo National Park, Río Pacuare and Hitoy Cerere Biological Reserves and La Amistad International Park (Costa Rica), La Amistad, Santa Fé, Soberanía, Chagres and Darién National Parks (Panama), and Los Katíos National Park (NW Colombia). While the species remains fairly common in some foothill forested areas, its range is increasingly fragmented, especially in Costa Rica and W Panama, where large areas of lowland and foothill forest have been converted to agricultural purposes, e.g. bananas and cattle, and are being lost to expanding human settlement.
Bibliography. Athanas (2004), Burns (1997b), Burns *et al.* (2003), Carriker (1910), David & Gosselin (2002a), Davis (1972), Foster & Johnson (1974), Garrigues & Dean (2007), Greenberg (1981a), Isler & Isler (1999), Marín & Schmitt (1991), Olson (1981c), Parker *et al.* (1985), Remsen *et al.* (2010), Ridgely & Gwynne (1989), Robbins *et al.* (1985), Slud (1964), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984).

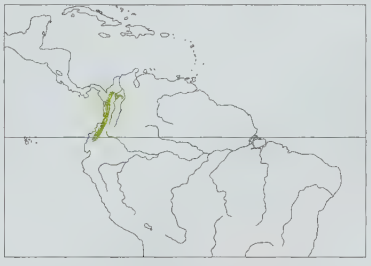
Genus *ERYTHROTHLYPIS* Berlepsch, 1912

177. Scarlet-and-white Tanager

Erythrothlypis salmoni

French: Tangara rouge **German**: Seidenflankentangare **Spanish**: Tangara Rojiblanca

Taxonomy. *Dacnis salmoni* P. L. Sclater, 1886, Remedios, Antioquia, Colombia.
Originally described in genus *Dacnis*, then transferred to *Nemosia*, and later placed in present monotypic genus. More recently, has been included within *Chrysothlypis* by some, but plumage very different, and the two also differ substantially in behaviour and in some morphological features; provisionally retained in monotypic genus. Thorough review of relationships, including molecular analysis, is warranted. Monotypic.
Distribution. N base of W & C Andes of Colombia (Antioquia S to middle Magdalena Valley) S on Pacific coast and slope to NW Ecuador (Esmeraldas).



Descriptive notes. 12 cm; male 9·8–14·5 g. Comparatively thin tanager, male with highly distinctive plumage. Male has head, throat and entire upperparts scarlet, lesser and median upperwing-coverts red (darker than body plumage), greater coverts and primary coverts dusky, broadly edged red, flight-feathers and tertials brownish-black, edged red, wingtips black (no edging); tail feathers tinged brownish and edged red; narrow median stripe down breast and belly scarlet, rest of underparts white, undertail-coverts red; iris brown; upper mandible dusky, lower mandible pale yellow; legs greyish-horn. Female is very different from male, bronzy olive-brown above, wing-coverts and flight-feathers dusky, edged brownish-olive (wing looks brownish-olive), primary coverts dusky; tail dark brown, edged olive; throat and chest tinged yellowish-buff, often a hint of yellowish-buff on median line of breast in pattern similar to that of male; rest of breast, and especially sides and flanks, whitish. Immature male is much like female, and probably indistinguishable from it; subadult male olive like female, but with patches of red showing. Voice. Possible song a weak, high-pitched and relatively short "ti ti ti-te-te-taheét", variable in length; undistinguished and easily overlooked, except for somewhat stronger note at end. During foraging or flying a weak, sibilant "chip" or "sciip".
Habitat. Borders and openings in foothills where there is stunted second growth, and especially dense, stunted or low mossy woodland along foggy ridgetops, on steep canyon slopes, and around steep, mossy, regenerating landslide scars; in areas of tall wet forest mainly at openings, light-gaps and in disturbed areas where vegetation is shorter with dense mossy regrowth. From c. 25 m to 1200 m, but uncommon and local in lowland areas, e.g. around Bahía Solano (Chocó), in Colombia; more numerous above c. 300 m in foothill regions.
Food and Feeding. Fruit and arthropods. In study in W Valle (Colombia) 58% of observed feeding records involved fruit, the remainder insects and other small arthropods. At least 11 species of fruit recorded in diet; 51% of all records were of arillate fruits, e.g. *Tovomitopsis* (Guttiferae) and *Clusia*, and a further 36% were of *Miconia* berries. Found in pairs, in family parties and in small groups of up to about six individuals, foraging alone or with mixed-species flocks containing other tanagers, especially *Tangara*. Forages actively, gleaning in outer foliage, hanging from leaves, and hovering. In W Valle, arthropod prey taken in crown of shrubs and trees, mostly 4·5–15 m up, rarely below 3 m. Of insect-hunting records, 61% of captures were made by gleaning, reaching or quick darting movements, mostly to foliage, more rarely from small branches (less than 3 cm in diameter), leaf petioles, flowerheads and fruit surfaces; 23% of captures made during sallies to air or flutter-pursuits, 8% during hovering and 7% by sallying to leaves and flowers. Often obtains arillate fruits by hovering. Gulps small berries, pecks pieces from larger items.
Breeding. Stub-tailed fledglings seen in Apr and May. Young of a previous generation may assist at the nest. No other information.
Movements. Resident. No local or migratory movements recorded during 16-month study with ringed birds in R Anchicayá, in Valle del Cauca (Colombia).
Status and Conservation. Not globally threatened. Restricted-range species: present in Nechí Lowlands EBA and Chocó EBA. Uncommon to locally fairly common. Occurs in several protected areas in Colombia, including Los Farallones de Cali, Ensenada de Utría and Tatamá National Parks, possibly also Sanquianga National Park and one or more protected areas in SW Colombia; has been found also in the newly established and privately operated La Reserva Arrierito Antioqueño (in N Antioquia), and occurs within the upper Anchicayá Valley, which is a privately protected hydropower watershed. Range includes extensive areas of habitat that are not protected but remain mostly intact. Deforestation is widespread and expanding throughout range, especially in foothills, including in NW Ecuador, and the species can be assumed to be declining. Because it readily utilizes landslides and other disturbed sites on steep slopes, however, it may not face immediate risk.
Bibliography. Athanas (2005), Chapman (1917, 1926), Dunning (1982), Haffer (1975), Hellmayr (1936), Hilty (1997, 2009b), Hilty & Brown (1986), Jahn *et al.* (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008).


inches 2
cm 5
PLATE 20
ssp speciosum
178
ssp amazonum
179
ssp cyanochroum
ssp leucogenys
180
181
ssp cinereum
182
ssp littorale
ssp pallidum
183
ssp sitticolor
ssp cyaneum
ssp intermedium
ssp albifrons
184
ssp atrocyaneum
ssp sordidum
185
186
187

Genus *CONIROSTRUM*

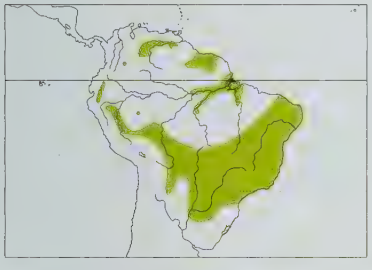
d'Orbigny & Lafresnaye, 1838

178. Chestnut-vented Conebill

Conirostrum speciosum

French: Conirostre cul-roux **German**: Rotsteiß-Spitzschnabel **Spanish**: Conirrostro Culirrufo

Taxonomy. *Sylvia speciosa* Temminck, 1824, Rio de Janeiro, Brazil.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. This species was originally placed in genus *Ateleodacnis*, and some taxonomists argue that it, along with the other lowland conebills (*C. leucogenys*, *C. bicolor* and *C. margaritae*), should be returned to that genus; as a group they are morphologically quite distinct from most highland members of present genus. Three subspecies recognized.
Subspecies and Distribution.
C. s. guaricola Phelps, Sr & Phelps, Jr, 1949 – E Guárico and W Anzoátegui, in NE Venezuela.
C. s. amazonum (Hellmayr, 1917) – E of Andes in W Venezuela (Apure) and E Colombia (S to Meta and N Vichada); E Ecuador and E Peru; and C Guyana E to N French Guiana, and N Brazil (NE Roraima, E Amazonas and W, C & NE Pará).
C. s. speciosum (Temminck, 1824) – SE Peru and Bolivia (except W) E across SC Brazil (to Maranhão, S to Mato Grosso, Paraná and São Paulo), Paraguay and NW & NE Argentina (Jujuy; E Formosa, N Corrientes and Misiones).



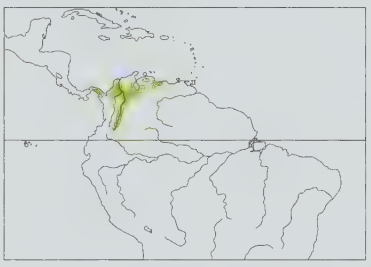
Descriptive notes. 11 cm; 8–9 g (Argentina). Small, rather dark conebill. Male nominate race has head and upperparts rather dark greyish-blue, lores and subocular area paler ashy grey, becoming whitish on lower (sometimes also upper) eyelid; lesser and median upperwing-coverts dark blue-grey, greater coverts dusky, broadly edged blue-grey; primary coverts blackish, flight-feathers, tertials and tail dusky, edged blue-grey, sometimes a small whitish patch at base of outer primaries; throat and underparts slightly paler, more bluish-grey, becoming greyish-white on belly; undertail-coverts contrastingly chestnut; iris dark reddish-brown; bill blackish; legs dark grey. Female has bluish-grey crown and nape, indistinct and variable whitish supraloral line, sometimes extending into weak supercilium, olive-green upperparts, including wings and tail; throat and underparts, including undertail-coverts, dull greyish-white, tinged with variable amount of buff. Juvenile is like female but duller, with head olive (like back). Races differ mainly in darkness of plumage, nominate palest (especially below); *amazonum* is close to nominate, but lores and subocular area blue-grey like rest of head (not paler) and underparts darker, female also slightly darker overall than nominate female; *guaricola* is intermediate in plumage colour between previous and nominate, and usually has tiny white spot at base of primaries. Voice. Song, in Venezuela, a very high, thin "tidé, tidé, tidé, tidé, ti'dee'rít" at leisurely pace, weak and easily overlooked; in Peru described as a series of repetitive phrases composed of high, squeaky notes, e.g. "tsip'er-tséé tsip'er-tséé tsip'er-tséé...", like that of a hummingbird (Trochilidae) in pattern and quality; in NE Brazil (Ceará) a repetitive, high-pitched "sa-séét, sa-séét, sa-séét..." at about one phrase per second for up to 15 seconds or longer. Calls include "tic" and "ti" notes during foraging.
Habitat. In Venezuela mainly in dry strongly seasonal areas, where occurs in canopy of gallery forest and treetops in scattered open groves of large trees, e.g. *Pithecellobium* and Leguminosae/Mimosoideae. In Ecuador found in canopy and borders of humid forest and secondary woodland, mainly in or near foothills. Local along R Amazon and its tributaries in canopy of fairly young successional-stage vegetation, including *Cecropia*, *Inga*, *Ficus* (figs), *Gynerium* cane, and Mimosoideae, on river islands and *várzea* riverbanks. In S Brazil and N Argentina found in dry open woodland and disturbed areas with taller trees. In all areas favours woodland where Leguminosae/Mimosoideae with small pinnately compound leaves predominate (e.g. *Pithecellobium*, *Albizia*). Sea-level to c. 200 m in Venezuela; c. 400–1200 m in Ecuador; to c. 600 m (rarely 900 m) in Peru; to 1300 m or possibly more in SE Brazil.
Food and Feeding. Diet little known; insects, possibly nectar. Seen in pairs and in families of 3–5 individuals; in SE Ecuador up to six seen together. Occurs with small mixed-species flocks or alone about equally; in SE Peru noted as foraging in association with Buff-fronted Foliage-gleaner (*Philydor rufus*) and *Ramphocelus carbo*. Active and full of nervous energy, but easily overlooked as it forages high in small leaves of outer foliage of spreading branches. Especially fond of searching tiny leaflets and axils of doubly compound foliage of legumes (Leguminosae), busily hustling from one spray of leaflets to the next, often hanging upside-down to probe and glean. May also use or key on damaged leaves locally. In SE Ecuador seen to forage in flowering trees, possibly taking insects or nectar.
Breeding. No information on season. Nest in E Brazil (Minas Gerais) a tiny cup made from leaf petioles and fibres, hidden in curled dead *Cecropia* leaf hanging from thin vine 4·5 m up at edge of forest bordering a road (nest differed from that of some congeners in being built from plant material, rather than animal product such as horsehair, feathers); contained 3 eggs, bluish-green with brown spots, dimensions 16·3–17·4 × 12–12·6 mm. No other information.
Movements. Resident. No certain local or migratory movements known.
Status and Conservation. Not globally threatened. Widespread, in varying abundance. Uncommon in Venezuela; rare and local in Ecuador; uncommon and local along R Amazon river and its tributaries. Can be found in a number of large protected areas, including Manu National Park (Peru), Calilegua and Iguazú National Parks (Argentina) and Poço das Antas Biological Reserve and Amazonia, Tijuca and Iguaçu National Parks (Brazil). Because this species occurs in a wide variety of secondary, disturbed and open woodland situations, as well as in areas where the impact of human settlement is often small, it is to a considerable extent secure against near-term or longer-term risks.
Bibliography. Albano (2006), Beecher (1951a), Burns (1997a), Burns & Racicot (2009), Burns *et al.* (2002, 2003), Fjeldså & Krabbe (1990), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), Lovette & Bermingham (2002), Lysinger *et al.* (2005), Marantz & Zimmer (2006), Meyer de Schauensee (1970a), Narosky & Di Giacomo (1993), Naumburg (1930), Oren & Parker (1997), Pacheco *et al.* (2007), de la Peña & Rumboll (1998), Ribon & Simon (1997), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Ridgway (1902), Salaman *et al.* (2002), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Zimmer (1942a).

179. White-eared Conebill

Conirostrum leucogenys

French: Conirostre oreillard **German**: Weißohr-Spitzschnabel **Spanish**: Conirrostro Orejiblanco

Taxonomy. *Dacnis leucogenys* Lafresnaye, 1852, Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. This species was originally placed in genus *Ateleodacnis*, and some taxonomists argue that it, along with the other lowland conebills (*C. speciosum*, *C. bicolor* and *C. margaritae*), should be returned to that genus; as a group they are morphologically quite distinct from most highland members of present genus. Three subspecies recognized.
Subspecies and Distribution.
C. l. panamense (Griscom, 1927) – E Panama (from Gulf of San Miguel E to Darién) and NW Colombia (Sinú Valley in Córdoba).
C. l. leucogenys (Lafresnaye, 1852) – N Colombia (Sucre, Atlántico, Magdalena and Cesar, and S in Magdalena Valley to Huila; E of Andes in Catatumbo lowlands of Norte de Santander) and adjacent W Venezuela (E across Zulia, Falcón and Yaracuy to Carabobo, in coastal cordillera).
C. l. cyanochroum (Todd, 1924) – W Venezuela in foothills of Sierra de Perijá and W base of Andes (Mérida).



Descriptive notes. 9·5 cm; c. 7 g. Small, short-tailed conebill with thin, sharply pointed bill. Male nominate race has crown and nape shiny black, contrasting white cheek and ear-coverts; upperparts dark bluish-grey, narrow white rumpband (usually hidden by closed wings); entire upperwing and tail dusky blue-grey; throat to belly pale grey with bluish tinge, centre of belly white, undertail-coverts chestnut; iris dark brown; bill black; legs dark grey. Female is dull bluish-grey above, with narrow, inconspicuous whitish rump; lores, narrow eyebrow, side of head and underparts pale buff (has rather pale, "blank" face), breast with olive tinge, belly with yellowish tinge. Juvenile male is plain brownish-grey above, and lacks white ear patch. Race *panamense* male differs from nominate in having decidedly darker plumage above and below, female also darker above and less olive; *cyanochroum* male is much like nominate, but slightly darker above and darker grey on breast, female more olive tinged on underparts and with little yellow. Voice. Song a high, thin, tinkling series of notes, "tsing-le, tséet-e-tséet" or similar variant, usually short, occasionally longer, to c. 1·5 seconds, complex, unmusical, and often slowing or fading at end. Often sings persistently, but easily overlooked.
Habitat. Dry to moist (semi-deciduous), open woodland, wooded borders, cacao plantations, gallery forest, and scattered tall spreading legumes in pastures; also in moist to humid evergreen forest and young to older second growth, especially where there are large legume trees. Sea-level to c. 800 m; once to 1300 m in Falcón, in Venezuela.
Food and Feeding. Few data on diet; arthropods and nectar taken. Lively pairs or parties of 3–5 individuals; sometimes with small mixed-species flocks. Sedulously gleans minute prey in high outer foliage of legumes and other medium-sized to tall trees with compound or pinnately compound leaves. Often hangs upside-down from leaves to check for minute insects or other arthropods. Sips nectar from *Erythrina* flowers, especially in dry season; may then come lower or to small trees, but otherwise usually remains high and easily overlooked. Foraging behaviour much as that of *C. speciosum*.
Breeding. In Colombia, pair building nest in Jan in upper Magdalena Valley (in Huila) and birds in breeding condition in Jan, Apr and May in N. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Can be found in a few protected areas, including El Paujil Reserve (Colombia) and in or near Morrocoy National Park and probably also Terepaima National Park (Venezuela). Thrives in a variety of second-growth habitats so long as there are scattered tall legumes or other open trees (especially with small compound leaves) along wooded borders or in pastures.
Bibliography. Beecher (1951a), David & Gosselin (2002a), Davis (1972), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), Meyer de Schauensee & Phelps (1978), Miller (1947), Quevedo *et al.* (2006), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ridgway (1902), Schäfer & Phelps (1954), Zimmer (1942a).

180. Bicolored Conebill

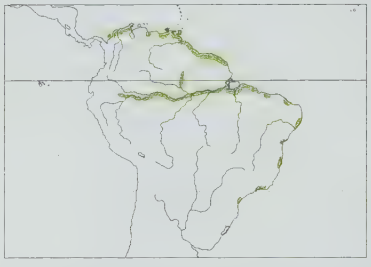
Conirostrum bicolor

French: Conirostre bicolore **German**: Zweifarben-Spitzschnabel **Spanish**: Conirrostro Bicolor

Taxonomy. *Sylvia bicolor* Vieillot, 1809, Cayenne, French Guiana.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. This species previously placed in *Ateleodacnis*, and some taxonomists argue that, along with the other lowland conebills (*C. speciosum*, *C. leucogenys* and *C. margaritae*), it should be returned to that genus; as a group they are morphologically distinct from most highland members of present genus. Two subspecies recognized.

On following pages: 181. Pearly-breasted Conebill (*Conirostrum margaritae*); 182. Cinereous Conebill (*Conirostrum cinereum*); 183. Blue-backed Conebill (*Conirostrum sitticolor*); 184. Capped Conebill (*Conirostrum albifrons*); 185. Rufous-browed Conebill (*Conirostrum rufum*); 186. Tamarugo Conebill (*Conirostrum tamarugense*); 187. White-browed Conebill (*Conirostrum ferrugineiventre*).

Subspecies and Distribution.
C. b. bicolor (Vieillot, 1809) – Colombia from SW of Cartagena (Fuerte I) E along coast, including Margareta I and Trinidad, locally to N & E Brazil (Amapá, and mouth of R Amazon, E then S very locally to São Paulo); also locally along R Branco (NC Brazil).
C. b. minus (Hellmayr, 1935) – both banks of R Amazon in NE Peru, SE Colombia and Brazil E to vicinity of R Madeira and R Tapajós, and probably (records spotty) to near mouth of R Amazon.



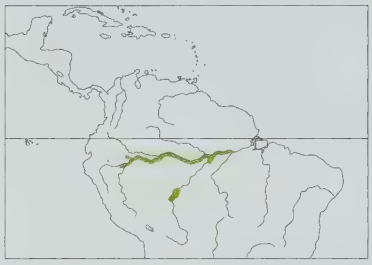
Descriptive notes. 11·4 cm; 10·5–11 g. Small dull, bluish-grey conebill with thin bill. Male nominate race has crown, nape and upperparts, including upperwing-coverts, dull pale bluish-grey, tail blue-grey, flight-feathers dusky, inner ones and tertials edged pale bluish-grey; lores and facial area pale grey, becoming dingy pale greyish-buff below, with throat and lower underparts palest; iris dull orange-red to dark red; bill bluish-grey; legs dull greyish-pink. Female is similar to male or slightly duller; underparts pale greyish-buff. Immature is dull olive above, including crown, nape, back and rump, and distinctly yellowish below, brighter on throat and breast, but amount of yellow variable; iris dark red, more or less as that of adult. Race *minus* differs from nominate in decidedly smaller size, rufescent tinge on underparts, especially undertail-coverts, and slight rufescent (not greyish) tinge on ear-coverts. Voice. Infrequently heard song in coastal Venezuela a high-pitched, squeaky and somewhat buzzy "pfits, t'wit'wit'wit'chit" or similar; in coastal mangroves of Brazil varies from short 2-note or 3-note phrases to much longer, complex, squeaky and fussy songs, e.g. "tzúu'eet, ..." repeated over and over (first note strongly emphasized) or much more complex "tsit-péu, tsit'tsit'pee'pee, zuu, tsit'tsit...", rather jerky and sputtering; in inland Brazil described as "tséédi, tséédi-didelide, tséédi, léédi'léé-zrrr". At least in some areas reminiscent of songs of *Coereba flaveola*, and everywhere much shorter than and quite unlike longer and much faster songs of *C. margaritae*. Soft calls, during foraging, include high, sibilant "tsik", also "pit-sik" and "few-it-sip".
Habitat. Found in two distinct habitats: first, on N coast, occurs locally in mangroves (red, black, white, etc.), and sometimes in adjacent low flooded forest (but always near mangroves and closely associated with them); second, along R Amazon and a few of its major tributaries, found in shrubby younger successional stages of vegetation on river islands and riverbanks. Sea-level to c. 100 m. In coastal mangroves from Colombia E to the Guianas generally not found together with resident "chestnut-headed" races of Yellow Warbler (*Dendroica petechia*), one or the other species (but not both) occurring in mangrove sites, although exact nature of possible competitive interactions between these two species is not well understood; present species is, however, found together with migrant Yellow Warblers in mangroves.
Food and Feeding. Diet poorly known; small arthropods taken. Occurs in pairs and family parties; usually not with mixed-species flocks, although occasionally loosely associated with a few other species in mangroves. Keeps in middle to upper levels of foliage, occasionally down to eye level, as it peers and probes into tight clusters of small leaves. Busily gleans for small arthropods in foliage and twigs of shrubs and trees on river islands; on river islands may use damaged leaves of *Cecropia*. Searches leaf surfaces (possibly the upper surfaces more) in mangroves. Easily attracted to source of squeaking noises, and will often closely approach a human observer.
Breeding. Season Feb–May in N Colombia (La Guajira). in N of range, nest a small, compact, deep cup of grass mixed with feathers, placed 0·3–4 m up in fork of mangrove branch. Clutch 2 eggs, pale buff with dark brown blotches, mainly at larger end. Nests in Trinidad often parasitized by Shiny Cowbird (*Molothrus bonariensis*). May breed in immature plumage. No further information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common locally in coastal N portion of range; uncommon and very local in Amazonia. Occurs in a few protected coastal areas, including Salamanca National Park and probably also Corales del Rosario National Park (Colombia), Morrocoy National Park (Venezuela) and Wia-Wia and Galibi Nature Reserves (Suriname). Destruction of mangrove habitats in coastal portion of its range is the most important threat facing this species. It may not occur in any protected zones within its river-island distribution in Amazonia, although relatively little pressure from habitat destruction here. Extensive forest clearing, however, has occurred on larger islands in lower parts of Amazon.
Bibliography. Amorim & Piacentini (2007), Beecher (1951a), Burns *et al.* (2003), David & Gosselin (2002a), Ffrench (1991), Haverschmidt (1954b), Haverschmidt & Mees (1994), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), Lefebvre *et al.* (1992), López-Lanus (2001), Lovette & Bermingham (2002), Meyer de Schauensee & Phelps (1978), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Ridgway (1902), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Sick (1985, 1993), Sidnei de Melo (2004), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Zimmer (1942a).

181. Pearly-breasted Conebill

Conirostrum margaritae

French: Conirostre marguerite **German**: Perlbrust-Spitzschnabel **Spanish**: Conirrostro Pechigrís

Taxonomy. *Ateleodacnis margaritae* Holt, 1931, north bank of Amazon at Ceo de Arary, above Parintins, Amazonas, Brazil.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. This species was originally placed in genus *Ateleodacnis*, and some taxonomists argue that it, along with the other lowland conebills (*C. speciosum*, *C. leucogenys* and *C. bicolor*), should be returned to that genus; as a group they are morphologically quite distinct from most highland members of present genus. Monotypic.
Distribution. NE Peru on banks of lower R Napo (sightings to 50 km or more above mouth) and banks of R Amazon (vicinity of Iquitos), E in Brazil to vicinity of R Jamunda (R Nhamundá); isolated record near junction of R Beni and R Iténez (in Brazil known as R Guaporé), Bolivia.
Descriptive notes. 11·5 cm. Closely resembles *C. bicolor*. Has crown to nape and upperparts, including upperwing-coverts and tail, dull pale bluish-grey, flight-feathers dusky, narrowly edged grey, secondaries and tertials broadly edged and tinged pale grey; facial area, throat and underparts more or less uniformly pale grey, belly and crissum pale greyish-white to whitish; iris pinkish to dull reddish-pink with sandy tinge; bill dusky; legs pinkish to pale pinkish-brown. Differs from very similar *C. bicolor* in slightly paler upperparts and lack of buff tones below. Sexes alike. Immature is entirely dull olive above, with facial area and underparts dull yellowish, sides and flanks tinged olive; almost identical to immature of *C. bicolor*, and best told by habitat and by identity of accompanying adults. Voice. Song a long-sustained (up to 15 seconds or more) series of high-pitched, squeaky chipping notes, rapid and somewhat jumbled, but distinctive once learned, and very unlike that of *C. bicolor*; often notably vocal, singing until mid-morning and at intervals throughout day from high perches in *Cecropia* trees; frequently, several individuals may be heard singing at once. Thin, weak and easily overlooked calls include high "teep" and rapid "ti-ti-ti".



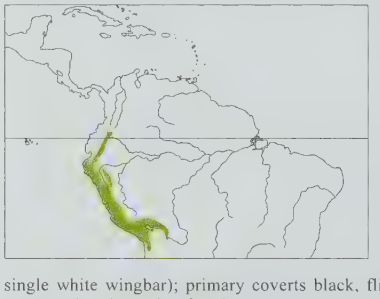
Habitat. Lines of mostly middle-aged *Cecropia* trees that form distinctive successional stage of colonizing vegetation on river islands along R Amazon and its major tributaries. These *Cecropia* are typically found in zones immediately following tall cane (*Gynerium*) and preceding figs (*Ficus*), and are replaced eventually by older more diverse successional vegetation stages. Seems not to use second growth that is significantly older (more diverse) or younger (e.g. not in *Tessaria*), nor does it utilize scrubby vegetation. Sea-level to c. 150 m.
Food and Feeding. Not well known. Diet probably small arthropods. Usually seen in loosely associated pairs or small groups that work rapidly through leafy canopy layer of mostly middle-aged *Cecropia*. Gleaning actions on leaves suggest that diet consists mostly of small insects, and this species is believed to concentrate on areas where leaf damage to *Cecropia* leaves is extensive.
Breeding. No information.
Movements. Not well documented, but because species' habitat is a relatively brief successional vegetation age-stage, populations are exceptionally dynamic, with numbers building quickly at suitable sites and individuals then dispersing quickly to new river-island sites. Dispersal distances unknown but populations highly mobile.
Status and Conservation. Not globally threatened. Generally rare or local; fairly common in some places. In appropriate even-aged stands of *Cecropia* on Amazonian river islands, may be not uncommon. Although present on river islands opposite Amazonas (SE Colombia), apparently no records yet in Colombian territory. Not known to occur in any protected areas, but annual cycles of flooding in its island habitat have, to this point, largely precluded significant human settlement or habitat alteration. This species may be largely buffered from problems associated with human-caused habitat loss because it uses, under normal conditions, a short-lived successional vegetation stage and is apparently well adapted to frequent dispersals; because of relatively ephemeral nature and high turnover rates of micro-habitat that it favours, presumed to be able to move easily from one river island to another, and rapidly to colonize appropriate habitat when it appears.
Bibliography. Beecher (1951a), Ridgely & Tudor (1989, 2009), Ridgway (1902), Rosenberg (1990), Schulenberg *et al.* (2007), Sick (1985, 1993), Souza (2002), Whittaker (2004), Zimmer (1942a).

182. Cinereous Conebill

Conirostrum cinereum

French: Conirostre cendré **German**: Weißstirn-Spitzschnabel **Spanish**: Conirrostro Cinéreo
Other common names: Fraser's Conebill (*fraseri*)

Taxonomy. *Conirostrum cinereum* d'Orbigny and Lafresnaye, 1838, Yungas, Bolivia.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Coastal race *littorale*, differing from others in plumage, may merit recognition as a separate species; replaced at higher elevations in Peruvian Andes by nominate, and apparently no intergrades known. N race *fraseri* differs even more from nominate, and may likewise represent a separate species. Three subspecies recognized.
Subspecies and Distribution.
C. c. fraseri P. L. Sclater, 1859 – Colombia in S part of C & E Andes (Cauca) S to S Ecuador.
C. c. littorale Berlepsch & Stolzmann, 1896 – W & NE Peru (W coast and W slope of Andes from Cajamarca, and E slope of Andes in upper Marañón Valley) S to N Chile (Tarapacá).
C. c. cinereum d'Orbigny & Lafresnaye, 1838 – C highlands and tree-line on E slope of Andes in Peru (from Huánuco) S to N Bolivia (La Paz, Cochabamba and Potosí) and N Chile.



Descriptive notes. 12–12·5 cm; 7·8–10·3 g (Chile). Greyish conebill with thin, sharply pointed bill. Nominate race has crown dusky, narrow white band on base of forehead extending rearwards as prominent white supercilium to side of rear crown, narrow dusky loral line extending through eye; side of head greyish, somewhat mixed dusky; nape and upperparts dingy grey to brownish-grey; tail dusky, tinged greyish and edged light grey; bend of wing white (usually concealed), lesser upperwing-coverts grey, median coverts dusky, edged dull pale grey, greater coverts dusky, edged grey and tipped white (forming single white wingbar); primary coverts black, flight-feathers dusky, edged pale grey, base of central primaries white (forming small L-shaped or T-shaped white patch joining single wingbar), tertials dusky, broadly edged white; below, light grey with faint brownish wash, belly and undertail-coverts greyish-buff; iris dark brown; bill black; legs dusky. Sexes similar. Juvenile has feathers of back and breast faintly tipped dusky, supercilium and underparts weakly tinged yellowish; immature similar to adult, but with buff wash on wingbars and edges of tertials. Race *fraseri* is slightly larger and darker than nominate, with crown and back greyish with brownish-olive tinge, long supercilium buff in front and fading to buff-white rearwards, underparts brownish-clay to rich buff; *littorale* is similar to nominate, but supercilium shorter, upperparts and crown tinged olive, and throat and underparts tinged buff, palest on throat. Voice. Infrequently heard song a fast jumble of twittering notes and phrases, rather like those of several congeners. In Chile song described as a fast, buzzy chatter lasting for more than a second, notes typically doubled, e.g. "ch pee'ch, pee'ch, pee'ch...". High thin "teep" call easily overlooked.
Habitat. In Andean highlands found near tree-line in dry to moderately humid zones, especially bushy woodland borders, patches of dense stunted shrubbery, gardens and other lightly wooded, drier habitats, also in *Polylepis* woodland. Race *littorale* of coastal desert and arid W slope of Andes (in Peru and NW Chile) occurs in shrubs, gardens, scrubby vegetation on slopes, and riparian vegetation along dry streambeds. At 2600–3600 m in Colombia; 2300–4000 m (mostly 2500–3500 m) in Ecuador; sea-level to 4500 m in Peru and Chile; probably mainly above c. 3000 m in Bolivia.

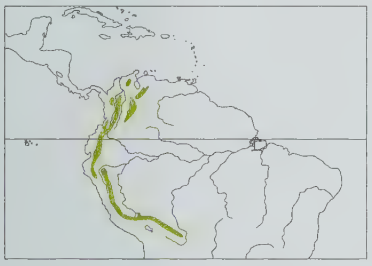
Food and Feeding. Food items appear to be mainly small insects. Seen singly, in pairs and in small parties (perhaps families); sometimes with small mixed-species flocks. Forages in active, nervous matter, gleaning from foliage of dense shrubs and stunted trees, often quite low, and sometimes clinging upside-down to inspect leaf and twig surfaces.
Breeding. Eggs in Nov in N Chile and Apr in Bolivia (La Paz); fledglings in Jun in Ecuador (Huánuco) and Aug in Bolivia (La Paz); territorial dispute and display in May and juvenile/immature, also in May, in Peru; juvenile/immature in Jul (Nariño), food-carrying adult in May and birds in breeding condition in Feb in Colombia. Nest is a woven cup made of fibres and vegetable down, and lined with horsehair; clutch 3 eggs, pale greyish-blue, thickly dotted purplish-grey. No further information available.
Movements. Mostly resident. Some local or seasonal movements likely, especially in dry tree-line zones.
Status and Conservation. Not globally threatened. Fairly common. Occurs in a number of protected areas, including Puracé National Park (Colombia), Sangay, Cajas and Podocarpus National Parks (Ecuador), Manu National Park (Peru) and Madidi and Amboró National Parks (Bolivia). Favours scrub and brushy habitat, including settled and disturbed areas, and risks to this species, whether in near term or longer term, are minimal.
Bibliography. Balderrama (2009), Burns (1997a), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Jaramillo (2003), Johnson & Goodall (1967), Koepcke (1970), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), de la Peña & Rumboll (1998), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Vogt (2006), Walker (2001), Zimmer (1942a).

183. Blue-backed Conebill

Conirostrum sitticolor

French: Conirostre à cape bleue **Spanish**: Conirrostro Dorsiazul
German: Blaurücken-Spitzschnabel
Other common names: Bolivian Conebill (*cyaneum*)

Taxonomy. *Conirostrum sitticolor* Lafresnaye, 1840, Santa Fé de Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Four subspecies recognized.
Subspecies and Distribution.
C. s. pallidum Aveledo & Pérez, 1989 – Sierra de Perijá (Cerro Viruela), in NW Venezuela, and probably also in adjacent Colombia.
C. s. intermedium Berlepsch, 1893 – Andes in Venezuela (Trujillo, Mérida and N Táchira).
C. s. sitticolor Lafresnaye, 1840 – Andes in Venezuela (S Táchira), and from Colombia S to N Peru (Piura, Cajamarca and Amazonas).
C. s. cyaneum Taczanowski, 1875 – Andes of Peru (from Huánuco) S to Bolivia (La Paz, Cochabamba and W Santa Cruz).



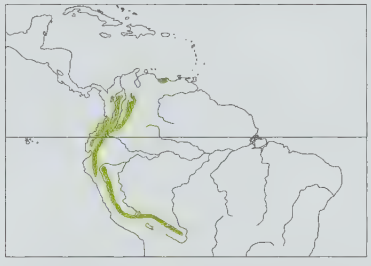
Descriptive notes. 13 cm; 9·6–13·7 g (Colombia). Small, high-elevation conebill with dark head and throat, blue back and rich rufous lower underparts; rather narrow, sharply pointed and conical bill. Nominate race has entire head, neck and throat black (in S part of range, with narrow blue postocular stripe extending to nape); nape and upperparts deep blue; tail blackish, feathers narrowly edged blue (obscurely on inner feathers); lesser upperwing-coverts light blue, median coverts dusky, broadly edged blue, greater coverts blackish, edged blue; primary coverts black, flight-feathers blackish, narrowly edged blue (inconspicuous), tertials black, more broadly edged blue; chest to undertail-coverts deep ferruginous; iris dark brown; bill black; legs blackish. Sexes alike. Immature is duller grey-blue on back and throat than adult. Race *intermedium* is much like nominate, but with prominent blue stripe extending rearwards from eye to join blue of nape and upperparts; *pallidum* differs in having blue postocular stripe faint and underparts rufous (paler than other races); *cyaneum* has blue eyestripe longer, extending anteriorly to above eye, and throat and chest dark blue. Voice. Song, mostly at dawn, fast and energetic, a high-pitched, highly complex, bubbly jumble of chipping and twittering notes rather like that of some congeners and some *Diglossa*, e.g. rapid "chipapita-chipapita, jeet, chipapita...", repetitious and somewhat musical, lasting for up to 6 seconds, and sometimes given over and over again with only brief pauses. Call include an insignificant high "tsi" and "sew".
Habitat. Humid montane forest, forest borders, and stunted elfin woodland up to tree-line. At 2550–3500 m (sightings to 2300 m) in Venezuela, 2600–3700 m in Colombia, mostly 2500–3500 m (once to 3800 m) in Ecuador, and at similar elevations in Peru and Bolivia; most numerous near tree-line or slightly below.
Food and Feeding. Mainly insectivorous. Occurs in active pairs and in small groups, most often with mixed-species flocks containing other tanagers, small tyrant-flycatchers (Tyrannidae) and New World warblers (Parulidae). A quintessential "gleaner" of minute items from axils of stiff, dense whorls of leaves and on twig and other leaf surfaces, which it finds by peering downwards or stretching upwards to overhead surfaces. Hops in dense foliage, also hangs upside-down to probe moss, and occasionally executes short sallies to air. Frequently forages and sings from fairly exposed sites, and not particularly difficult to see.
Breeding. In Colombia, fledglings in Nov and Jan (Cundinamarca and Cauca), juveniles/immatures in Feb, Jul, Sept and Oct (Andes) and two breeding-condition birds in Feb and Jul, respectively (C Andes); fledglings and juveniles in Jul and Aug in Ecuador, in Apr, Jun, Oct and Nov in Peru, and in Sept and Oct in Bolivia. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common. Can be found in numerous protected areas, among them Sierra Nevada and Tamá National Parks (Venezuela), Chingaza, Puracé, Los Nevados (Tolima) and Nevado de Huila National Parks (Colombia), Cajas, Sangay and Podocarpus National Parks (Ecuador), Tingo Maria and Manu Parks (Peru), and Madidi National Park (Bolivia). This species' range also includes a considerable extent of suitable habitat that is not protected, but is at relatively low risk in the short term. Most serious long-term risk is deforestation.
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (2000), Aveledo Hostos & Pérez Chinchilla (1989), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Johnson & Goodall (1967), Krabbe *et al.* (2001), Lovette & Bermingham (2002), Meyer de Schauensee (1966, 1970a), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Zimmer (1942a).

184. Capped Conebill

Conirostrum albifrons

French: Conirostre coiffé **German**: Kappenspitzschnabel **Spanish**: Conirrostro Coronado
Other common names: Blue-capped Conebill ("*atrocyaneum* group"); White-capped Conebill (*cyanonotum*, *albifrons* and *centralandium*)

Taxonomy. *Conirostrum albifrons* Lafresnaye, 1842, Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Dark-crowned races *atrocyaneum*, *sordidum* and *lugens* have sometimes been regarded as representing a separate species. Six subspecies recognized.
Subspecies and Distribution.
C. a. cyanonotum Todd, 1932 – N Venezuela (coastal cordillera of Aragua, Vargas and Distrito Federal).
C. a. albifrons Lafresnaye, 1842 – W Venezuela (Andes of S Táchira) and W slope of E Andes of Colombia (S to latitude of Bogotá).
C. a. centralandium Meyer de Schauensee, 1946 – C Andes of Colombia (Antioquia S to W Huila, and on E slope in Nariño).
C. a. atrocyaneum Lafresnaye, 1848 – W Andes of Colombia (Antioquia S on W slope to Nariño) S through Ecuador to N Peru (Piura and Cajamarca).
C. a. sordidum Berlepsch, 1901 – Andes of C Peru (from Junín) S to N Bolivia (La Paz).
C. a. lugens Berlepsch, 1901 – Andes of Bolivia (Cochabamba and Santa Cruz).



Descriptive notes. 13–13·5 cm; 11·7–21·5 g (Colombia). Medium-sized conebill with thin, sharp bill and tail-wagging habit. Male nominate race has crown snowy white; rest of plumage mostly dull black, becoming ultramarine-blue on scapulars and lower mantle, down onto uppertail-coverts (bluish tinge most obvious in hand); tail dusky, tinged dark blue, lesser upperwing-coverts glossed dark blue to violaceous, median coverts dull black, edged dark blue, rest of wing dull black, faintly edged dark blue; iris dark brown; bill dark grey, paler base; legs dark grey. Female has crown dull blue, becoming blue-tinged greyish on nape and side of head; upperparts olive-green, lesser wing-coverts pale green, greater coverts, flight-feathers and tail dusky, edged olive-green; throat, chest and median breast pale grey with hint of bluish tinge, sides, flanks and lower underparts contrastingly yellowish-olive. Immature is much like female; subadult male (in transitional plumage) resembles female, but shows blue on shoulders and bluish-black on back. Races differ mainly in crown colour of male: *centralandium* is much like nominate, but crown often flecked with blue, underparts tinged bluish, and rump brighter; *cyanonotum* has crown deep violet-blue with faint silvery streaking, often the pale streaks mixed with a few dark blue feathers; *atrocyaneum* has crown deep purplish-blue; *sordidum* has crown brighter blue than previous, outer margins of primaries faintly greenish (instead of bluish), and plumage overall with less ultramarine gloss, female crown darker blue than previous; *lugens* is very similar to last, but plumage with more ultramarine gloss. Voice. Infrequently heard song, mainly at dawn, a high-pitched and penetrating "itsu-tseeu, tsu-tseeu, tsu-tseeu", usually preceded by jumbled "tsududuit"; in Peru, described as variable, but usually high-pitched and wiry, repetitive series of notes, sometimes with different ending, "ti-teeteetee tzeew-tzeew"; in Cuzco (SE Peru), song at dawn a short, high and weak "tzeet! tee-tee-tzeeeeu", with high thin "teet" note irregularly between songs. Calls a rich "tchew" and high "sick".
Habitat. High humid and wet montane forest, especially at forest borders; also older disturbed vegetation, alders (*Alnus*) in landslides, and taller second growth. Recorded at 1500–3000 m, most records at or above c. 2000 m; in coastal cordillera of N Venezuela, race *cyanonotum* occurs mainly from 1850 m to 2000 m (maximum elevation of much of the cordillera); common down to c. 2000 m in Urubamba Valley, in S Peru.
Food and Feeding. Diet mainly (possibly entirely) insects. Forages singly or, more often, in pairs or small groups, and as a rule is seen with mixed-species flocks containing small tyrant-flycatchers (Tyrannidae), *Diglossa* flowerpiercers and other tanagers. Food items gleaned or picked from leaves, leaf axils and bud tips in high outer foliage; rarely seen lower down. Moves actively, usually working outwards along branches with peculiar, slightly crouching and twisting gait, this accentuated by habit of continually flicking up tail. Also occasionally hangs upside-down or with head downwards to inspect surfaces briefly.
Breeding. Birds in breeding condition in Mar–Sept in Andes of Colombia. No further information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Generally fairly common over much of range. Occurs in numerous protected areas, among them El Avila, Henri Pittier, Guaramacal, Sierra Nevada and Tamá National Parks (Venezuela), Chingaza, Cueva de los Guacharos, Puracé, Las Orquídeas and Farallones de Cali National Parks and Reinita Cielo Azul, Tambito and Río Blanco de Manizales Nature Reserves (Colombia), Sangay and Podocarpus National Parks (Ecuador), Manu National Park (Peru), and Madidi National Park (Bolivia). This species utilizes both primary forest and a variety of older-stage second-growth woodland types, including alders in landslides; it is not at risk in the foreseeable future. In the longer term, deforestation and forest fragmentation may pose a risk.
Bibliography. Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (1999), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Walker (2001), Yuri & Mindell (2002), Zimmer (1942a).

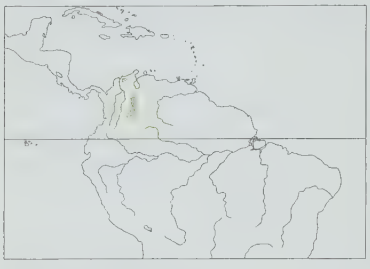
185. Rufous-browed Conebill

Conirostrum rufum

French: Conirostre roux **German**: Rotbrauen-Spitzschnabel **Spanish**: Conirrostro Rufo

Taxonomy. *Conirostrum rufum* Lafresnaye, 1843, Santa Fé de Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Monotypic.

Distribution. E Andes from W Venezuela (extreme S Táchira) S locally in adjacent Colombia from Norte de Santander (Páramo de Guerrero, W of Salazar) to latitude of Bogotá; also Santa Marta Mts (N Colombia).



Descriptive notes. 13 cm; mean 11 g. Small, dark *Conirostrum* with deep rufous face and underparts, and short, thin, sharply pointed bill. Has crown to uppertail-coverts plumbeous grey, often with brownish tinge on crown to mantle, not sharply defined from the ochre-cinnamon to chestnut-rufous on forehead, eyebrow, side of head and neck, and entire underparts, this colour being richest on forehead and eyebrow and duller on side of head, especially in duskier lores and postocular stripe; tail dusky; upperwing-coverts, flight-feathers and tertials dusky, base of outer flight-feathers sometimes with small narrow whitish spot (often obscure or absent) formed by white on outer web of a few outer primaries; tertials narrowly edged dull white to buffy white; iris dark brown; bill blackish; legs dark grey. Sexes similar. Juvenile is like adult, but duller, with underparts pale cinnamon to buff-coloured. Voice. Song, mainly at dawn, a very fast short, squeaky phrase, "ta-twée-ta-twéet", about one phrase per second, repeated up to 15 times or more without interruption in fast, complex stream of notes, often with additional notes squeezed in between each phrase; accented notes in each phrase form unmusical rhythmic pattern or "beat"; songs also may be more complex, but typically include repetitive, accented notes or phrases repeated over and over that lend a rhythm to the song, e.g. "ta'ta'te'pfitsa'pfitsa'pfitsa'ta'ta'ti' pfitsa' ta'tati-e..." and so on, in rapid stream lasting up to 6 seconds or more.

Habitat. Bushy and shrubby vegetation in fairly dry to humid areas, including borders of humid and wet stunted forest and elfin woodland up to tree-line; shrubs and woody regrowth vegetation dominated by Andean oak (*Quercus humboldtii*) on drier hillsides, and in a mix of native and exotic trees in parks, gardens and urban areas (e.g. around Bogotá), and in shrubs and trees around small wetlands (*humedales*) on Sabana de Bogotá, and occasionally foraging out into tall reeds and sedges in marshes. Not found inside forest. Recorded at c. 2600–3300 m (tree-line) in Colombian Andes and Santa Marta Mts; in Venezuela, reported only at 2800 m (four specimens) in S Táchira (Cerro Retiro).

Food and Feeding. Mainly small insects. Encountered mostly singly or in pairs, less often in small groups which likely represent families; may follow mixed-species flocks containing small tyrant-flycatchers (Tyrannidae), *Diglossa* flowerpiercers and other tanagers, although more often seen foraging independently of them. Forages mostly in tops of shrubs, shorter vegetation and smaller trees or somewhat higher, but infrequently in tops of tall trees. Mainly probes and gleans from dense tufts of leaves, in leaf axils, dense flowerheads (e.g. Asteraceae), and gleans from twig surfaces, much in manner of *C. sitticolor*.

Breeding. In Colombia, fledglings found in Jul, Aug and Dec in Cundinamarca and Oct in Santander, and six birds in breeding condition in Feb–Sept in Santa Marta Mts and E Andes. Nest a small cup constructed from dry grasses and other plant material; one nest was located 2·5 m up in blackberry thicket (*Rubus*) at edge of road and was camouflaged with dry blackberry leaves incorporated into exterior. Clutch 2 eggs. No other information.

Movements. Resident. No migratory movements reported, although local seasonal movements possible; in marsh edges and semi-open areas at Parque La Florida, in Bogotá, more numerous during Jan–Apr than during May–Jul.

Status and Conservation. Not globally threatened. Restricted-range species: present in Colombian East Andes EBA and Santa Marta Mountains EBA. Locally fairly common to common. Reported as "rare" in Santa Marta Mts, but this may be an artefact of the difficulty of sampling appropriate habitat in this region. Few records from Venezuela. In Colombia, occurs in shrubby and cut-over areas, and is at least seasonally common in shrubby areas in Parque La Florida, in Bogotá, and shrubbery and trees around other wetlands; occurs also in Chingaza National Park (Cundinamarca), and in scrubby and cut-over vegetation in drier oak-dominated regions in N Boyacá (e.g. near Soatá); almost certainly occurs also in Tamá National Park. Despite small range, appears not to be threatened because of its ability to utilize bushy second growth.

Bibliography. Anon. (2000), Athanas (2010b), Carriker (1941–1954), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), López-Lanus (2007), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Todd & Carriker (1922).

186. Tamarugo Conebill

Conirostrum tamarugense

French: Conirostre des tamarugos **Spanish**: Conirrostro de Tamarugal
German: Rotstirn-Spitzschnabel

Taxonomy. *Conirostrum tamarugense* Johnson and Millie, 1972, in the northern area of the recently developed Tamarugo plantations which extend on either side of the Panamerican Highway in Lat. 20°30', Tarapacá, Chile.

Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Monotypic.

Distribution. SW Peru (arid highlands in Arequipa, Moquequa and Tacna) and N Chile (S, patchily, to Tarapacá).



Descriptive notes. 12·5 cm; two females from Chile each 10·5 g. Small greyish-and-rufous conebill with thin, sharply pointed bill. Male is dark grey above, with short bright rufous supercilium, grey lores, and rufous throat and chest (may not contrast strongly with grey of rest of plumage); tail dusky; bend of wing and lesser upperwing-coverts grey, median and greater coverts dusky, edged grey and tipped pale cinnamon (forming two narrow wingbars, often weakly indicated), flight-feathers dusky, edged pale grey and with small but prominent white patch at base of primaries (wingband most visible in flight); side of head, and underparts below rufous of throat and chest plain grey, becoming buffy white on centre of belly; undertail-coverts contrastingly rufous; iris dark brown; bill black; legs dark grey. Female is similar to male, but duller and browner. Immature is even duller and paler, with supercilium faint or lacking, wingbars narrower and paler (buff), and patch on throat and chest buff to chamois, or faintly indicated as a rusty wash, or almost entirely lacking, belly and undertail-coverts buff. Voice. Song resembles that of *C. cinereum*, a fast, buzzy jumble of squeaks lasting c. 1 second, with slightly higher-pitched single-syllable notes interspersed; in Chile described as a fast, buzzy chatter lasting less than 1 second, "chit-chit-chit-chit", resembling song of *C. cinereum* but notes single (not doubled) and higher-pitched. Call a high-pitched "tsee".

Habitat. Patches of sparse, low, scrubby woodland, especially *Polylepis* trees, also in *Gynoxys*, in dry and arid zones; in N Chile found mostly in mature tamarugo (*Prosopis tamarugo*) plantations, and to lesser extent in riverine scrub, agricultural land and citrus groves. Mainly at 3400–4100 m, rarely as low as 1300 m in Tacna (Calientes), in Peru; sea-level to c. 2950 m in Chile.

Food and Feeding. Poorly known. Diet includes caterpillars, especially those of lycaenid butterfly *Leptotes trigemmatus*. Forages in pairs and small groups; often in small mixed-species flocks with *C. cinereum* in Chile, and loosely associated with various furnariids in Peru. Gleans items from foliage.

Breeding. Season at least Sept–Dec, coinciding with seasonal blooming of tamarugo flowers (which provide food for *Leptotes trigemmatus* caterpillars); immature-plumaged birds in Jul in Peru (Arequipa) and Dec in Chile (Tarapacá). Breeds in tamarugo woodland in Chile. No other information.

Movements. Migratory. Following breeding (in Chile), migrates N to SW Peru, where apparently reported between about Apr and Nov. In Chile, makes post-breeding movement to higher elevations and into pre-*puna* shrub zones.

Status and Conservation. VULNERABLE. Restricted-range species: present in Peru-Chile Pacific slope EBA. Locally common breeder in Chile; locally fairly common non-breeding visitor in Peru, where seen with some regularity above Chiguata, on Arequipa–Puno Road. In 1993, estimated global population little more than 35,000 individuals, within breeding range of 108 km²; possibly increasing with expansion of suitable habitat. In Chile, largely restricted to two populations within Pampa del Tamarugal National Reserve, in Tarapacá; occurs, and probably breeds, also in tamarugo forest S of Arica in R Chaca (Vitor) valley, and possibly present farther upriver from there. May perhaps breed near Zapiga and in other large forested areas in Pampa del Tamarugal S of known range. Potential changes in forest management could severely affect entire population.

Bibliography. Anon. (2010a), Athanas (2010b), Butchart & Stattersfield (2004), Estades (1996), Estades & Lopez-Calleja (1995), Jaramillo (2003), Johnson & Goodall (1967), López-Calleja & Estades (1996), Mayr & Vuilleumier (1983), de la Peña & Rumboll (1998), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg (1987), Schulenberg *et al.* (2007), Silva-Aranguiz (2010), Stattersfield & Capper (2000).

187. White-browed Conebill

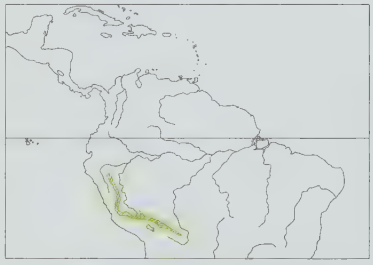
Conirostrum ferrugineiventre

French: Conirostre à ventre roux **Spanish**: Conirrostro Cejiblanco
German: Weißbrauen-Spitzschnabel

Taxonomy. *Conirostrum ferrugineiventre* P. L. Sclater, 1855, Bolivia.

Genus has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Oreomanes* as sister-group. Has hybridized with *Oreomanes fraseri*. Monotypic.

Distribution. Highlands and tree-line on E slope of Andes in C & S Peru (S San Martín, Huánuco, Junín and Cuzco, probably also Puno) and tree-line on E slope of Bolivian Andes (in La Paz, Cochabamba and W Santa Cruz).



Descriptive notes. 12 cm; 11–12 g. Small grey-and-rufous conebill with prominent white eyebrow, and thin, sharply pointed bill. Has crown blackish, bordered by long white supercilium from base of upper mandible back to nape; lores and subocular area black (forming short, triangular mask), sometimes with a few thin whitish streaks; rear ear-coverts and side of neck blue-grey; entire upperparts and tail blue-grey; birds from N part of range (Huánuco, in Peru) have slightly darker crown, bluer back and buff-tinged supercilium; upperwing-coverts dusky-grey, edged slightly paler grey (edging not conspicuous), primary coverts black, flight-feathers and tertials dusky with blue-grey edgings (edges of primaries sometimes whitish); white throat and submoustachial line separated by narrow dark greyish malar stripe; underparts, including belly and undertail-coverts, rufous; iris dark brown; bill dusky; legs dusky grey. Sexes similar. Juvenile is similar to adult, but moustache and upperparts greyer, supercilium buffy white, pale shaft streaks on side of head, tertials distinctly edged whitish, and may show dusky speckling on back and breast; immature like juvenile, but lacks speckles on back and underparts. Voice. Infrequently heard song, mainly at dawn (in Peru), typically from exposed branch at top of shrub or tree, a jumble of high, thin, and wiry notes. Call a high, thin "tsit".

Habitat. Borders of humid and wet stunted forest (to c. 10 m), including *Polylepis*, and in shrubs and bushes on humid slopes up to tree-line; also shrubbery in lower zones of *páramo*, and occasionally in semi-humid *Polylepis* woodland. At 2500–4100 m in Peru; mostly 3000–3600 m and in vicinity of tree-line.

Food and Feeding. Small arthropods. Forages alone, in pairs, and sometimes with small mixed-species flocks containing New World warblers (Parulidae), *Diglossa* flowerpiercers and other tanagers; reported also as associating with *Oreomanes fraseri*. Observed mainly when gleaning for insects in leaves and on twigs in middle and upper parts of shrubs and small trees. Tends to forage within canopy crown, keeping mostly hidden from view, and often hangs downwards in thin outer foliage.

Breeding. No information.

Movements. Primarily resident. Periodic downslope movements may occur during periods of inclement weather.

Status and Conservation. Not globally threatened. Fairly common. Occurs in Manu National Park and possibly a few other high-elevation protected areas in Peru and Bolivia. Firewood-cutting, deforestation for human settlement, and disturbance of tree-line habitats may eventually exert an adverse impact on this species' overall distribution and abundance.

Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), McCarthy (2006), Mayer (2000), Ridgely & Tudor (1989, 2009), Schulenberg (1985), Schulenberg *et al.* (2007), Walker (2001), Zimmer (1942a).

PLATE 21 ➤



PLATE 21

inches 2
cm 5

Genus *OREOMANES*

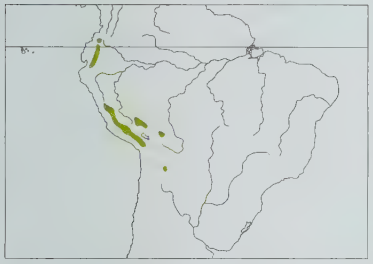
P. L. Sclater, 1860

188. **Giant Conebill**

Oreomanes fraseri

French: Conirostre géant **German**: Riesenspitzschnabel **Spanish**: Conirrostro Gigante

Taxonomy. *Oreomanes fraseri* P. L. Sclater, 1860, Panza, 14,000 feet [c. 4265 m], Chimborazo, Ecuador.
Has sometimes been placed in Coerebidae or Parulidae, but molecular-genetic data indicate that it belongs in present family, with *Conirostrum* as its sister. Genus sometimes subsumed in latter; hybrid between this species and *Conirostrum ferrugineiventre* also suggests close relationship. Geographical variation minor, partly clinal, and with checkerboard pattern, in general bill length increasing from N to S, plumage becoming paler from N to S, and differences in facial plumage varying independently of geographical location (and often much variation within a single population); proposed races *binghami* (described from Cedrobamba Ruins, near Machu Picchu, at timber-line in SE Peru) and *sturninus* (from Finca Salo, at c. 3960 m in Potosí, in Bolivia) considered undiagnosable. Monotypic.
Distribution. Extreme S Colombia (volcanoes on border) S in high Andes to Ecuador (S to Azuay and N Loja), and NC Peru S to extreme N Chile (Tarapacá), Bolivia and NW Argentina.



Descriptive notes. 16·5 cm; 22–27 g. Large grey-and-rufous conebill having rather long straight, sharply pointed, conical bill. Has crown and upperparts grey, short rufous to dark chestnut supercilium; forehead and sometimes narrow supraloral line white, or forehead streaked/mottled with white; cheek and lower ear-coverts white (amount of white variable, in some areas extending over much of lower side of head); lores and chin black or mottled with black; lesser upperwing-coverts grey, rest of wing-coverts and flight-feathers dusky, edged grey, tertials dusky with narrow grey edges; throat and underparts entirely chestnut except for grey thighs; iris dark reddish-brown; bill dusky; legs dark grey. Sexes alike. Juvenile is tinged brownish above, has extensive brownish and dusky mottling on head and underparts; immature similar to adult, but paler below, and with white throat and much more extensive white on face, also may show dusky markings on throat (especially at side). Voice. Notably quiet, although occasionally gives weak, high "chip" note. Infrequently heard song, in Ecuador, a fairly musical twittering, e.g. "cheet, cheeveét, cheeveét". In Peru presumed dawn song a repetitive 2-note series interspersed with higher notes, "tew-tuséétu tew-tuséétu tsee tew tew-tuséétu..."; possible day song a high, squeaky and jerky warble.
Habitat. Found almost entirely in dry to humid, moss-covered *Polylepis* shrub, and taller canopied *Polylepis* woodland; sometimes visits *Puya* and *Gynoxys* adjacent to *Polylepis*, but otherwise not found outside pure or mixed stands of *Polylepis*. Recorded at elevations of 2700–4850 m, mainly at 3300–4500 m.
Food and Feeding. Diet poorly known; takes small arthropods, including beetles (Coleoptera), small larvae and spiders (Araneae). Single birds, pairs or families sometimes loosely associated with other species. Typically, forages in slow, quiet and inconspicuous manner, this aided by grey and rufous colours of plumage, which closely match the cinnamon colour of *Polylepis* bark and the interplay of light and shadows on interior branches. Searches mainly on trunks and medium-sized to large limbs in interior of *Polylepis* trees, where it probes beneath the thin peeling bark; may open bill under bark to separate the scaly layers; may remain for several minutes within a small tree, carefully working along and around trunk and limbs somewhat in manner of nuthatch (*Sitta*). Does not descend head first, but may cling upside-down or clamber along with legs widely spread. Reported also as gleaning aphids (Aphidoidea) and sugar secretions from beneath *Gynoxys* leaves, and may probe flowers of mistletoes (Loranthaceae) and *Puya*. After a foraging bout, apt to fly off some distance, sometimes even to a distant grove of *Polylepis*.
Breeding. Season mainly Sept–Dec, at beginning of rainy season, near Cochabamba, in Bolivia, where eight nests found; fledglings in Aug (Lima), Nov (Puno) and Dec (Cuzco) in Peru. In Bolivia, nest an open cup constructed mostly from material from *Polylepis* trees and mosses, averaged external width 20 cm, with thick rim 5·5 cm, located in tree (average 3·16 m in height), well camouflaged, in interior of *Polylepis* forest; mean clutch size 1·86 eggs. No further information available.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Rare to uncommon, very local and declining. Occurs in a few protected areas, among them Cajas National Park (Ecuador). Restricted to *Polylepis* woodland, a habitat which has been destroyed or extensively degraded by firewood-gathering and burning throughout much of Andes. This habitat is now highly fragmented, and the number of *Polylepis* woodland sites large enough to support this species are declining steadily. Some estimates suggest that as little as 10% of *Polylepis* woodland remains intact, and much of what survives may be too small or too heavily damaged to be utilized by present species. Human disturbance, especially burning and wood-cutting, are greatest ongoing threats.
Bibliography. Anon. (2010a), Burns (1997a), Burns *et al.* (2002, 2003), Butchart & Stattersfield (2004), Cahill & Matthysen (2007), Cahill *et al.* (2008), de Coster *et al.* (2009), Fjeldså (2002), Fjeldså & Kessler (1996), Fjeldså & Krabbe (1990), George (1964), González & Torres-Mura (2000), Herzog *et al.* (2003), Hilty & Brown (1986), Isler & Isler (1999), Jaramillo (2003), Koepcke (1970), Krabbe *et al.* (2001), Mason & Burns (2010), Mazar Barnett, Pugnali & della Seta (1998), McCarthy (2006), Meyer de Schauensee (1966, 1970a), Parker & O'Neill (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg (1985), Schulenberg *et al.* (2007), Sclater (1886), Servat (2002), Stattersfield & Capper (2000), Stotz *et al.* (1996), Vuilleumier (1984b), Walker (2001), Wetmore *et al.* (1984), Zimmer (1942a).

Genus *XENODACNIS*

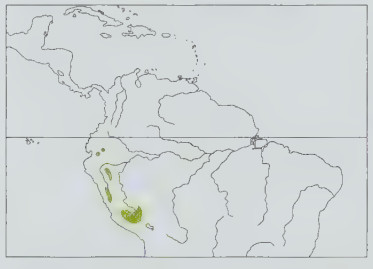
Cabanis, 1873

189. **Tit-like Dacnis**

Xenodacnis parina

French: Xénodacnis mésange **German**: Meisenpitpit **Spanish**: Dacnis Andino

Taxonomy. *Xenodacnis parina* Cabanis, 1873, Maraynioc, Peru.
Has sometimes been placed in family Coerebidae; recent molecular-genetic data, however, indicate that it belongs in present family and is closest to genus *Diglossa*, and also to *Haplospiza*, *Acanthidops* and *Catamenia*, the last three genera currently placed in Emberizidae. Races *petersi* and *bella* have been considered to represent a separate species, distinct from smaller S nominate race, although plumage differences from latter not very pronounced. Race *bella* closely resembles *petersi* and should perhaps be synonymized with it. Three subspecies currently recognized.
Subspecies and Distribution.
X. p. bella J. Bond & Meyer de Schauensee, 1939 – NC Peru (S Amazonas and La Libertad N of R Marañón).
X. p. petersi J. Bond & Meyer de Schauensee, 1939 – C Peru on W slope of Andes in Ancash, Huánuco (W of R Marañón) and Lima.
X. p. parina Cabanis, 1873 – S Peru on E slope of Andes in Junín, Ayacucho, Apurímac, and Cuzco, and the W slope in Arequipa.
Also, race uncertain, SC Ecuador (NW Azuay and NW Morona-Santiago); sightings and specimens believed probably referable to *bella*.



Descriptive notes. 11 cm, male 11–12 g, female 10–12 g (nominate); 13 cm, male 15·4–18·5 g, female 11·5–17·5 g (other races). Small, with short, thin bill. Male nominate race is essentially all dark blue with faint greyish tinge above and below, sometimes with indistinct thin silvery streaking on crown, back, rump and throat and central breast; lesser and median upperwing-coverts dark blue, greater coverts dusky, broadly edged and tinged medium blue, flight-feathers and tertials and tail dusky, edged medium blue; iris dark brown; bill blackish; legs dark grey. Female has crown and central nape blue, upperparts light brownish-olive, lower back more greyish with hint of blue wash, lesser upperwing-coverts blue, rest of coverts and flight-feathers dusky with little evident blue tinge; throat and underparts deep cinnamon-buff, fading to buff on belly. Immature and subadult are dingy greyish-brown with obscure blue tinge on wings, and slightly paler below. Races differ markedly in size (nominate notably smaller than others), rather less in plumage: *bella* male is very like nominate, all dark blue but lacking greyish tinge, and regularly with thin silvery streaking throughout, female with blue forehead, lores and ocular area (forming small blue mask across eye), otherwise greyish-brown above and with lesser and median wing-coverts medium blue, primary coverts dark blue, rest of wing feathers and tail dusky with inconspicuous brownish edges (or tail with tinge of blue), throat and breast cinnamon, becoming buff to whitish on belly (paler below than nominate); *petersi* male differs little from previous, although marginally larger and perhaps with slightly brighter streaking. Voice. Notably vocal, some calls, and especially the song, being surprisingly loud. Song, in Peru, a fast variable series of whistles, "zwit-zwit-zwit-zwit-zhweet-zhweet-zhweet..." and so on, the first series lower, the last higher; number of notes in series variable, sometimes only a series of "zwit" notes given, and sometimes female joins male in antiphonal duet in which she gives harsher or scratchy notes that continue after male finishes.
Habitat. At or above tree-line in stunted woodland, often in *Polylepis* groves where mixed with *Gynoxys* shrubs. *Gynoxys* may be a critical plant within territories; where *Gynoxys* is abundant, populations of this tanager are often very numerous. At c. 3700–4000 m in Ecuador; 3200–4600 m in Peru.
Food and Feeding. Tiny arthropods, including aphids (Aphidoidea) and sweet nectar-like secretions, both liquid or crystalline, deposited on leaves by aphids (or excreted by leaves themselves), also takes other, aphid-like insects; has been seen feeding at flowers and with nectar observed on feathers. Fourteen stomachs contained only insects, including caterpillars. Occurs in pairs and in small chattery groups, sometimes in remarkably high densities of a dozen or more per hectare in Peru, individuals aggressively attempting to defend tiny territories. Moves quickly from shrub to shrub, where it gleans tiny insects from undersides of leaves. Also forages often on *Gynoxys* shrubs.
Breeding. Juveniles observed in various stages of moult in Feb in Ancash, and fledglings seen in May in Ancash and in Jul on Ancash–Huánuco–Lima border; likely that more than one brood attempted per season when food abundant. Nest a tiny cup made form "wool" of *Gynoxys* shrub, located in tree (no height given, but presumed fairly low). No other information.
Movements. Resident. Concentrates locally in high numbers, but no long-distance or significant elevational movements reported.
Status and Conservation. Not globally threatened. Fairly common very locally in both Ecuador and Peru. Only known populations in Ecuador occur in or near El Cajas National Park and Sangay National Park; while sites within the parks are protected, others are not, and population of this species in Ecuador must be small. More widespread in Peru and may occur in a few protected areas, but its tree-line habitat, especially *Polylepis*, is now fragmented and under constant pressure from firewood-cutting, land clearance and fires associated with human activities. Given the small population and pressure on its habitat, this species may soon be listed as Near-threatened or perhaps even Vulnerable.
Bibliography. urns (1997a), Burns *et al.* (2002, 2003), Clements & Shany (2001), Fjeldså & Krabbe (1990), George (1964), Koepcke (1970), Krabbe *et al.* (2001), Meyer de Schauensee (1970a), Parker & O'Neill (1980), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Short & Morony (1969), Walker (2001), Weske (1972), Zimmer (1942a).

On following pages: 190. Cinnamon-bellied Flowerpiercer (*Diglossa baritula*); 191. Slaty Flowerpiercer (*Diglossa plumbea*); 192. Rusty Flowerpiercer (*Diglossa sittoides*); 193. Venezuelan Flowerpiercer (*Diglossa venezuelensis*); 194. White-sided Flowerpiercer (*Diglossa albilatera*); 195. Chestnut-bellied Flowerpiercer (*Diglossa gloriosissima*).

Genus *DIGLOSSA* Wagler, 1832

190. Cinnamon-bellied Flowerpiercer

Diglossa baritula

French: Percefleur cannelle **Spanish**: Pinchaflor Ventricanelo
German: Zimtbauch-Hakenschnabel
Other common names: Highland/Cinnamon Flowerpiercer, Highland Honeycreeper

Taxonomy. *Diglossa baritula* Wagler, 1832, Mexico.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species forms a superspecies, and formerly considered conspecific, with *D. plumbea* and *D. sittoides*, genetic data suggesting that the three form a monophyletic group. Three subspecies recognized.
Subspecies and Distribution.
D. b. baritula Wagler, 1832 – C Mexican highlands from Jalisco, Guanajuato, Hidalgo and Veracruz S to Isthmus of Tehuantepec in Oaxaca; also coastal chain in Guerrero and Oaxaca.
D. b. montana Dearborn, 1907 – highlands of S Mexico (Chiapas), Guatemala and El Salvador.
D. b. parva Griscom, 1932 – highlands of W & C Honduras and CN Nicaragua.



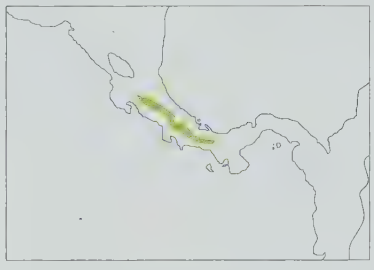
Descriptive notes. 11 cm; 6–15 g. Small flowerpiercer with slender and slightly recurved bill, lower mandible more obviously upturned than upper mandible, upper mandible with sharp hook at tip. Male nominate race has head and upperparts dusky blue-grey to dark plumbeous grey, more blackish on head; upperwing-coverts and flight-feathers narrowly edged dull blue; throat and entire underparts dull rufous; iris dark brown; bill blackish on tip and upper mandible, most of lower mandible pale grey to pinkish-horn; legs pinkish-grey. Female is dull greyish-olive above, including head; wings and tail darker, usually with narrow paler edging on wing-coverts, flight-feathers and, more broadly, tertials; throat and underparts greyish-olive, paler than above and tinged cinnamon, throat and breast faintly streaked with buff, belly cinnamon. Juvenile is much like female, but usually slightly darker, more brownish, above, and with single pale buff lower wingbar, flight-feathers edged olive, throat and chest light olive-grey with distinct yellowish tinge and blurry streaking, lower underparts light cinnamon; subadult male much like adult female, but with variable amount of olive on upperparts and throat, and breast and lower underparts often tinged with cinnamon. Race *parva* male differs from nominate in having throat dusky grey, underparts dull rufous; *montana* is similar to previous, but grey of throat extends somewhat onto chest, and birds from highlands S of Isthmus of Tehuantepec have undertail-coverts slightly tinged cinnamon. VOICE. Call, in Mexico, a high, thin, sharp "tsi" or "tsik" and a quite mellow trill, "truuuur". Song a high, thin slightly squeaky twittering warble, increasing in intensity and then fading, "ss-ssi-ssi-ssiiu-i-siin-i-siin-i", with variations.
Habitat. Favours bushy areas with flowering shrubs in overgrown clearings, pastures, gardens and borders of pine–oak (*Pinus–Quercus*), fir (*Abies*) and broadleaf evergreen forest in fairly dry to humid zones; often in flower gardens in settled areas. Mostly 1200–3350 m (tree-line) in Mexico and elsewhere; may wander lower seasonally.
Food and Feeding. Nectar, as well as some insects. Found singly, in pairs and in family units, infrequently as many as 10 individuals together. Like congeners, a hyperactive species that moves quickly, flitting from one flower blossom to the next, often remaining in relatively small area and tending to keep out of sight. Examines flowers at almost any height, from near ground to tops of foliage; pauses for scarcely a second at each flower, where it clings to flower stalks and uses lower mandible to puncture bases of corollas in order to reach nectar within. Also makes short aerial sallies of a few metres to chase down flying insects.
Breeding. Unusual biannual breeding cycle reported during four-year study in Mexico: breeding Jan–Apr dry season and Jul–Oct rainy season (latter coinciding with that of resident Trochilidae), but cycles skewed, c. 90% of females of present species breeding in rainy season and only 30% in dry season, whereas proportion of males in breeding condition about the same in each period (86% and 92%, respectively); also, some males underwent two complete moults annually (unlike females), though moulting of both sexes heavily concentrated during rainy season (when apparently more food resources available). Two nests described, each a deep open cup built from dead leaves, pine needles and fine rootlets, one 1·2 m above ground between two cypress saplings, the other 1·5 m up in shrub in bushy pasture. One nest held 2 eggs, bright blue, heavily spotted brown on large end; incubation by female alone; chicks fed by both adults, male reportedly feeding more than did female, apparently mostly with regurgitated insects. No other information.
Movements. Moves up and down mountain slopes seasonally to take advantage of seasonal flowering and shifting nectar abundance.
Status and Conservation. Not globally threatened. Fairly common to common. Because of its ability to utilize nectar sources in gardens and cultivated areas, this species faces no immediate threats.
Bibliography. del Coro Arizmendi (2001), Davis (1972), Dickey & van Rossem (1938), Edwards (1972), Fjeldså & Krabbe (1990), Griscom (1932), Hackett (1995), Howell & Webb (1995), Isler & Isler (1999), Lyon & Chadek (1971), Mauck & Burns (2009), Meyer de Schauensee (1966, 1970a), Monroe (1968), Newman (1954), Peterson & Chalif (1973), Schaldach (1963), Schondube *et al.* (2003), Skutch (1954), Vuilleumier (1969b), Wetmore (1941).

191. Slaty Flowerpiercer

Diglossa plumbea

French: Percefleur ardoisé **German**: Einfarb-Hakenschnabel **Spanish**: Pinchaflor Plomizo
Other common names: Slaty Flowerpecker

Taxonomy. *Diglossa plumbea* Cabanis, 1861, Costa Rica.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Forms a superspecies, and formerly considered conspecific, with *D. baritula* and *D. sittoides*, genetic data suggesting that the three form a monophyletic group. Proposed race *veraguensis* (described from Cordillera de Veraguas, in SW Panama) is now considered to be inseparable from populations in rest of species' range. Monotypic.
Distribution. Highlands of Costa Rica (from C Guanacaste) S to W Panama (E to Veraguas).



Descriptive notes. 11 cm; 9·3–10·1 g. Small, plain grey or brown flowerpiercer with slender and slightly recurved bill, lower mandible more obviously upturned than upper mandible, upper mandible with sharp hook at tip. Male has crown and upperparts blackish-grey with faint bluish tinge, tail blackish-grey, lesser and median upperwing-coverts dusky grey, greater coverts and flight-feathers blackish with slightly paler edgings; throat and underparts dark slate-grey, slightly paler than upperparts, and palest on centre of belly; iris dark brown; bill black above, mostly pale flesh-grey below, with darker tip; legs pinkish-grey. Female is plain greyish-olive above, wing-coverts and flight-feathers darker and narrowly edged olive; throat and underparts light greyish-olive, paler than upperparts and with hint of buff streaking on throat and breast, belly whitish, undertail-coverts tinged cinnamon; much like female of *D. baritula*. Subadult male is very like female or slightly darker. VOICE. Both calls and song weak and not far-carrying. Call a high, thin, weak "tsip" or a piercing "tsweep"; several such notes run together in sharp twitter, especially in interactions. Song, in Costa Rica, a varied high, thin, rapidly delivered medley of slurred whistles, short warbles, chips and weak trills, "see-chew see-chew see-chew seer seer surrtseep, tsee tseew tsewery tseer tsewery sewy tsink-tsink-tsink", with tinkling quality. In Panama, song descriptions similar, songs lasting c. 2 seconds and often given from only a few metres up in small shrub.
Habitat. Bushy and overgrown clearings, dense vegetation along forest borders, hedgerows, flower gardens and cultivated areas around settlements; much less often in canopy of humid montane forest. At 2000–3000 m, seasonally down to 1200 m, in Costa Rica; mostly above 1500 m in Panama.
Food and Feeding. Nectar; also substantial quantities of insects. Occurs singly, in pairs, and occasionally in family groups that includes adult pair and an offspring. Very active; visits wide variety of flowers, both native and introduced species, and is especially fond of certain flowering shrubs and epiphytes. Feeds by hooking upper mandible over, or into, a flower corolla to hold it firm while it uses sharp and slightly upturned lower mandible to puncture base of corolla, and then extracts nectar with its brush-tipped tongue. Foraging movements accomplished with remarkable swiftness, each flower visit lasting little more than a second before the bird flits to another, nearby flower and repeats the process. Also gleans small insects from foliage or chases them in short, quick aerial sorties. Notably territorial; pairs or non-breeding singletons will vigorously defend favourite flower patches against conspecifics, and are, themselves, frequently attacked by hummingbirds (Trochilidae) attempting to use or defend same resources. Often avoid hummingbird attacks by retreating into dense foliage. Reported also as following regular foraging routes in the manner of some "trap-lining" hummingbirds.
Breeding. Following information mainly from studies in Costa Rica. Breeding period centred on second (or longer) rainy season, Aug–Dec, occasional activity extending to Feb and Mar. Nest apparently built entirely by female, male remaining out of sight; nest is a bulky and substantial cup of moss, shredded and decaying leaves and various coarse fibres, even pine needles, lined with finer rootlets, fibres and moss, placed 0·4–4 m up in spiny palm, thick shrub or dense clump of tall grass in pasture. Clutch 2 eggs, light blue, finely speckled with brown, especially in wreath around larger end; incubation period c. 14 days; chicks fed with regurgitated food by both adults, nestling period c. 16 days.
Movements. Largely resident. May wander or migrate seasonally to higher or lower elevations in response to changing abundances of nectar; during year-long study in Costa Rica, however, a pair remained on territory throughout, although flower utilization rates, as well as number of competitive interactions with hummingbirds, varied dramatically.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Fairly common to common. Occurs in a number of protected areas, among them Arenal, Poas, Volcán and Chirripó/La Amistad National Parks and Monteverde and Santa Elena Forest Reserves (Costa Rica) and La Amistad and Volcán Barú National Parks (Panama). Also found widely in settled areas. This species appears to be buffered from long-term risks by its ability to live in gardens and settled areas and to exploit many species of plant introduced by humans.
Bibliography. Barrantes (1994b), Colwell *et al.* (1974), Davis (1972), Foster & Johnson (1974), Hackett (1995), Isler & Isler (1999), Mauck & Burns (2009), Naoki (1998), Narosky & Di Giacomo (1993), Ridgely & Gwynne (1989), Skutch (1954), Slud (1964), Stiles & Hespenheide (1972), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984), Wolf (1976).

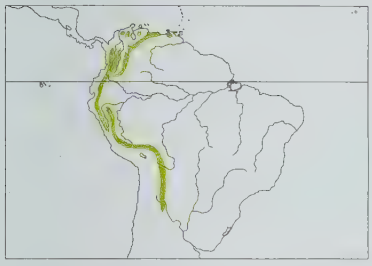
192. Rusty Flowerpiercer

Diglossa sittoides

French: Percefleur rouilleux **Spanish**: Pinchaflor Ferrugíneo
German: Rostbauch-Hakenschnabel
Other common names: Rusty Flowerpecker

Taxonomy. *Serrirostrum sittoides* d'Orbigny and Lafresnaye, 1838, Valle Grande, Bolivia.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Forms a superspecies, and formerly considered conspecific, with *D. baritula* and *D. plumbea*, genetic data suggesting that the three form a monophyletic group. Considerable variation occurs within as well as between races; revision awaited. Six subspecies tentatively recognized.
Subspecies and Distribution.
D. s. hypervthra Cabanis, 1851 – N Colombia (Santa Marta Mts) and N Venezuela (cordillera from Carabobo E to Miranda).

D. s. coelestis Phelps, Sr & Phelps, Jr, 1953 – extreme W Venezuela in Perijá Mts.
D. s. mandeli Blake, 1940 – Mt Turumiquire, in extreme NE Venezuela (Sucre).
D. s. dorbignyi (Boissonneau, 1840) – Andes of Venezuela (Lara S to Táchira) and Colombia (E slope of W Andes and both slopes of C & E ranges).
D. s. decorata J. T. Zimmer, 1930 – Andes of Ecuador and Peru S on both slopes to Bolivia.
D. s. sittoides (d'Orbigny & Lafresnaye, 1838) – Bolivia and NW Argentina (S to vicinity of Tucumán).



Descriptive notes. 11 cm; 7–10·7 g. Small greyish-and-cinnamon flowerpiercer with slender and slightly recurved bill, upper mandible more obviously upturned than lower mandible, upper mandible with sharp hook at tip. Male nominate race is entirely plumbeous grey above, including upperwing-coverts, flight-feathers and tail; slightly darker across forehead, lores, and areas around and behind eye (effect of rather narrow dusky mask); tertials dusky, edged buff to bluish; throat and entire underparts pale cinnamon; iris reddish-brown; bill dusky above, mostly blue-grey below; legs dark grey. Female is medium olive-grey above, wing-coverts and flight-feathers pale-edged, sometimes with more prominent pale buff tips on greater coverts (forming weakly indicated wingbar); pale greyish-olive and largely unstreaked below. Juvenile is similar to female, but usually more obviously streaked and more olive-tinged; immature male variable, some essentially identical to female, others whiter on belly, or with cinnamon tinge on underparts, or with darker, more dusky breast and flanks. Races differ mainly in intensity of plumage colours of male and in intensity of yellow on underparts and extent of streaking of female: *mandeli* is darker above, especially on head, darker and richer below than others, male has crown almost black and obscure bluish tertial edges, female head almost blackish; *hyperythra* is somewhat intermediate, paler than previous but darker than other races, male with pale bluish edges of tertials; *decorata* male is slightly paler above than last and tertials have paler (buffish-white) edges, female brownish above and whitish below, with narrow but distinct streaking on throat, breast and sides, plain brownish flanks; *coelestis* is palest race; *dorbignyi* male has crown decidedly darker than back, female strongly tinged yellowish below and lightly streaked on breast. Voice. Call a sharp "cheek". Song, usually from conspicuous perch on shrub or bush (occasionally a little higher), apparently varies considerably in structure across wide range in Andes: in Peru, Bolivia and Argentina a very fast, metallic rattling "j-j-j-j-j-j-j-jzseeet", rising at end, c. 1 second in duration (though in Peru has been described also as variable in speed); in Colombia (Antioquia) a fast but much more complex song, rising and falling somewhat in pitch, e.g. "p'tzedle'de p'tzedle'de p'tzedle-de-te", the last 2 (or more) notes thin, rising and trailing off; in Ecuador described as variable, either a short thin twitter or a fast series of high-pitched notes followed by lower burry note.

Habitat. Favours shrubby areas, overgrown pastures, forest edges, light open woodland, scrub, bushy hedgerows, and especially flower gardens and shrubs in settled areas, where it utilizes both native and many introduced species as sources of nectar. Dry to humid zones, infrequent inside canopy of mature forest at c. 1500–3000 m; recorded at elevations of 600–3400 m (mostly 1500–2500 m) in Colombia and 1500–2800 m in Ecuador; 1200–3500 m, occasionally down to sea-level, in Peru.

Food and Feeding. Food items include nectar and many small insects. Stomach contents reveal mostly insect remains. Found singly and in pairs, less often in small family groups; may associate with mixed-species flocks along forest borders and in plantations with light woodland, but more often forages apart from flocks. Feeds from near ground to canopy of moderately high trees. Like its allies, a hyperactive species that darts quickly from one flower to the next in quick succession. Spends little more than a second at each flower, then quickly moves to another one nearby, hopping or flitting quickly and keeping mostly out of sight inside dense bushes or shrubs, its head or body appearing briefly beside a flower, then the bird abruptly disappearing. Often leans down to inspect a flower, or hook the flower with upper mandible before puncturing it with its sharp pointed bill. Using its brush-tipped tongue, it extracts nectar through the puncture hole in a movement so quick and deft that it is almost impossible to see. Frequently and sometimes persistently attacked by larger flowerpiercers and by hummingbirds (Trochilidae), to which it responds by quickly fleeing to dense cover, but will reappear as soon as attacks cease; at some nectar sources, will persist in feeding despite attacks from hummingbirds and other competitors. Gleans small insects from foliage or flowers or catches them in short aerial sallies.

Breeding. Fledglings reported in Sept–Feb in Bolivia; juveniles reported almost throughout year in Colombia and in Sept in NW Ecuador; a bird in breeding condition in Apr in Peru (Lima). Holds breeding territory. Builds a deep cup-nest similar to that of *D. plumbea*; clutch 2 eggs, grey to blue with weak greyish spotting, mostly around large end. Male may breed in subadult plumage. No other information.

Movements. Resident. Some seasonal elevational movements likely, but poorly documented.

Status and Conservation. Not globally threatened. Uncommon to fairly common throughout extensive Andean range. Occurs in numerous protected areas, among them Henri Pittier, Guaramacal and Sierra Nevada National Parks (Venezuela), Sierra Nevada de Santa Marta, Puracé and Farallones de Cali National Parks and Río Blanco de Manizales and Reinita Cielo Azul and Tambito Nature Reserves (Colombia), Mache Chindul and Cayambe-Coca Ecological Reserves and Sangay and Podocarpus National Parks (Ecuador), Tingo Maria and Manu National Parks (Peru), Madidi and Amboró National Parks (Bolivia) and Calilegua National Park (Argentina). This species occurs also in many settled areas and flower gardens in rural and urban areas, and is unlikely to face any serious near-term risks.

Bibliography. Anon. (2000), Balderrama (2009), Castelino (1999), Clements & Shany (2001), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hackett (1995), Hellmayr (1935), Hilty (1994, 2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Mauck & Burns (2009), Meyer de Schauensee (1970a), Miller (1963), Moynihan (1979), Narosky & Yzurieta (1987), Nehrkorn (1899), Ogilvie-Grant (1912), van Oosten (2008), Phelps & Phelps (1950, 1963), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Taczanowski (1884), Vuilleumier (1969b), Walker (2001), Wetmore *et al.* (1984), Zimmer (1942b).

193. Venezuelan Flowerpiercer

Diglossa venezuelensis

French: Percefleur du Venezuela **Spanish**: Pinchaflor Venezolano
German: Trauerhakenschnabel
Other common names: Venezuelan Flowerpecker

Taxonomy. *Diglossa venezuelensis* Chapman, 1925, Carapas, 5600 feet [c. 1710 m], Sucre, Venezuela.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species is closely allied to *D. albilatera*. Monotypic.

Distribution. NE Venezuela: Cordillera de Caripe, in N Sucre (from E slope of Cerro Peonía E to Cerro Turumiquire, on Monagas border); also slopes of Cerro Negro (on Sucre–Monagas border), and Cerro Humo (Peninsula de Paría).



Descriptive notes. 12·7 cm. Small flowerpiercer with slender and slightly recurved bill, lower mandible more obviously upturned than upper mandible, upper mandible with sharp hook at tip; resembles more widespread *D. albilatera*. Male has plumage entirely dull black, except for white pectoral tuft and white wing-linings (pectoral tuft almost always visible when bird flicks wings; white on underwing best seen as bird flies); iris dark brown; bill dark; legs grey. Distinguished from very similar *D. albilatera* by black (not slate-coloured) plumage, smaller pectoral tufts, and less white on underwing-coverts. Female has head dark yellowish-olive, upperparts dark brownish-olive, throat and upper chest dull yellowish-olive (paler than crown), this shading to plain dull greyish-olive to brownish-olive on rest of underparts, white pectoral tuft and white wing-linings as on male; much like female of *D. albilatera*, but slightly darker and with less white. Juvenile and subadult male look much like female. Voice. Song a complex but somewhat repetitive series of soft, low-pitched notes uttered rapidly, the entire series lasting up to c. 25 seconds, chattery and rising and falling in pitch several times; not unlike song of *D. major*, but softer and without latter's energy and speed; very unlike song of *D. albilatera*.

Habitat. Borders of humid montane forest, also young to older second growth and shrubby and bushy areas adjacent to forest. At 1525–2450 m in Cordillera de Caripe; 1675–1775 on Cerro Negro; sightings down to 885 m at Melanas, on Paría Peninsula.

Food and Feeding. Diet little known; takes both nectar and small insects. Found singly and in pairs that forage mostly independently of mixed-species flocks. Like congeners, a nervous and hyperactive bird that takes nectar by rapidly piercing bases of flower corollas at almost any height, from near ground to tops of shrubs and trees. Also seen and photographed while foraging low in *Heliconia* thickets.

Breeding. No information.

Movements. Resident. Seasonal elevational movements in response to changing nectar resources likely, but undocumented; sightings at 885 m on Paría Peninsula probably refer to such movements.

Status and Conservation. ENDANGERED. Restricted-range species: present in Caripe-Paria Region EBA. Very local; declining. Known only from a small number of localities in extreme NE Venezuela. Known to occur in Paría Peninsula and El Guácharo National Parks. Areas where it could still occur include Cumbres de San Bonifacio, Serranía de Turumiquire and Cerro Humo. Widespread deforestation for agriculture and cattle pastures evident in Cordillera de Caripe, and extensive forest damage taking place even in El Guácharo National Park. Most of Cerro Negro now completely denuded or devoted to shade coffee plantations. In Serranía de Turumiquire, deforestation for coffee, bananas, mango and citrus is occurring, although considerable intact forest still present. Cerro Humo faces similar forest degradation and uncontrolled burning. Extent to which this species is able to survive in areas of regrowth vegetation or in coffee plantations, which increasingly threaten to overwhelm almost all of the native forest remaining in its range, is not known. Other members of its genus tend to thrive, or at least survive, in cultivated areas and gardens with flowers, even in settled areas, but that seems not to be the case with present species and an assessment of its habitat requirements is needed urgently. A fairly large number of specimens were taken from Cerro Turumiquire as recently as 1963, but the number of sightings since that time is small. A recent paved road from Güiria to tip of Paría Peninsula (at Macuro) will almost certainly lead to loss of habitat as human settlement follows. A proposed gas pipeline over Paría Peninsula, running from gas fields on N shore to cryogenics facilities on S shore, represents an additional serious threat.

Bibliography. Anon. (2010a), Boesman & Curson (1995), Butchart & Stattersfield (2004), Collar *et al.* (1992), Hilty (2003), Isler & Isler (1999), Meyer de Schauensee & Phelps (1978), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Stattersfield & Capper (2000).

194. White-sided Flowerpiercer

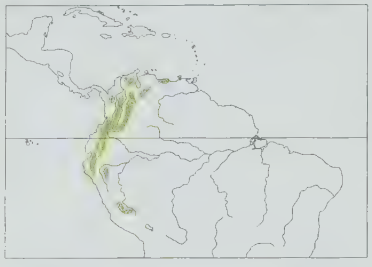
Diglossa albilatera

French: Percefleur à flancs blancs **Spanish**: Pinchaflor Flanquiblanco
German: Schieferhakenschnabel
Other common names: White-sided Flowerpecker

Taxonomy. *Diglossa albi-latera* Lafresnaye, 1843, Santa Fé de Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species is closely allied to *D. venezuelensis*. Four subspecies recognized.

Subspecies and Distribution.
D. a. federalis Hellmayr, 1922 – coastal cordillera of N Venezuela (from Aragua E to Distrito Federal and Vargas, probably also adjacent Miranda).
D. a. albilatera Lafresnaye, 1843 – Sierra de Perijá (Colombia–Venezuela border), Andes of Venezuela (from Lara S to Táchira), and Colombia in Sierra Nevada de Santa Marta and all three ranges of Andes S to S Ecuador (except extreme SW) and probably to N Peru (Cajamarca).
D. a. schistacea Chapman, 1925 – extreme SW Ecuador and NW Peru W of R Marañón.
D. a. affinis J. T. Zimmer, 1942 – Peru from R Utcubamba watershed in Amazonas (E of R Marañón) and on W slope in Ayacucho S to NW Cuzco.

Descriptive notes. 12 cm; male 8·5–12·7 g, female 8–11·4 g (Colombia). Small flowerpiercer with thin, short and somewhat upturned bill, upper mandible with distinct hook at tip, lower mandible slender, sharply pointed and more obviously upturned. Male nominate race is dark slate-grey above and below, with elongated, partly concealed tufts of silky-white feathers on each side of body



(visible as flashes of white as bird flicks wings); underwing-coverts white; iris dark brown; bill entirely blackish, sometimes paler at base of lower mandible; legs grey. Female is plain olive-brown above, paler below, with obvious cinnamon tinge on most of underparts, but slightly more yellowish-buff on belly, and undertail-coverts tinged rufescent; no pale edges on wing feathers, or occasionally some pale edging on greater wing-coverts (forming one faint wingbar); underwing-coverts and elongated feathers of sides silky white, as on male. Juvenile is like female, but faintly scaled and with belly whitish; immature male like female, but duller, underparts broadly washed buff, and breast obscurely streaked darker. Race *federalis* male differs from nominate in decidedly paler and greyer plumage, female is paler overall, more olive-tinged above and much more yellowish buff below than nominate and with cinnamon wash paler and more confined to chest and sides; *schistacea* male is similar to nominate, but paler, bluish-slate, above and below and with bluish gloss to plumage; *affinis* male is much like previous, but has on average longer wing and tail, and plumage darker, especially on upperparts, and without bluish colour, female differs from nominate female in slightly larger size, more brownish (less olive) upperparts and warmer, less ochraceous throat and breast. Voice. Song in Venezuela 1–2 high shrill notes followed by lower-pitched rattle-trill of even pitch and strength, "swéé-ti ti'ti'ti'ti'ti'ti' ti'ti'ti'ti", entire song lasting just over 1 second; in N cordillera (Venezuela) typically a high, thin, tinny trill descending slightly, then a flat rattle, "ti ti ti ti ti ti ti ti ti ti ti ti ti ti te'te'te'te'te'te'te". When disturbed gives a flat buzzy trill, much faster than song and sometimes rising slightly in pitch. Elsewhere in range, song described as a fairly loud flat trill usually preceded by 2 faint notes.

Habitat. Exhibits fondness for flowering vines, and occurs in humid overgrown clearings, shrubby forest edges, stunted cloudforest, cultivated areas and highland gardens, even suburban areas. At c. 1600–2800 m, but most numerous in lower half of this elevational range, somewhat higher in S, where generally less numerous; recorded as low as 1200 m in N Colombia (Santa Marta Mts), and down to 1550 m in Ecuador; 1650–3000 m in Peru.

Food and Feeding. Nectar; probably also insects. Forages singly or in loose pair, or occasionally a family of three seen together; follows mixed-species flocks or, more often, forages independently of them. Restless and hyperactive, constantly flicking wings and exposing patch of white beneath each wing. Moves somewhat furtively along dense forest borders from below eye level to canopy, mostly in middle levels. Adept as staying out of sight inside dense shrubs, then popping into view briefly to pierce a flower corolla. Repeatedly appears briefly and then disappears inside dense shrubbery as it moves from one flower to the next, pausing for little more than a second at each to puncture the flower for nectar, or to revisit holes previously punched into flower corollas. In some areas visits nectar feeders.

Breeding. Fledglings reported in Nov and Apr, immatures in Jul and Dec and birds in breeding condition in Apr–Aug in Colombia; eggs in Mar and fledglings in Apr and Oct in Ecuador; and fledglings in Jul and immatures in Jul and Sept in Peru. One nest found in Ecuador, a compact open cup of moss, grass and rootlets, placed 0·8 m up in clump of dense small bamboo shoots; in Colombia, cup-nest of moss, lichens and fern fragments, up to c. 5 m above ground. In Ecuador, eggs blue or greenish-blue, thickly speckled with brown, especially around larger end; no information on clutch size. No other information.

Movements. Poorly documented. Presumed resident, but some seasonal wandering (or possibly regular migratory movements) to higher and lower elevations likely.

Status and Conservation. Not globally threatened. Fairly common. Widespread in more open, sunny, montane habitats where flowering shrubs and bushes present. Found in many protected areas, among them Henri Pittier, Macarao, Yacambú, Guaramacal and Sierra Nevada National Parks (Venezuela), Sierra Nevada de Santa Marta, Chingaza, Las Orquídeas, Farallones de Cali and Cueva de los Guácharos National Parks and Reinita Cielo Azul and Tambito Nature Reserves (Colombia) and Cotocachi-Cayapas Ecological Reserve and Sangay and Podocarpus National Parks (Ecuador). This species' ability to utilize bushy clearings and flower gardens in settled areas buffers it, in large measure, from near-term risks.

Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (2000), Burns & Racicot (2009), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Greeney (1999), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Mauck & Burns (2009), Mazar Barnett *et al.* (2006), Moore *et al.* (1999), Moynihan (1979), Nehrkorn (1899), Ogilvie-Grant (1912), Restall *et al.* (2006), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg (2000b), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Skutch (1954), Snow & Snow (1980), Strewe & Navarro (2004), Todd & Carriker (1922).

195. Chestnut-bellied Flowerpiercer

Diglossa gloriosissima

French: Percefleur à ventre marron **Spanish**: Pinchaflor Ventrirrufo
German: Maronenbauch-Hakenschnabel
Other common names: Chestnut-bellied Flowerpecker

Taxonomy. *Diglossa gloriosissima* Chapman, 1912, Andes, west of Popayán, 10,340 feet [c. 3150 m], Cauca, Colombia.

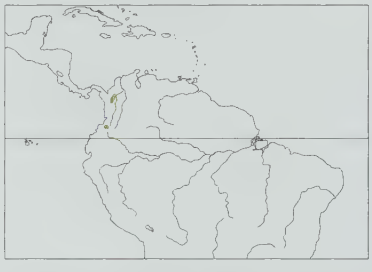
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species forms a superspecies with *D. lafresnayii* and *D. mystacalis*, and all formerly considered conspecific; molecular-genetic data indicate that present species and *D. mystacalis* are more closely related to each other than either is to *D. lafresnayii*. Two subspecies recognized.

Subspecies and Distribution.

D. g. boylei G. R. Graves, 1990 – Nudo de Paramillo (in Municipio de Ituango) and Urrao (on Páramo Frontino), in N Antioquia (Colombia).

D. g. gloriosissima Chapman, 1912 – El Tambo, on Cerro Munchique (Cauca), in Colombia.

Also, in Antioquia, one individual near Jardín (33 km NW of Citará) and two additional specimens at Páramo de Citará, all three probably referable to race *boylei*.



Descriptive notes. 14 cm; two birds each 14 g. Medium-sized, chestnut-bellied flowerpiercer with bill somewhat upturned and strongly hooked at tip. Male nominate race is mainly lustrous black above and below, with lesser and median upperwing-coverts silvery-blue (forming small, triangular-shaped shoulder patch), uppertail-coverts lustrous black, suffused with slate-grey (usually concealed and barely discernible); middle of breast to belly and undertail-coverts rich rufous-chestnut, sides sometimes indistinctly mottled with black; iris dark brown; bill black except for pale blue-grey line at base of lower mandible; legs dark grey. Sexes similar. Juvenile has plumage pattern similar to that of adult, but much duller, head, throat and upperparts dingy dark brown (not black), duller paler rufous of lower underparts variably mixed with dark brown. Race *boylei* is similar to nominate, but rump and uppertail-coverts slightly more contrasting, dark grey to bluish-grey, and sides cleaner rufous-chestnut. Voice. Song notably slower and lower-pitched than that of most congeners, a leisurely to moderately brisk series of high, penetrating, semi-musical notes mixed with hard, slightly metallic ones, rising and falling in complex (patterned?) manner, e.g. "chut, chet-chet-chee-sa'wee, sa-wee-tu-tu-tslee-chet-tslee, chet, chet chee, chut, sa-wee...", may continue uninterrupted for nearly 30 seconds, then slow and, following a few hesitant random notes, song may start again; "chet-chet-chee" or similar 3-note phrase repeated frequently in song.

Habitat. Near tree-line in humid and wet montane scrub and elfin forest, and ranges only short distance above or below this tree-line ecotone; probably tolerates some amount of habitat degradation. At c. 3000–3800 m.

Food and Feeding. No information; probably similar to *D. lafresnayii*. At Páramo Frontino (race *boylei*) believed to compete with *D. brunneiventris*, the two species apparently holding mutually exclusive territories.

Breeding. No information.

Movements. No information.

Status and Conservation. ENDANGERED. Restricted-range species: present in Chocó EBA. Until recently known from three localities, two of them at N end of W Andes in Antioquia (Páramo Frontino and Cerro Paramillo) and a third at lower elevation and far to S in Cauca (Cerro Munchique). Recorded at Páramo Frontino in 1965, but thereafter went unreported for almost 40 years. In 2003, recorded (specimen) at an unpublished site near Jardín, in Antioquia, and in 2004 rediscovered at type locality (ten observed and three collected), as well as at a new locality, Farallones del Citará, 70 km to S; at last-named site, three were captured in nets and three others seen. Small number of records, at least of N population, doubtless reflects lack of fieldwork because of difficulty of reaching these remote mountain-top sites, and because of security problems, which have plagued the region. Rare, but found to be fairly common very locally at type locality (Páramo Frontino). Periodic fires in *páramo*, as well as cattle-rearing and other agricultural activities, including livestock grazing, are key threats; estimated that the species has already lost 17% of its habitat. On the positive side, both the N and the S populations lie partly within national reserves, Paramillo National Park (in N) and Munchique National Park (in S), although maintaining the integrity of the parks is an ongoing problem. Also on the positive side, although no estimates of total population available, recent fieldwork indicates that the species is relatively numerous within the pockets of habitat where it occurs. Its small natural range and naturally fragmented distribution place this species at risk. Human settlement and associated deforestation and burning near Cerro Paramillo, and a communications facility and military activity near top of Cerro Munchique, are considered threats. Burning of diverse *páramo* vegetation and its replacement with pasture grasses may also be a significant threat.

Bibliography. Anon. (2010a), Athanas (2007), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Flórez *et al.* (2004), Graves (1982a, 1990), Hellmayr (1935), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2006), Mauck & Burns (2009), Meyer de Schauensee (1970a), Moynihan (1979), Pulgarín-R. & Múnera-P. (2006), Pulgarín-R. *et al.* (2005), Renjifo *et al.* (2002), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman, Cuadros *et al.* (1990), Salaman, Donegan & Caro (2008), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Stiles (1998a), Tobias *et al.* (2006), Vuilleumier (1969b), Wege & Long (1995).

PLATE 22 ➤



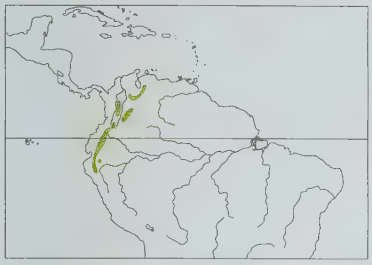
196. **Glossy Flowerpiercer**

Diglossa lafresnayii

French: Percefleur de Lafresnaye **German**: Stahlhakenschnabel **Spanish**: Pinchaflor Satinado
Other common names: Glossy Flowerpecker

Taxonomy. *Uncirostrum La Fresnayii* Boissonneau, 1840, Santa Fé de Bogotá, Colombia.
Genus has sometimes been placed in Cœrebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species forms a superspecies with *D. gloriosissima* and *D. mystacalis*, and all formerly considered conspecific; molecular-genetic data indicate that *D. gloriosissima* and *D. mystacalis* are more closely related to each other than either is to present species. Monotypic.

Distribution. Andes of Venezuela (S from Trujillo) S to Colombia (Norte de Santander; isolated population in Cundinamarca, in E Andes; C range from Antioquia S to Quindío and Tolima, and in S from E Cauca and Huila) S through Ecuador to N Peru (Cajamarca).
Descriptive notes. 14·5 cm; 13·1–19 g. Fairly large, all-black flowerpiercer with decidedly upturned bill hooked at tip, lower mandible sharply pointed. Plumage is almost entirely glossy black above, with marginal coverts and lesser upperwing-coverts contrastingly pale blue-grey (forming small triangular patch on shoulder, sometimes partly hidden), forehead to supercilium more velvety-black; flight-feathers, tail and underparts more or less unglossed black, or some gloss on breast and sides; iris deep reddish-brown; bill black, basal half of lower mandible pale grey; legs dark grey. Differs from closely similar *D. humeralis* mainly in having larger blue-grey shoulder patch, also in larger size, larger and heavier bill, and glossy plumage. Sexes similar. Juvenile and immature are brownish-black, with shoulder patch faint. Voice. In Venezuela song an exuberant stream of rapid chattering and chipping notes, "chit'chat'chip'chat' chip'chip'cheet'chit..." and so on for up to a minute or more, colourless, rather directionless and rising and falling, with little evident pattern (some songs with galloping pattern); some appear to be sung more or less simultaneously as a duet (possibly antiphonal) by partners. Songs described from Peru seem to be similar, a variable series



of single and double notes, some thin, some louder, that stumble along for minutes. In E Andes of Colombia, song described as a series of thin high notes in groups of 3–4, at times the series very prolonged, "chip chip chiiu chip chip chiu" etc. or "chii chichi chiiu chii...", often given when perched in the open at end of small branch (after which it usually disappears inside vegetation). At dawn, often sings from favourite location at top of a shrub. Both sexes sing.

Habitat. Humid and shrubby montane thickets and stunted and mossy forest up to tree-line; also thrives in disturbed habitats such as overgrown pastures, hedgerows and flower gardens at lower elevations. At c. 2000–3750 m (tree-line), most records at c. 2700–3700 m. In E Andes of Colombia most numerous at high elevations in *subpáramo* and stunted vegetation, but at lower elevations, in settled areas, flower gardens and disturbed areas, greatly outnumbered by *D. humeralis*.

Food and Feeding. Nectar and insects. Regularly follows mixed-species flocks, but also often forages independently of them. Can be particularly furtive and secretive as it wiggles through dense shrubbery, popping into view momentarily, then disappearing almost immediately; although it sings in the open at dawn, it otherwise tends to remain out of sight during the day, and stays low when flying between shrubs or crossing open spaces. Regularly visits hummingbird feeders for nectar in Ecuador. Like other members of genus, actively punctures bases of flowers for nectar and often revisits punctured flowers; also forages for small insects, which it sometimes chases in short quick aerial sallies. Pair defends a common territory when breeding, but at other times of year holds individual territories, which it vigorously defends.

Breeding. In Colombia, fledgling in Mar, juvenile/immature in Jul and birds in breeding condition in Feb–Jul. Nest a cup built from moss and plant fibres, lined with finer plant material, overall more bulky than nest of *D. humeralis*; placed 1–2 m up in dense bush or clump of bamboo. No other information.

Movements. Apparently resident. Little definite information. Some seasonal movements to higher or lower elevations may occur when nectar resources low.

Status and Conservation. Not globally threatened. Fairly common over most of range; inconspicuous. Occurs in a number of protected areas, among them Sierra Nevada and Tamá National Parks (Venezuela), Tamá, Chingaza, Nevado de Tolima and Puracé National Parks (Colombia), Cotopaxi, Sangay and Podocarpus National Parks (Ecuador) and possibly Cordillera de Colán National Park (Peru). Important threats within its range include widespread burning, cattle grazing and wood-cutting in upper montane-*páramo* ecotone areas. Like many congeners, this species is buffered to some extent by its ability to utilize areas with human settlement and disturbance.

Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (2000), Burns (1997a), Burns *et al.* (2002, 2003), Clements & Shany (2001), Fjeldså & Krabbe (1990), Graves (1982a), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), del Hoyo (2005), Isler & Isler (1999), Koenen & Koenen (2000), Krabbe *et al.* (2001), Martin, P.R. *et al.* (2009), Mauck & Burns (2009), Meyer de Schauensee (1970a), Moynihan (1963b, 1979), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Vuilleumier & Ewert (1978).

197. Moustached Flowerpiercer

Diglossa mystacalis

French: Percefleur moustachu **German**: Barthakenschnabel **Spanish**: Pinchaflor Bigotudo
Other common names: Moustached Flowerpecker

Taxonomy. *Diglossa mystacalis* Lafresnaye, 1846, yungas of La Paz, Bolivia.

Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species forms a superspecies with *D. gloriosissima* and *D. lafresnayii*, and all formerly considered conspecific; molecular-genetic data indicate that *D. gloriosissima* and present species are more closely related to each other than either is to *D. lafresnayii*. Four subspecies recognized.

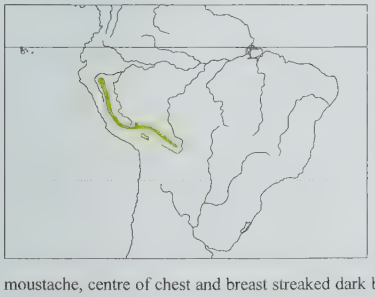
Subspecies and Distribution.

D. m. unicincta Hellmayr, 1905 – N Peru on E Andean slope from S Amazonas and La Libertad S to Huánuco (W & N of R Huallaga), also locally on W slope of E cordillera in Marañón Valley.

D. m. pectoralis Cabanis, 1873 – C Peru on E Andean slope from C Huánuco (E of R Huallaga) S to Pasco and Junín.

D. m. albilinea Chapman, 1919 – SE Peru (Ayacucho, Cuzco and Puno).

D. m. mystacalis Lafresnaye, 1846 – Bolivia (La Paz, Cochabamba and W Santa Cruz).



Descriptive notes. 14·5 cm; 12–19·2 g, four birds 16–16·5 g (*albilinea*). Fairly large flowerpiercer with distinctive throat pattern; bill proportionately longer, straighter and less clearly hooked than that of smaller members of genus. Nominate race is mainly glossy black, with rufous moustache, small pale blue shoulder patch and rufous-tinged undertail-coverts; upperwing-coverts slightly glossed, flight-feathers and tail dull black to blackish; iris dark brown; bill black; legs dark grey. Sexes similar. Juvenile (race *unicincta*) is mainly dark brown above, with forecrown, side of head and upperwing-coverts dusky brown, throat dusky, with irregular white moustache, centre of chest and breast streaked dark brown, sides and flanks dark brown, central lower underparts and undertail-coverts buffy rufous, basal half of lower mandible dull pinkish-yellow; immature (all races) similar to adult, but duller; subadult somewhat streaky, with white on breast. Races differ mainly in pattern of markings on throat and chest: *albilinea* is similar to nominate, but with moustache white (sometimes stained buff distally) and rufous vent and undertail-coverts; *unicincta* has prominent white moustache extending as a broad rufous arc across chest, has vent and undertail-coverts strongly rufous; *pectoralis* is similar to last, but lower part of pectoral band white, and lacks pale shoulder patch. Voice. Song, heard mostly at dawn, typically from exposed position at top of shrub or low tree, a rather strong, vigorous, even strident series of rising and falling notes, 4–5 per second, lasting for a few seconds or up to several minutes and given at relatively even volume.

Habitat. Stunted, humid montane woodland, low cloudforest, elfin forest, and patches of woody shrubs and *Polylepis* in lower *páramo*; also drier scrubby woodland in S part of range. At c. 2400–3700 m (in Peru), and recorded to 4000 m, but most numerous near tree-line.

Food and Feeding. Unlike its smaller congeners, rather insectivorous; also takes nectar from wide variety of flowers. Usually singly and often with mixed-species flocks containing small tyrant-flycatchers (Tyrannidae), other tanagers and New World warblers (Parulidae). Forages at middle levels or higher by moving in and out of dense foliage, disappearing and then reappearing.

Breeding. Fledglings in Aug in N Peru (Amazonas) and juveniles and immatures seen throughout year in both Peru and Bolivia. No other information.

Movements. No information. Because of greater dependence on insects than are its smaller allies, may be less inclined to engage in seasonal movements.

Status and Conservation. Not globally threatened. Uncommon to fairly common. Occurs in a few protected areas, among them the Machu Picchu Historical Sanctuary, Manu National Park and probably Huascarán National Park (Peru) and Madidi National Park (Bolivia). This species' range includes extensive unprotected, tree-line habitat that is under constant pressure from firewood-cutting and burning, and is at risk locally.

Bibliography. Clements & Shany (2001), Fjeldså & Krabbe (1990), Graves (1982a), Hellmayr (1935), Isler & Isler (1999), Mauck & Burns (2009), Meyer de Schauensee (1970a), Moynihan (1979), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Weske (1972).

198. Merida Flowerpiercer

Diglossa gloriosa

French: Percefleur de Mérida **German**: Méridahakenschnabel **Spanish**: Pinchaflor de Mérida
Other common names: Merida Flowerpecker

Taxonomy. *Diglossa gloriosa* P. L. Sclater and Salvin, 1871, Paramo de la Culata, north of Mérida, Venezuela.

Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species forms a monophyletic group with *D. humeralis*, *D. brunneiventris* and *D. carbonaria*, and all were previously regarded as conspecific. Monotypic.

Distribution. Andes of Venezuela (Trujillo, Mérida, and Táchira N of the Táchira gap).



Descriptive notes. 13·5 cm; 11–11·5 g. Medium-sized chestnut-bellied flowerpiercer with slender and somewhat upturned bill with prominent hook at tip. Has head, throat, chest, side of neck and most of upperparts deep black (not glossy), bluish-grey rump and uppertail-coverts usually concealed; short and inconspicuous bluish-grey superciliary stripe, some individuals also with traces of rufous malar; marginal and lesser upperwing-coverts blue-grey, forming narrow triangular patch on shoulder; breast, belly and undertail-coverts rufous-chestnut, flanks grey (usually visible); iris dark brown; bill black, basal half of lower mandible pale grey; legs dark grey. Sexes similar. Juvenile is dingy greyish-brown above, somewhat mottled and streaked on back, dark brown median and greater upperwing-coverts with buff edges and tips, flight-feathers dusky brown, inner feathers and tertials edged buff, throat dingy brown, becoming paler and buffier on lower underparts and with throat and breast streaked dark brown; immature dusky brown above, sometimes with hint of pale malar and pale edging on wing-coverts, dark brown throat and chest streaked buff, rusty-buff lower underparts somewhat streaked dusky; older birds show more clear separation of dark throat, and variable amount of rufous appearing on lower underparts. Voice. Virtually nothing known. One vocalization a long trill.

Habitat. Dry and open or semi-open scrubby areas in highlands, including cultivated areas, flower gardens, hedgerows, stunted montane thickets and low, wooded borders, from well below tree-line to far above it in *páramo*; rare or absent in humid areas. At 2500–4150 m.

Food and Feeding. Nectar and insects. Occurs in pairs when breeding, but otherwise usually seen singly; occasionally associates with mixed-species flocks, but more often found alone. Nervous-acting and highly strung, but not so furtive as *D. lafresnayii* and usually easy to observe. Works rapidly and quickly through dense shrubbery and flowering bushes; keeps low when flying across openings, and often returns again and again to favourite patches of flowers. Pugnacious in defending joint feeding territory when breeding; at other times defends individual territory. Often harassed by hummingbirds (Trochilidae), especially larger species such as Golden Starfrontlet (*Coeligena eos*); eludes attacks by ducking head or retreating momentarily into dense shrubbery, or, in persistent attacks, by leaving the area. Behaviour much like that of *D. humeralis*, *D. brunneiventris* and *D. carbonaria*.

Breeding. One nest believed to have been of this species found in Apr; a deep cup of grass and moss placed atop a bank. No other information.

Movements. Resident. Given strongly seasonal nature of flowering in much of high Andes in Venezuela, some local seasonal movements in response to changing food abundances seem likely.

Status and Conservation. Not globally threatened. Restricted-range species: present in Cordillera de Mérida EBA. Locally common. Occurs in several protected areas, including Guaramacal, Sierra de la Culata, Páramos del Batallón y La Negra, Sierra Nevada and probably Dinira National Parks. Although total range occupied by this species is small, it is buffered against serious risk by its ability to utilize a variety of degraded or altered habitats in settled areas if flowers present. Particularly attracted to flower gardens in both rural and urban areas.

Bibliography. Fjeldså & Krabbe (1990), Graves (1982a, 1991), Hellmayr (1935), Hilty (2003), Isler & Isler (1999), Kjonaas & Rengifo (2006), Mauck & Burns (2009), Meyer de Schauensee (1970a), Meyer de Schauensee

On following pages: 199. Black Flowerpiercer (*Diglossa humeralis*); 200. Black-throated Flowerpiercer (*Diglossa brunneiventris*); 201. Grey-bellied Flowerpiercer (*Diglossa carbonaria*).

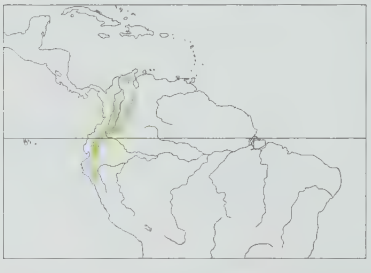
& Phelps (1978), Moynihan (1979), Phelps & Phelps (1950), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Sibley & Monroe (1990), Stotz *et al.* (1996), Vuilleumier (1969b, 1984a), Vuilleumier & Ewert (1978).

199. **Black Flowerpiercer**

Diglossa humeralis

French: Percefleur noir **German**: Schwarzbauch-Hakenschnabel **Spanish**: Pinchaflor Negro
Other common names: Black Flowerpecker; All-black Flowerpiercer/Flowerpecker (*aterrima*); Santa Marta Flowerpiercer (*nocticolor*)

Taxonomy. *Agrilorhinus humeralis* Fraser, 1840, Santa Fé de Bogotá, Colombia.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species forms a monophyletic group with *D. gloriosa*, *D. brunneiventris* and *D. carbonaria*, and all were previously regarded as conspecific. Three subspecies recognized.
Subspecies and Distribution.
D. h. nocticolor Bangs, 1898 – Santa Marta Mts, in N Colombia, and Perijá Mts, on Colombia–Venezuela border.
D. h. humeralis (Fraser, 1840) – SW Venezuela (S Táchira S of the Táchira gap) and adjacent E Andes of Colombia (from Norte de Santander S to Cundinamarca, probably to Nariño).
D. h. aterrima Lafresnaye, 1846 – Andes of Colombia (S from N Antioquia in C range, from Cerro Munchique, in Cauca, in W range), Ecuador and N Peru (S to Marañón Valley).



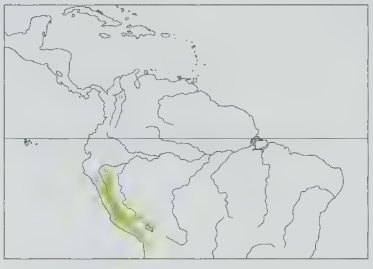
Descriptive notes. 13·7 cm; 9·6–14·3 g, male 12–15·4 g and female 12·4–13·6 g (Colombia). Medium-sized black flowerpiercer with slender and somewhat upturned bill with prominent hook at tip. Nominate race is almost entirely dull black above, rump more dark grey (visible only in hand), with small blue-grey shoulder patch (marginal coverts and lesser upperwing-coverts); some individuals have faint grey barring on uppertail-coverts and undertail-coverts, flanks and belly, and some have chestnut undertail-coverts and/or faintly indicated pale supercilium; iris reddish-brown; bill black, basal half of lower mandible pale grey; legs dark grey. Differs from extremely similar *D. lafresnayii* in slightly smaller size, smaller bill, and mainly matt black (not glossy) plumage with smaller blue-grey shoulder patch. Sexes similar. Immature is greyish-brown, indistinctly streaked dusky, underparts paler and more prominently streaked. Race *aterrima* has rump black, lacks blue shoulder patch, never has pale supercilium and/or chestnut undertail-coverts; *nocticolor* is very like previous, but rump dark grey. Voice. Song, from atop low shrub or bush, also from well up in tall tree, a jumbled stuttering and twittering, resembles that of *D. lafresnayii*, but faster, in Bogotá area (Colombia) sharp and rapid, 2–4 thin notes followed by one or two rapid trills, "tsi-tsi-tsrrr-sirrt-t" etc. or "psi-si-psit-tsrrrrrr" etc.; song sometimes a mix of fast, high-pitched and unmusical trills and short notes. Both sexes sing. Call a thin "sit" or "tsi", high-pitched and fine; occasionally a rough "friiiiiii".
Habitat. Humid montane regions. Occurs in stunted elfin forest, shrubby borders and sheltered wooded ravines at or near tree-line, occasionally in *Polylepis* and low shrubs well above tree-line, but more commonly in hedgerows, parks, flower gardens and other cultivated areas with shrubbery in settled areas at lower elevations, including large urban settings (e.g. Bogotá), where *D. lafresnayii* scarce. At 2175–3300 m, mostly above 2700 m, in Venezuela; elsewhere 1500–4000 m (mostly 2200–3400 m in Colombia, 2200–4000 m in Ecuador, 1850–3300 m in Peru).
Food and Feeding. Nectar, also insects. Behaviour generally similar to that of *D. lafresnayii*, but, unlike that species, infrequently with mixed-species flocks. Forms pairs briefly for breeding, but otherwise individuals aggressively defend solitary territories with flowers against both conspecifics and other nectar-feeders, including congeners, hummingbirds (Trochilidae) and *Conirostrum* conebills. Highly active when foraging, but keeps mostly inside dense shrubbery and out of sight, often for extended periods of time, and generally attempts to avoid competitive conflicts with hummingbirds by retreating inside dense shrubs. Takes nectar from flowers by puncturing base of corolla, as well as probing flowers directly from outside; takes insects from foliage and flowers, also in short quick aerial sallies.
Breeding. Juveniles and immatures reported virtually throughout year and birds in breeding condition in Feb–Sept in Colombia. Nest in Ecuador a cup made from rootlets and moss, suspended 0·8 m up from thorns of sword-like aloe leaf (*Aloe*); in Colombia well hidden 1–4 m up in bush, shrub or bamboo. Clutch in Ecuador 2 eggs, blue, speckled with red, in Colombia eggs clear blue or speckled brown. No other information.
Movements. Not well documented. Highly territorial; seasonal movements in response to changing resources may be mostly local.
Status and Conservation. Not globally threatened. Locally common. Can be found in numerous protected areas, among them Tamá National Park (Venezuela), Sierra Nevada de Santa Marta, Tamá, Chingaza, Los Nevados, Nevado de Huila and Puracé National Parks (Colombia), Cotopaxi, Cajas, Sangay and Podocarpus National Parks (Ecuador) and probably Cordillera de Colán National Park (Peru). Deforestation, burning and firewood-cutting are important threats to the natural habitat of this species, although it adapts well to settled areas wherever there are parks and gardens with flowers; unlikely to face serious risks in the near future.
Bibliography. Anon. (2000), Clements & Shany (2001), Fjeldså & Krabbe (1990), Goodfellow (1901), Graves (1982a, 1991), Hellmayr (1935), Hilty (1994, 2003), Hilty & Brown (1986), Isler & Isler (1999), King (1990), Koenen & Koenen (2000), Krabbe *et al.* (2001), Mauck & Burns (2009), McCarthy (2006), Moynihan (1963b, 1979), Phelps & Phelps (1950), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Taczanowski (1884), Vuilleumier (1969b).

200. **Black-throated Flowerpiercer**

Diglossa brunneiventris

French: Percefleur à gorge noire **Spanish**: Pinchaflor Gorjinegro
German: Schwarzkehl-Hakenschnabel
Other common names: Black-throated Flowerpecker; Vuilleumier's Flowerpiercer (*vuilleumieri*)

Taxonomy. *Diglossa brunneiventris* Lafresnaye, 1846, Peru.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species forms a monophyletic group with *D. gloriosa*, *D. humeralis* and *D. carbonaria*, and all were previously regarded as conspecific; known to hybridize, to limited extent, with *D. carbonaria* in small area of range overlap in Bolivia (La Paz). Isolated N race *vuilleumieri*, two populations of which are separated by c. 1500 km from larger nominate race in S, occurs in very humid zones, whereas nominate mainly in dry to arid zones, and song of at least W population of *vuilleumieri* (on Páramo Frontino) differs markedly from that of nominate (though specimens of the two are so similar that many, if not most, are racially inseparable); further taxonomic investigation required. Two subspecies recognized.
Subspecies and Distribution.
D. b. vuilleumieri G. R. Graves, 1980 – Antioquia (N end of W Andes and N end of C Andes), in Colombia.
D. b. brunneiventris Lafresnaye, 1846 – N Peru from S Cajamarca (S of R Marañón) S on W Andean slope to extreme N Chile (Tarapacá) and S on E slope to W Bolivia (La Paz).



Descriptive notes. 14 cm; 9·8–15 g. Medium-sized chestnut-bellied flowerpiercer with slender and somewhat upturned bill with prominent hook at tip. Nominate race is mainly black above, including crown, side of head, most of upperparts, most of wing, and entire tail; rump and uppertail-coverts rather pale grey, marginal coverts and lesser upperwing-coverts pale bluish-grey (forming small triangular patch on shoulder, sometimes partly concealed by scapulars), variable number of scapulars sometimes pale grey; centre of throat black, bordered by prominent rufous submoustachial stripe, latter continuous with deep rufous underparts; sides and flanks light blue-grey, partly concealed by wing (but always visible), thigh black; iris dark reddish-brown; bill black, basal half of lower mandible pale grey; legs dusky grey. Sexes similar. Juvenile is dusky olivaceous brown above, usually with some very faint dusky streaking, has two cinnamon-coloured wingbars and wing edgings, narrow moustachial streak buff to greyish, throat and underparts buff; immature like juvenile, but wing-coverts and wing edgings dull greyish, underparts streaked dusky, some immatures (possibly subadults) cinnamon-rufous below with dusky streaks and spots. Race *vuilleumieri* is very like nominate, but slightly larger in body size, with slightly larger black throat patch. Voice. Both sexes sing. In Peru, song is a fast complex series of notes, duration 1·5–4 seconds, described as a rapid jumble of warbling notes. At dawn typically, perches in open in top of shrub or small tree for extended periods to sing; rarely, song given also in flight. Call a thin "zit" and various wheezy notes. Song of *vuilleumieri* (at N end of W Andes) distinctive, consisting of three parts, a short, very flat and loose, low-pitched rattle, blending into brief slightly rising, complex phrase, and terminating with a longer, slightly higher-pitched rattle, the three parts run together without a noticeable break, e.g. "tw'tw'tw'tw'st'sle't'te'te'te'te'te'te'te'te'te'te".
Habitat. Humid elfin forest and montane–*páramo* ecotone in Colombia (race *vuilleumieri*). In Peru, W Bolivia and N Chile found mainly in dry to arid scrub at high elevation, and also, in much smaller numbers, in semi-humid or humid regions; wooded borders, hedgerows, cultivated and agricultural areas, including rather severely degraded regions so long as some scrub vegetation remains; also bushy streamside and in *Polylepis* above tree-line. Most numerous in dry low-stature montane scrub, especially with *Brachyotum* (Melastomataceae), *Gynoxys* (Asteraceae), second growth, gardens and even exotic eucalypts (*Eucalyptus*). Apparently c. 2000–3900 m in Colombia; 2400–4300 m (occasionally down to 2000 m) in Peru.
Food and Feeding. Following information based on studies of nominate race; N race (*vuilleumieri*) very poorly known in life. Diet nectar and insects. In pairs when breeding, but otherwise holds individual territory, which vigorously defended against other small nectar-feeders. Occasionally forages through shrubby areas with small mixed-species parties containing *Conirostrum* species and other tanagers, New World warblers (Parulidae) and tyrant-flycatchers (Tyrannidae), but more often seen alone or in pairs. Forages at all heights, from near ground, occasionally even on ground, to tops of shrubs and small trees. Very active; flicks wings, twists and turns and works through dense vegetation or flies low between patches of scrub. Although adept at keeping out of sight, is much less furtive than some others of genus, e.g. *D. lafresnayii* and *D. humeralis*. May cling or hang downwards if necessary to reach flowers. Punctures tubular corollas of a wide variety of small flowers, moving rapidly from one to the next and pausing little more than a second at each; regularly revisits puncture holes for nectar. Also forages for insects on foliage and in flowers, and makes quick aerial sorties for flying insects. Also probes flowers directly through front of corolla (without piercing), and reported as being a legitimate pollinator of *Tristerix* mistletoe in Peru.
Breeding. Fledglings reported in Dec–Jun and juveniles and immatures throughout year in Peru. No other information.
Movements. Probably chiefly resident. Little precise information. Local movements in response to changing nectar abundance may occur; in W Peru reported as shifting habitats seasonally, but no quantitative details.
Status and Conservation. Not globally threatened. Nominate race common and widespread, especially in dry intermontane valleys in Peru; occurs in Manu National Park and probably Huascarán National Park, both in Peru. Status of Colombian race *vuilleumieri* unclear. The species' range also includes large areas of disturbed vegetation which is not protected, but which provides suitable habitat for this species.
Bibliography. Athanas (2010a, 2010b), Clements & Shany (2001), Fjeldså & Krabbe (1990), Graves (1980, 1982a, 1982b, 1991), Hellmayr (1935), Hilty & Brown (1986), Isler & Isler (1999), Jaramillo (2003), Koepcke (1970), Mauck & Burns (2009), Mayer (2000), McCarthy (2006), Meyer de Schauensee (1970a), Moynihan (1979), Phelps & Phelps (1950), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Taczanowski (1884), Vuilleumier (1969b, 1984a), Walker (2001).

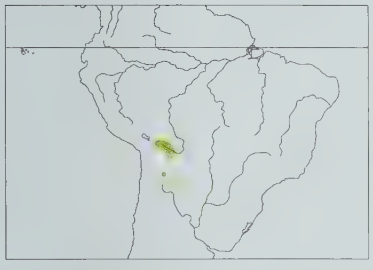
201. **Grey-bellied Flowerpiercer**

Diglossa carbonaria

French: Percefleur charbonnier **Spanish**: Pinchaflor Carbonero
German: Grauschulter-Hakenschnabel
Other common names: Grey-bellied Flowerpecker, Coal-black/Carbonated Flowerpiercer/Flowerpecker

Taxonomy. *Serrirostrum carbonaria* d'Orbigny and Lafresnaye, 1838, Sicasica, La Paz, Bolivia. Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Present species forms a monophyletic group with *D. gloriosa*, *D. humeralis* and *D. brunneiventris*, and all were previously regarded as conspecific; known to hybridize, to limited extent, with *D. brunneiventris* in small area of range overlap in Bolivia (La Paz). Monotypic.

Distribution. Bolivia from vicinity of La Paz (city of La Paz) SW along E ridge of Andes to departments of Santa Cruz and Chuquisaca, and N Argentina (N Jujuy).



Descriptive notes. 13 cm; 9–14·8 g. Medium-sized flowerpiercer with grey, black and rufous plumage, slender and somewhat upturned bill with prominent hook at tip. Has head, throat and most of upperparts black, dark grey rump contrasting only slightly with rest of upperparts (and often hidden); marginal and lesser upperwing-coverts light grey (forming small triangular patch on shoulder), variable number of scapulars sometimes pale grey, rest of upperwing black, tail black; breast, belly, sides and flanks grey, upper breast somewhat mottled and streaked with black, undertail-coverts rufous; throughout range, a few individuals have some plumage characteristics typical of *D. brunneiventris*, including rufous malar and rufous feathers on underparts; iris dark brown; bill black, basal half of lower mandible pale grey; legs dusky grey. Sexes similar. Juvenile is somewhat streaked, upperparts dark greyish-brown, underparts similar but paler and with obscure dusky to buff streaking, sides greyish-brown and somewhat streaked brown, belly buff, undertail-coverts dull rufous; immature dark brown above with hint of dark olive streaking, two faint wingbars, edges of inner flight-feathers and tertials buffy brown, grey below, becoming buff on belly, most of underside from throat to belly variably streaked dusky, overall much like immature of *D. brunneiventris*. VOICE. Song a rapid, complex jumble of high-pitched notes somewhat like song of *D. brunneiventris*, lasts c. 3 seconds and repeated every few seconds during peak bouts, e.g. "peeza-peeza-seetza'sizza-peeza'teez-teez'za-te-za-te-t-t", trailing off and ending inconclusively in a series of perceptibly slower, single notes.

Habitat. Dry montane scrub, patches of scrubby woodland at tree-line, and settled areas with hedgerows, gardens and brush; less often in light woodland in semi-humid and humid regions. At 2100–4300 m.

Food and Feeding. Nectar, also insects. Stomach contents largely insects. Occurs in pairs when breeding, mainly singly at other times. Territorial and aggressive in defending small patches of flowers. Highly active and nervous in behaviour, and may remain largely hidden, or appear only momentarily, as it works quickly through denser vegetation. Also takes many insects from foliage and in short aerial sallies. Behaviour generally similar to that of *D. brunneiventris*.

Breeding. Fledglings seen in Dec–Jul and juveniles and immatures in Mar–Jul and Dec. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Bolivian and Peruvian Upper Yungas EBA and High Andes of Bolivia and Argentina EBA. Generally common within limited range. Recent sight record of this species from extreme NW Argentina (near Jujuy) requires corroboration. Occurs in a few protected areas, including Tunari National Park and probably also in Madidi, Carrasco and Amboró National Parks. Within its range extensive habitat alteration has resulted from firewood-cutting, burning, grazing and agriculture, but the species adapts well to these altered environments and is unlikely to face any serious threats in the short term.

Bibliography. Cahill (2008), Fjeldså & Krabbe (1990), Graves (1980, 1982a, 1982b, 1991), Hellmayr (1935), Isler & Isler (1999), Kessler & Herzog (1998), Mayer (2000), McCarthy (2006), Meyer de Schauensee (1970a), Moynihan (1979), Phelps & Phelps (1950), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Sclater (1875), Vuilleumier (1969b, 1984a), Vuilleumier & Ewert (1978).



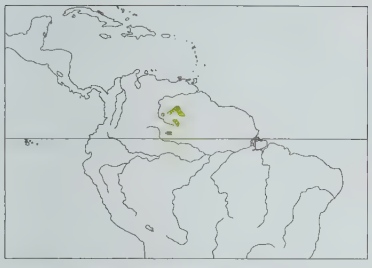
202. **Scaled Flowerpiercer**

Diglossa duidae

French: Percefleur des tépuis **Spanish**: Pinchaflor del Duida
German: Schuppenbrust-Hakenschnabel
Other common names: Scaled Flowerpecker

Taxonomy. *Diglossa duidae* Chapman, 1929, Mount Duida, 6600 feet [c.2010 m], Amazonas, Venezuela. Genus has sometimes been placed in Coerèbidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Race *georgebarrowcloughi* differs little from *hitchcocki* and perhaps better subsumed within latter; retained pending further study. Proposed race *parui* (described from Cerro Parú, in NC Amazonas) considered inseparable from nominate. Three subspecies currently recognized.

Subspecies and Distribution.
D. d. duidae Chapman, 1929 – isolated tepuis in Amazonas (including Cerro Parú, Cerro Huachamacari, Mt Duida and Cerro Marahuaca) and SW Bolívar (Meseta de Jaua and Cerro Sarisariñama), in S Venezuela.
D. d. hitchcocki Phelps, Sr & Phelps, Jr, 1948 – Cerro Sipapo, Cerro Guanay and Cerro Yavi (N Amazonas), in S Venezuela.
D. d. georgebarrowcloughi Dickerman, 1987 – Cerro de la Neblina, on S Venezuela–Brazil border.
Descriptive notes. 14 cm; male 11·9–18·5 g, female 12·9–16 g. All-dark flowerpiercer with upturned bill strongly hooked at tip of upper mandible. Nominate race is slaty black above, head darker, marginal and lesser upperwing-coverts broadly tipped paler blue-grey (forming small, inconspicuous, paler triangular shoulder patch), similar tips less developed on median coverts, greater coverts sometimes faintly tipped whitish (hint of pale wingbar), flight-feathers and tail dusky, with narrow slate-grey fringes; throat and chest slate-grey, gradually becoming slightly paler on lower underparts, feathers of lower breast and belly with pale grey subterminal crescents (imparting somewhat scaled appearance), undertail-coverts mixed grey and whitish; iris reddish-brown; bill black, basal portion of lower mandible greyish-horn; legs dusky grey. Sexes similar. Juvenile has crown blackish, upperparts and throat dull dusky grey (no bluish), median and greater upperwing-coverts



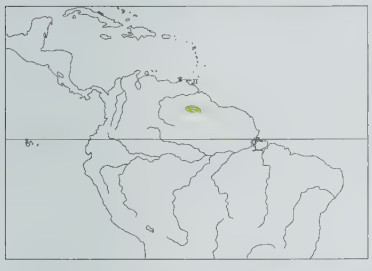
tipped whitish (forming fairly well-defined pale wingbars), breast and lower underparts medium grey, somewhat spotted with white; immature like juvenile, but darker above, whitish wingbar (usually only one) less distinct, and underparts darker and much like those of adult. Race *hitchcocki* is very like nominate, but glossier above, spots and scales of underparts visible from foreneck downwards, those of lower underparts slightly larger and brownish, and undertail-coverts scaled with white; *georgebarrowcloughi* is quite similar to nominate, but slightly larger, blacker with slight bluish gloss above, black of underparts more confined to throat, and more obviously scaled and spotted below. Voice. No information.
Habitat. Poorly known. Probably scrubby humid forest on rocky slopes and tops of tepuis, but habitat not well documented. Recorded at 1400–2600 m; lower-elevation records from Cerro Sipapo (1400–1800 m), highest ones from Cerro Marahuaca and Cerro de la Neblina.
Food and Feeding. No information. Presumably much as for *D. major*.
Breeding. No information.
Movements. Presumably resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tepuis EBA. Very poorly known. Probably common, as numerous specimens have been collected, from a number of different sites. Occurs on many tepuis in S Venezuela, almost all of which are remote and of difficult access, and have been visited only rarely by scientific expeditions. This species is perhaps the most poorly known of its genus, essentially unknown in life, and with no certain information on its status or any aspects of its natural history. Except for scattered Amerindian villages at bases of some tepuis, there is almost no human activity within the distributional range of this species, and no human intervention on the upper slopes where it lives. It is, thus, one of the few members of its genus which has had no exposure to human activity or habitat alteration, and it is unlikely that it will face any threats in the foreseeable future.
Bibliography. Dickerman (1987), Hilty (2003), Isler & Isler (1999), Mauck & Burns (2009), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Souza (2002).

203. Greater Flowerpiercer

Diglossa major

French: Grand Percefleur **German**: Strichelhakenschnabel **Spanish**: Pinchaflor Grande
Other common names: Greater Flowerpecker, Great Flowerpiercer

Taxonomy. *D[iglossa] major* Cabanis, 1848, Cerro Roraima, 6000 feet [c. 1830 m], near border of Guyana and Venezuela.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. Four subspecies recognized.
Subspecies and Distribution.
D. m. gilliardi Chapman, 1939 – Auyán-tepui (SE Bolívar), in SE Venezuela.
D. m. disjuncta J. T. Zimmer & Phelps, Sr, 1944 – tepuis on W side of Gran Sabana (including Ptaritepui, Sororopán-tepui, Uaipán-tepui, Aprada-tepui, and Acopán-tepui), in SE Venezuela.
D. m. chimantae Phelps, Sr & Phelps, Jr, 1947 – Chimantá-tepui (SE Bolívar).
D. m. major Cabanis, 1848 – Cerro Roraima, including sites within Venezuela, Brazil and Guyana; also Cerro Cuquenán and Uei-tepui, in extreme SE Bolívar (Venezuela).
Also on Sierra de Lema (E Bolívar), race uncertain, presumably referable to nominate.



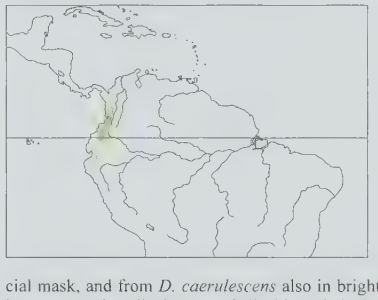
Descriptive notes. 17·3 cm; 17·5–25 g (*disjuncta*). The largest flowerpiercer, dark and rather long-tailed, with bill noticeably thick at base and strongly hooked. Nominate race has forehead, lores, periocular area and chin black (forming mask), fading to bluish-slate across ear-coverts, moustachial region spotted bluish-white (narrow moustachial stripe); otherwise slightly glossed bluish-slate above, rear crown to uppertail-coverts with inconspicuous silvery-blue shaft streaks; lesser and median upperwing-coverts dark bluish like body, and with a few pale shaft streaks, greater coverts and primary coverts dull black; flight-feathers and tail blackish, narrowly and obscurely edged whitish; throat and underparts paler slaty grey (minimal bluish tinge) with just a few indistinct pale shaft streaks, undertail-coverts ochre-rufous; iris brown to deep red-brown; bill pale blue-grey, blackish on culmen and tip; legs dusky black. Sexes similar. Immature is dusky brown above, grey-brown with dull whitish streaking below, white moustachial stripe freckled black, undertail-coverts chestnut. Race *gilliardi* is much like nominate, but darker, slightly glossed, with ear-coverts more extensively black, moustachial stripe only weakly defined, flight-feathers edged pale blue (not whitish), and underparts more slaty bluish (less grey) and with more obviously pale blue shaft streaks; *disjuncta* is similar to previous, but streaking obscure or largely lacking, underparts less blue, vent and undertail-coverts deep chestnut; *chimantae* only slightly darker than nominate, underparts plain slate-grey, vent and undertail-coverts deep chestnut. Voice. Unusual song, typically delivered from prominent high perch by single individual, or in complex duet, consists of rapid burst of high-pitched and variable notes more or less repeated over and over for 20–30 seconds, occasionally up to several minutes; in duets, one bird sings a series of harsh or flat, low-pitched notes, the other a repetition of high-pitched, tinkling notes all of which rise and fall in pitch and may vary also in volume. Song, whether delivered singly or as duet, is chattery, rather than musical, and like pulses or bursts of scratchy static that swell and then fade in volume as the bird turns its head.
Habitat. Borders and middle and upper levels of humid and wet montane forest, stunted cloudforest, dense, mossy second growth, and especially borders of melastome-dominated second growth on white sandy soil. At 1400–2850 m in Venezuela, but numerous only at high elevations, e.g. common to abundant above c. 2000 m on Cerro Roraima; elsewhere mainly above 1800 m, once as low as 1200 m on Guyana side of Cerro Roraima. On Sierra de Lema, highest elevations little more than 1500 m.
Food and Feeding. Nectar, also insects. Occurs singly, in pairs when breeding, and is usually independent of mixed-species flocks. Forages from eye level up to canopy, more often high. Active; frequently wing-flicks as it moves restlessly through foliage. Pierces bases of flower corollas, also probes directly into short flower corollas for nectar (and presumably insects); especially attracted to flowers of arboreal bromeliads.
Breeding. Nests attributed to this species described as open cup of grass and small sticks situated among rocks, usually under overhanging shelf and less than 0·4 m up; further verification desirable, as other members of genus typically build nests of moss, ferns and tiny rootlets. No other information.
Movements. Few data; altitudinal movement noted. Marked seasonal movements at lower elevations (i.e. on Sierra de Lema), but little information from higher elevations, where the species is much more numerous.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tepuis EBA. Rare (at low elevations) to abundant (higher elevations). Common to abundant above c. 2000 m on Cerro Roraima; scarce and local on Sierra de Lema (one of the few accessible localities where the species is recorded), which rises to little more than 1500 m. Occurs in Canaima National Park (Venezuela) and Kaieteur National Park (Guyana). Although total range occupied by this species is small, it faces no real threats. Distribution is naturally fragmented, with various populations largely or entirely isolated from each other at present time. Few human settlements exist within its range. Unregulated mining for gold and diamonds, burning of grassland, road-building projects and long-distance power transmission lines are ongoing activities in the region, although few of these, at present, directly affect this species.
Bibliography. Braun *et al.* (2003), Chapman (1939), Gilliard (1941), Hilty (2003), Isler & Isler (1999), Lovette & Bermingham (2002), Mauck & Burns (2009), Meyer de Schauensee & Phelps (1978), Phelps (1938), Phelps & Phelps (1950), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Souza (2002).

204. Indigo Flowerpiercer

Diglossa indigotica

French: Percefleur indigo **German**: Indigohakenschnabel **Spanish**: Pinchaflor Índigo
Other common names: Indigo Flowerpecker

Taxonomy. *Diglossa indigotica* P. L. Sclater, 1856, Ecuador.
Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species, along with *D. glauca*, *D. caerulescens* and *D. cyanea*, has sometimes been placed in separate genus, *Diglossopis*, on grounds of some important anatomical features (of corneous tongue, bony palate, maxillo-palatines and mandible, and structure of rhamphotheca), all of which may set them apart from present genus; these four species, with a proportionately smaller bill hook, may have evolved only once, while all other flowerpiercers (with larger hook) may have evolved multiple times; recent molecular-genetic data, however, indicate that these four "small-billed" species do not form a monophyletic group, and all flowerpiercers are best retained in a single genus. Monotypic.
Distribution. Pacific slope of W Andes from Risaralda (Cerro Tatamá), in Colombia, S to NW Ecuador (Pichincha).



Descriptive notes. 11 cm; 10·5–18 g. Very small, rather short-tailed, dark flowerpiercer with short bill upturned (especially lower mandible), upper mandible hooked at tip. Has lores, narrow ocular area and chin black, otherwise bright shining indigo-blue above and below; tail dusky, feathers edged bright blue; lesser upperwing-coverts indigo-blue, median and greater coverts dusky, heavily edged indigo-blue, flight-feathers blackish, narrowly edged bright blue, tertials more broadly edged turquoise-blue; iris fire-red; bill and legs black. Differs from similar *D. cyanea* in smaller size, shorter bill and lack of obvious dark facial mask, and from *D. caerulescens* also in brighter blue coloration. Sexes similar. Juvenile and immature undescribed. Voice. Call a high-pitched, thin note reminiscent of that of *D. caerulescens*. Unusual song (markedly dissimilar to those of congeners) a series of extremely high-pitched, penetrating and evenly spaced notes that gradually descend, e.g. "see'see'see'ee'ee'ee'ee'ti'ti'ti'ti 'ti'ti'ti' ti'te'te'te'ee'ee'ee'ee'eee, eee," c. 20–30 or more notes in 4·5–6·5 seconds, the notes with pulsating quality. Context of a thin, almost strained "squik, squik, squik, squik", at deliberate pace, is unknown.
Habitat. Humid and wet montane forest, especially moss-clad and bromeliad-laden cloudforest and along wet and mossy forest borders and tall second growth. At 700–2200 m in Colombia; the few records in Ecuador mostly at 1600–2000 m. Generally at lower elevations than most other members of genus within its range.
Food and Feeding. Nectar, berries and small arthropods. Occurs singly or in pairs, and persistently with mixed-species flocks containing *Tangara* and *Chlorochrysa* tanagers. Hyperactive, constantly fidgeting, wing-flicking and flitting along mossy branches and among tangles of vines, bromeliads and other epiphytes. Behaviour recalls that of a parulid warbler (e.g. *Dendroica*) more than a flowerpiercer. Has been observed to puncture small tubular flower corollas for nectar, but more often seen as it peers and gleans for small arthropod prey and berries on branches covered with epiphytes and moss.
Breeding. One bird carrying nesting material in Jun in Colombia (Valle). No other information.
Movements. No information. Some local movements possible; during intensive 15-month study in Anchicayá Valley (1050 m) in W Colombia, the species was observed in all months except Apr and Jul, but appeared to be much more numerous in some months than in others.
Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Fairly common very locally in Colombia; rare and local in Ecuador, with few verified records anywhere within presumed range in that country (old records from Nanegel and Canzacoto, in

On following pages: 205. Deep-blue Flowerpiercer (*Diglossa glauca*); 206. Bluish Flowerpiercer (*Diglossa caerulescens*); 207. Masked Flowerpiercer (*Diglossa cyanea*).

Pichincha, and one uncorroborated sight record in El Oro). Occurs in Farallones de Cali and Munchique National Parks, the protected watershed of upper R Anchicayá hydropower dam, Tambito Nature Reserve and probably also Tatamá National Park (Colombia); may occur also in one or more private reserves in extreme SW Colombia, e.g. Pangan Reserve and Río Nambí Community Nature Reserve. Much of the species' small range is rapidly being deforested or damaged through a combination of agriculture, mining, logging and increased human settlement. Reasons for its extreme scarcity in Ecuador, despite some apparently suitable habitat, are unknown. Should perhaps be listed as Near-threatened or even Vulnerable.

Bibliography. Bock (1985), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Mauck & Burns (2009), Moore *et al.* (1999), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sibley & Monroe (1990), Spencer (2008c), Stotz *et al.* (1996).

205. **Deep-blue Flowerpiercer**

Diglossa glauca

French: Percefleur glauque **German**: Ultramarin-Hakenschnabel **Spanish**: Pinchaflor Glauco
Other common names: Deep-blue Flowerpecker, Golden-eyed Flowerpiercer

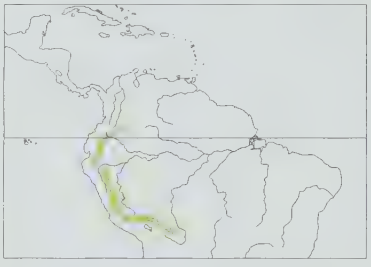
Taxonomy. *Diglossa glauca* P. L. Sclater and Salvin, 1876, Nairapi, Bolivia.

Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species, along with *D. indogotica*, *D. caerulescens* and *D. cyanea*, has sometimes been placed in separate genus, *Diglossopis*, on grounds of some important anatomical features (of corneous tongue, bony palate, maxillo-palatines and mandible, and structure of rhamphotheca), all of which may set them apart from present genus; these four species, with a proportionately smaller bill hook, may have evolved only once, while all other flowerpiercers (with larger hook) may have evolved multiple times; recent molecular-genetic data, however, indicate that these four "small-billed" species do not form a monophyletic group, and all flowerpiercers are best retained in a single genus. Geographical variation of present species minimal, race *tyrianthina* differing only slightly from nominate; species perhaps better treated as monotypic. Two subspecies currently recognized.

Subspecies and Distribution.

D. g. tyrianthina Hellmayr, 1930 – S Colombia on E slope of E Andes (in W Caquetá, W Putumayo and E Nariño) and S on adjacent E slope in Ecuador to about Peru border and to extreme N Peru (Cordillera del Condor).

D. g. glauca P. L. Sclater & Salvin, 1876 – E slope in N Peru (S of R Marañón) S to Bolivia (to Cochabamba).



Descriptive notes. 11–12 cm; 9·5–13 g. Small golden-eyed flowerpiercer with short and somewhat upturned bill with prominent hook at tip of upper mandible. Male nominate race is mainly deep blue throughout, with very narrow black area on forehead, lores and chin; upperwing-coverts, flight-feathers and tail dusky, edged deep blue; iris brilliant golden-yellow; bill black; legs dusky. Female is similar to male, but slightly duller. Juvenile and immature undescribed. Race *tyrianthina* is very like nominate, but black more restricted to loral area. Voice. When foraging often gives high-pitched pure "keeeee", mechanical or amphibian-like, sometimes doubled, also "ti-ti-dweeeer", and sharp "psew". Song in Colombia described as high thin series of chips and squeaks, dropping, accelerating and very jumbled at end; in Peru as variable, very high and wheedling, with melancholy quality, less musical than songs of *D. cyanea*, more varied than song of *D. caerulescens*; may give a flat trill (much like that of *D. albilatera*). These descriptions, however, do not agree with several recent recordings of song made in Ecuador and Peru, which similar to song of *D. indigotica* but shorter, weaker and less penetrating, e.g. very high-pitched thin series of "ti" notes at moderate pace and descending slightly, "ti-ti-ti-ti-ti-ti-te-te-te-te". Possible that more than one song type is given. Call note a thin high "ti", often a few given as lead-in to last-mentioned song.

Habitat. Humid to wet, mossy forest (cloudforest) and along wet forest borders. At 1400–2300 m in Colombia, mainly 1000–1800 m in Ecuador, and 1000–2300 m in Peru; generally at lower elevations than most congeners within its range.

Food and Feeding. Diet little known; insects and berries, possibly also nectar. Single birds or pairs are persistent members of mixed-species flocks, especially those containing *Tangara* tanagers. Forages mainly for insects, especially in bromeliads and on mossy branches; often takes small berries. Although hooked bill is suitable for piercing flowers, this species, like *D. indigotica*, is not often seen at flowers.

Breeding. No information.

Movements. No relevant information.

Status and Conservation. Not globally threatened. Locally fairly common. Occupies a narrow band of cloudforest on E slope of Andes that is at risk from deforestation, settlement and other human activities. Occurs, or probably occurs, in a number of protected areas on E Andean slope, among them Cayambe-Coca and Antisana Ecological Reserves and Sangay and Podocarpus National Parks (Ecuador), Cordillera Azul, Tingo Maria and Manu National Parks (Peru) and probably Madidi National Park (Bolivia).

Bibliography. Álvarez-Rebolledo *et al.* (2007), Athanas (2008), Bock (1985), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Mauck & Burns (2009), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schulenberg (2000a), Schulenberg *et al.* (2007), Sibley & Monroe (1990), Spencer (2010).

206. **Bluish Flowerpiercer**

Diglossa caerulescens

French: Percefleur bleuté **German**: Silberhakenschnabel **Spanish**: Pinchaflor Azulado
Other common names: Bluish Flowerpecker

Taxonomy. *Diglossopis caerulescens* P. L. Sclater, 1856, Caracas, Venezuela.

Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species, along with *D. indogotica*, *D. glauca* and *D. cyanea*, has sometimes been placed in separate genus, *Diglossopis*, on grounds of some important anatomical features (of corneous tongue, bony palate, maxillo-palatines and mandible, and structure of rhamphotheca), all of which may set them apart from present genus; these four species, with a proportionately smaller bill hook, may have evolved only once, while all other flowerpiercers (with larger hook) may have evolved multiple times; recent molecular-genetic data, however, indicate that these four "small-billed" species do not form a monophyletic group, and all flowerpiercers are best retained in a single genus. Some races of present species weakly differentiated; *intermedia* differs only slightly from *saturata* (to N of it) and *pallida* (to S), being intermediate between the two, and may not merit recognition. A slightly paler specimen of *saturata* from El Chaco, on E slope in Ecuador, is perhaps intermediate between that race and *media*. Some authors have suggested that all specimens from C & W Andes of Colombia and adjacent NW Ecuador (currently placed in *saturata*) belong to an as yet unnamed race, and that specimens from most of Ecuadorian range of *media* (except SW Ecuador) represent an additional undescribed race; further study required. Seven subspecies tentatively recognized.

Subspecies and Distribution.

D. c. ginesi Phelps, Sr & Phelps, Jr, 1952 – upper R Negro region of Sierra de Perijá, in W Venezuela.

D. c. caerulescens (P. L. Sclater, 1856) – coastal cordillera of N Venezuela (Carabobo, Aragua, Vargas and Distrito Federal).

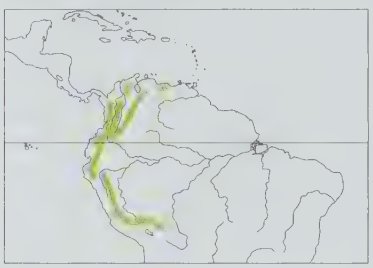
D. c. saturata (Todd, 1917) – Andes of Venezuela (from Trujillo S to Táchira), and all three ranges in Colombia and apparently Andes of N Ecuador (S to Pichincha on W slope; a specimen from El Chaco on E slope).

D. c. media J. Bond, 1955 – N portion of E slope of Andes in Ecuador (specimen from at least as far N as Sierra Azul, in Napo) S to E slope in N Peru (Cajamarca and N Amazonas).

D. c. intermedia Carriker, 1935 – Department of Cajamarca (Chira, Tambillo, Palto, Tabaconas, Levanto and Tamiapampa), in N Peru.

D. c. pallida (Berlepsch & Stolzmann, 1896) – N & C Peru (from S side of R Marañón S to La Libertad, Lima and Junín).

D. c. mentalis J. T. Zimmer, 1942 – E slope of Andes in S Peru S to Bolivia (La Paz).



Descriptive notes. 13·5 cm; 10·1–16 g. Relatively dull, bluish flowerpiercer with rather long and thin bill only slightly upturned and with proportionately smaller hook at tip than in any other member of genus. Male nominate race is mainly dull bluish-grey, with lowermost forehead, loral area and small area around eye blackish (forming small, rather weakly defined mask); upperwing-coverts dull blue, primary coverts and flight-feathers dusky, edged blue; throat and underparts slightly paler than upperparts, dull blue somewhat mixed with whitish feather edging, greyer on centre of belly; iris dark red to orange-red, red colour often inconspicuous; bill black; legs dark grey. Female is similar to male, but duller, with duller eyes. Juvenile is duller still, with faint streaking on lower parts, base of lower mandible yellow; immature resembles adult, but duller blue, mask obscure, and eyes brownish to reddish-brown. Races vary most obviously in tone of blue, also in size, nominate largest: *ginesi* differs from nominate in slightly paler and duller upperparts, smaller mask; *saturata* is decidedly darker and slightly more purplish above, and darker, more slaty blue, below; *media* is much like nominate (and previous), but slightly brighter blue above and not so purplish-tinged below, and has more whitish edging on lower underparts; *intermedia* is clearer and bluer above, close to *saturata*, with underparts almost exactly intermediate between latter and *pallida*, showing definite contrast between breast and belly, and with breast paler than that of *saturata*; *pallida* is dullest race, essentially grey below, with throat and upper breast only slightly darker (weak demarcation) than lower underparts; *mentalis* is darker than last, has upperparts with clearer bluish tinge, throat and breast darker greyish, point of chin with small blackish area spreading over anterior malar region. Voice. In Peru, song described as a variable, high, lisping, melancholy warble, descending in pitch; in Venezuela and Colombia a few slow, high notes, then an accelerating shower of chattery staccato notes (may vary geographically or possibly individually) that cascade from tree canopy, e.g. "eeeéét, esa-eet, eat-tsu-ti' tip-ta-leep' ta-lip, chlip, chee-ep, cheelip' iz si..." and so on, often descending somewhat in pitch and ending in fussy, tittering jumble varying from 2 seconds to long-sustained. Context of song variation unknown. In Venezuela and Colombia, often heard call a hard, metallic, "tiink", distinctive once learned.

Habitat. Humid montane forest, older second growth and forest borders; in S part of range (Peru) may favour scrubbier forest on nutrient-poor soils. At 1400–2100 m in N Venezuela, c. 1600–3200 m S in Andes (mainly 2100–2700 m in Colombia and Ecuador, although has been reported much lower and higher), 1300–3100 m in Peru.

Food and Feeding. Insects, also small berries (especially *Miconia*), and reported taking fruits of *Cavendishia bracteata* in Colombia and of *Rubus* in several places; also takes nectar. Forages singly and in pairs; most often seen when accompanying mixed-species flocks containing New World warblers (Parulidae), other flowerpiercers and other tanagers. Forages in middle levels and canopy of forest, where it feeds extensively on small berries and gleans insects from outer foliage and twigs. Infrequently punctures flowers for nectar (far less than do many smaller species) and, when taking nectar, most often probes flowers directly. Behaviour and feeding more like those of *D. cyanea* and of various parulid warblers and *Tangara* tanagers than those of other flowerpiercers; not so active and nervous as its smaller congeners, nor is it so furtive.

Breeding. Nest with eggs in Feb in Venezuela (Trujillo), juvenile/immature in Dec (Santander) and eight birds in breeding condition in Jun–Aug in Colombia, and fledgling reported in Feb in N (Amazonas) and juvenile/immature in Jun (N) and Aug (in S) in Peru; these records, collectively, suggest breeding from mid-dry season through first part of rainy season. Nest an open cup of dry grass and moss, placed in bush, Venezuela nest sited in deep pocket on steep mossy roadbank. No information on clutch size, nest in Venezuela held 2 eggs, eggs in Colombia pale greenish-blue, blotched and spotted reddish-brown, mainly at large end. No other information.

Movements. Mainly resident. Seasonal movements reported (without details) in N Venezuela; occasional records elsewhere at higher or lower elevations suggest limited seasonal movements, but documentation needed.

Status and Conservation. Not globally threatened. Common and relatively widespread; scarce or absent locally, e.g. in NW Ecuador. Occurs in numerous protected areas, including Henri Pittier and Sierra Nevada National Parks (Venezuela), Chingaza and Los Farallones National Parks and

Reinita Cielo Azul, Tambito and Río Blanco de Manizales Nature Reserves (Colombia), Manu National Park (Peru), and presumably other reserves on E slope in Ecuador, Peru and Bolivia. This species is often fairly numerous in older regrowth forest where there are fruiting trees (e.g. melastomes) with small berries, a habitat that should to some extent act as a buffer against risk.

Bibliography. Anon. (2000), Bangs & Noble (1918), Bock (1985), Bond (1955), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Mauck & Burns (2009), Moynihan (1979), Nehrkorn (1899), Ogilvie-Grant (1912), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg (2000a), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sibley & Monroe (1990), Snow & Snow (1980), Vuilleumier (1969b), Walker (2001).

207. **Masked Flowerpiercer**

Diglossa cyanea

French: Percefleur masqué **German**: Maskenhakenschnabel **Spanish**: Pinchaflor Enmascarado
Other common names: Masked Flowerpecker

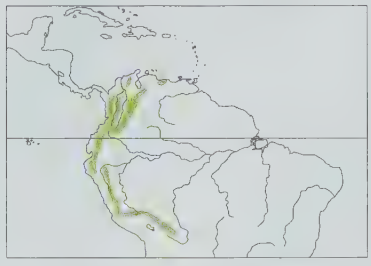
Taxonomy. *Uncirostrum cyaneum* Lafresnaye, 1840, Santa Fé de Bogotá, Colombia.

Genus has sometimes been placed in Coerebidae or Parulidae or even, because of an apparent close relationship to *Acanthidops*, in Emberizidae. Molecular phylogenies indicate that it is most closely related to *Xenodacnis* and to *Acanthidops*, *Haplospiza* and *Catamenia* (the last three genera currently placed in Emberizidae), and that all clearly belong in present family. Members of this clade may also be closely related to the *Oreomanes–Conirostrum* clade. This species, along with *D. indogotica*, *D. glauca* and *D. caerulescens*, has sometimes been placed in separate genus, *Diglossopis*, on grounds of some important anatomical features (of corneous tongue, bony palate, maxillo-palatines and mandible, and structure of rhamphotheca), all of which may set them apart from present genus; these four species, with a proportionately smaller bill hook, may have evolved only once, while all other flowerpiercers (with larger hook) may have evolved multiple times; recent molecular-genetic data, however, indicate that these four "small-billed" species do not form a monophyletic group, and all flowerpiercers are best retained in a single genus. Distributional limits of race *obscura* of present species uncertain; not yet recorded on Colombian side of Perijá Mts, but may extend S to meet nominate race near border of Venezuela with Colombia. Five subspecies recognized.

Subspecies and Distribution.

D. c. obscura Phelps, Sr & Phelps, Jr, 1952 – Sierra de Perijá, in W Venezuela.
D. c. tovarensis J. T. Zimmer & Phelps, Sr, 1952 – coastal cordillera of N Venezuela (in Aragua and Distrito Federal).
D. c. cyanea (Lafresnaye, 1840) – Andes of Venezuela (S from Trujillo) and all three ranges in Colombia and Andes of Ecuador (except far SW).
D. c. dispar J. T. Zimmer, 1942 – Andes of SW Ecuador and NW Peru.
D. c. melanopis Tschudi, 1844 – Andes of Peru (except NW) S to Andes in Bolivia (to Santa Cruz).

Descriptive notes. 15 cm; 12–22·5 g. Large, rich blue flowerpiercer with red eyes and large black mask, rather long and thin bill only slightly upturned and with relatively small hook at tip of upper mandible. Nominate race is rich, shining dark blue, with conspicuous black mask across forehead and extending back around and below eye to ear-coverts and forwards to chin; lesser upperwing-coverts blue (generally hidden), rest of wing-coverts, flight-feathers, tertials and tail black, broadly edged dark blue; iris bright red; bill black; legs dusky. Female is similar to male, but slightly duller. Juvenile and immature are much duller and greyish, especially below, where almost entirely dull dark grey, black mask faintly indicated, with iris dark, base of bill pale; subadult has dark red iris. Races differ mainly in intensity of blue colour: *obscura* differs from nominate in overall darker blue



colour; *tovarensis* is rather like nominate, but brighter and paler blue, especially on forecrown, with black mask more contrasting; *dispar* differs from nominate in that blue colour has more of a greenish tinge (less violaceous tinge); *melanops* is slightly larger than others, and generally darker and duller than nominate, with blue of outer margins of tertials less sharply outlined. VOICE. In N Venezuela, song (race *tovarensis*) given all year, a high, wiry series of 2–3 thin "zeet" notes, then a rapid, increasingly complex series of tinkling and twittering notes, descending somewhat in pitch and often ending in 2 thin but distinct "zeet" or "seet" notes; each bird may sing slightly different song, or several different songs, but the 2–3 introductory notes distinctive and constant (and seem to be lacking in other members of genus in Venezuela). In S songs seem less distinctive, in Ecuador described as a series of thin notes followed by a twitter, and in Peru as a variable high, lisping, melancholy warble, more melodic than song of *D. caerulescens*. Song variation seems sufficiently marked to warrant further study. Sings from partly concealed perch near top of bush or tree, perhaps less often from exposed perch.

Habitat. Humid montane forest (cloudforest) and forest borders and in smaller numbers to tree-line, where occurs in elfin forest and low shrubs. Recorded at 1450–3600 m, mainly c. 1800–3300 m.

Food and Feeding. Small fruits and berries (especially species of Melastomataceae), also some insects; more frugivorous than any other member of genus. Seen singly, in pairs, and regularly also in varyingly sized flocks of its own, and in all cases often accompanies mixed-species flocks in forest canopy or middle level or along edges of forest. Most often seen as it moves quickly along mossy branches, twigs, vines and in foliage, where it searches for small food items. Has been seen to pierce small fruits for juice, and frequently makes short sallies to air for flying insects. Only rarely punctures or visits flowers, then usually probing them directly.

Breeding. Fledglings in Dec, Mar and Apr in Venezuela and Colombia and in Mar, May, Jul and Dec in Peru and Bolivia, immatures reported virtually throughout year, and nine birds in breeding condition Jun–Sept in Colombia; may breed twice each year, even while in moult, in Venezuela and Colombia. Open cup-nest of moss, grass and feathers, generally placed in bush; nest and eggs from Antioquia (Colombia) much like those of *D. caerulescens*, but nest feather-lined, and eggs slightly larger. No other information.

Movements. Poorly documented. In some areas undertakes seasonal or periodic movements, mostly between higher and lower elevations; at such times single-species groups of 20–30 individuals may move together, e.g. c. 25 birds seen while streaming upslope (moving upwards from c. 1450 m) in state of Barinas, Venezuela, in Jun (early rainy season); similar groups reported farther S in Andes.

Status and Conservation. Not globally threatened. Fairly common to common; widespread. Occurs in many parks and reserves, among them Henri Pittier, Sierra Nevada and Tamá National Parks (Venezuela), Chingaza, Las Orquídeas, El Cocuy, Los Nevados, Nevado del Huila, Cueva de los Guácharos and Puracé National Parks (Colombia), Sangay and Podocarpus National Parks (Ecuador), Cordillera de Colán, Tingo María and Manu National Parks (Peru) and Madidi National Park (Bolivia). This species also occurs in many unprotected areas of montane forest, some of which are at risk, others at little risk in immediate term.

Bibliography. Anon. (2000), Bardeleben & Gray (2005), Bock (1985), Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hellmayr (1935), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Koenen & Koenen (2000), Krabbe *et al.* (2001), Mauck & Burns (2009), Moore *et al.* (1999), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg (2000b), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Sibley & Monroe (1990), Vuilleumier (1969), Walker (2001).



Genus *CATAMBLYRHYNCHUS* Lafresnaye, 1842

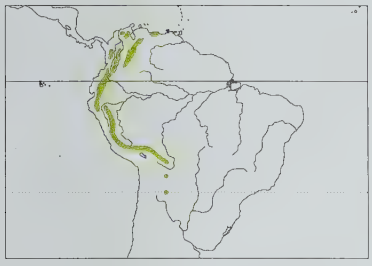
208. **Plushcap**

Catamblyrhynchus diadema

French: Tête-de-peluche couronné **German**: Plüschkopftangare **Spanish**: Tangara Peluda
Other common names: Plush-capped Finch

Taxonomy. *Catamblyrhynchus diadema* Lafresnaye, 1842, "Bogotá".
Relationships uncertain. Genus has been placed variously in a separate monotypic family, Catamblyrhynchidae, and in a separate subfamily, Catamblyrhynchinae, within Emberizidae; molecular-genetic data support its inclusion in present family. Three subspecies recognized.

Subspecies and Distribution.
C. d. diadema Lafresnaye, 1842 – W Venezuela (Sierra de Perijá, and Andes S from Trujillo) and Colombia (Santa Marta Mts, and Andes generally) S to S Ecuador.
C. d. federalis Phelps, Sr & Phelps, Jr, 1953 – coastal cordillera (Aragua, Vargas and Distrito Federal, probably also Miranda), in N Venezuela.
C. d. citrinifrons Berlepsch & Stolzmann, 1896 – Andes of Peru S on W slope to Lambayeque, and throughout E slope S to Bolivia (La Paz, Cochabamba and W Santa Cruz) and to NW Argentina (Jujuy).
Descriptive notes. 14 cm; 16 g, male average 14·9 g and female average 13·4 g (Bolivia). Distinctive species, adult with yellow forehead and chestnut underparts, with stubby bill thick and swollen. Nominate race has forehead and forecrown golden-yellow, feathers short, extremely dense and somewhat stiff and plushy (hence vernacular name), hindcrown and nape blackish; dusky lores, diffuse ocular area; entire upperparts, including scapulars and uppertail-coverts, bluish-grey; upperwing-coverts bluish-grey, primary coverts, flight-feathers and tail dusky, tinged brownish and edged dull bluish-grey; tail, strongly graduated, feathers pointed, with outer web very narrow;



side of head dusky chestnut, becoming rich chestnut on throat and underparts to undertail-coverts; iris dark brown; bill black; legs greyish horn, tinged brown. Sexes similar. Juvenile is very dull, forehead and forecrown dark grey, feathers slightly stiffened, upperparts dull greyish-olive, paler and tinged rufescent below; immature similar to juvenile, but hint of yellow on forecrown, especially on base of feathers, and plumage somewhat brighter. Race *federalis* closely resembles nominate, but slightly brighter overall, except for paler chestnut undertail-coverts, and golden area on forehead smaller and duller; *citrinifrons* has less yellow on head (yellow confined to forehead), the feathers not stiff and plush-like, and forehead bordered behind by narrow line of chestnut, underparts slightly paler than nominate, juvenile forehead and forecrown paler grey than nominate. Voice. Not often heard. Gives soft, high "chip" notes when foraging. In Peru, song a jerky, disjointed series of high-pitched, unmusical chips and twitters, "tseep-tseu-teep-ti-tsip-tseep...", duration 15–60 seconds, reminiscent of song of several *Hemispingus* tanagers. Call (Peru) a high "pseep" and "ti-ti-ti".

Habitat. Wet montane forest, dense forest borders, second growth, and elfin forest at or near tree-line; in all habitats mainly where *Chusquea* bamboo present. From c. 1800 m to 3500 m across broad Andean range (occasionally somewhat lower or higher), lowest elevations in coastal cordillera of N Venezuela, where occurs at c. 1800–2300 m; elsewhere in Venezuela 2300–2900 m, and from Colombia S to Bolivia generally c. 2000–3500 m.

Food and Feeding. Food apparently mostly small insects and other arthropods, perhaps some plant material, taken around the leafy bamboo internodes. Rather quiet and inconspicuous. Typically seen singly, or as loosely associated pair, or occasionally in family group of three individuals, travelling with mixed-species flocks containing small frugivores and insectivores; infrequently seen away from flocks with which it forages. Forages mainly in lower half of forest (c. 1–6 m up), where it keeps on the move, seldom remaining in view for more than a short time. Forages primarily in dense *Chusquea* bamboo, hopping actively up curving stems, often twisting or peering to the side as it examines leafy stem bases emerging from cane internodes; adept at hanging upside-down. Has been observed apparently to "bite" or squeeze stems of younger *Chusquea* bamboo as it hops up these canes, although food items that it seeks while doing this not known.

Breeding. Juvenile with adults in late Dec and immatures seen in early Feb in N Venezuela; fledglings reported in Oct in Colombia (Quindío), Jun in SE Ecuador and Jun–Aug at several localities in Peru, and juveniles/immatures reported May–Dec from S Colombia S to Bolivia; also, birds in breeding condition Jun–Jul in N Colombia; records suggest breeding mainly in wet season. No other information.

Movements. None reported. Apparently resident.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Home range or foraging range may be fairly large, corresponding to area used by mixed-species flock which it follows, or sometimes larger. Occurs in numerous protected areas, among them Henri Pittier, Sierra Nevada and Tamá National Parks (Venezuela), Chingaza and Puracé National Parks and Tambito Nature Reserve (Colombia), Sangay and Podocarpus National Parks (Ecuador), Tingo María and Manu National Parks (Peru), and Madidi National Park (Bolivia). The species occurs also in many unprotected areas, some of which probably at little near-term risk, but logging, human settlement, and deforestation for agriculture and cattle pasture have greatly reduced and fragmented the area of habitat available to it. In particular, race *federalis*, confined to narrow spine of N cordillera in Venezuela, may be at risk because of the small amount of suitable bamboo habitat remaining.

Bibliography. Anon. (2000), Bledsoe (1988), Di Giacomo *et al.* (1997), Donegan & Dávalos (1999), Echeverry-Galvis & Córdoba-Córdoba (2007), Fjeldså & Krabbe (1990), Hellmayr (1938), Hilty (2003), Hilty & Brown (1986), Hilty *et al.* (1979), Krabbe, Flórez *et al.* (2006), Krabbe, Moore *et al.* (2001), Meyer de Schauensee (1970a), Moore *et al.* (1999), Narosky & Di Giacomo (1993), Phelps & Phelps (1950), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Walker (2001), Yuri & Mindell (2002).

Genus *UROTHRAUPIS*

Taczanowski & Berlepsch, 1885

209. **Black-backed Bush-tanager**

Urothraupis stolzmanni

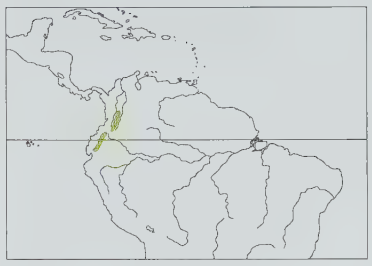
French: Urotangara de Stolzmann **German**: Stolzmanntangare **Spanish**: Tangara de Stolzmann
Other common names: Black-backed Finch/Brushfinch

Taxonomy. *Urothraupis stolzmanni* Taczanowski and Berlepsch, 1885, Hacienda San Rafael, 9000 feet [c. 2740 m], Volcán Tungurahua, Ecuador.

Relationships uncertain; considered by some authors to be most closely allied to *Chlorospingus*, but regarded by some others as belonging in family Emberizidae and possibly closest to *Atlapetes*; molecular-genetic data indicate that it probably belongs in present family. Monotypic.

Distribution. Colombia in C Andes (Caldas and Cauca, and from Nariño) S to SC Ecuador (Tungurahua).

Descriptive notes. 15 cm; 19–27 g (Ecuador). Rather short-billed species with slightly graduated tail. Has crown and side of head to well below eye black, upperparts to uppertail-coverts and tail dull black; upperwing-coverts blackish, vaguely tinged brown and faintly edged brown-grey, edging more conspicuous and palest on outer primaries, often also on tertials; throat white, often somewhat puffed and sharply contrasting with dark side of head; chest whitish, mottled and flecked with grey, gradually becoming grey on lower breast and belly; flanks and undertail-coverts darker sooty-grey; iris dark brown; bill blackish; legs dark grey. Sexes similar. Juvenile undescribed. Voice. During foraging, high-pitched, soft "tsit", "see", "sic" and "tic" notes, singly or occasionally a note doubled, or in brief, thin trill. (These call notes differ little, if at all, from those given by many other high-elevation associates, e.g. *Iridosornis* and *Hemispingus*.) No song recorded.



Habitat. Dense wet forest, wooded borders, and stunted woodland up to tree-line, especially where many dense bushes and shrubs present. In Ecuador mainly near tree-line and, on E side of Andes, in patches of *Polylepis*-dominated woodland. Recorded mostly at c. 3000–3600 m (rarely as low as 2750 m) in Colombia and c. 3200–4000 m in Ecuador.

Food and Feeding. Diet little known; apparently a mixture of insects and small berries and fruits. Occurs in groups of 3–6 individuals, occasionally up to nine, either alone or with mixed-species flocks containing New World warblers (Parulidae), other tanagers and emberizids. Although it forages in dense foliage, it regularly searches near tips of branches, where more easily seen. Forages actively, perch-gleaning, or stretching to peer above and below leaves; also works foliage and dense vegetation in manner of a tit (Paridae), gleaning, probing and occasionally hanging briefly near branch tip.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Central Andean Páramo EBA. Uncommon and local. Occurs in Puracé National Park, in Colombia; perhaps also in parts of Llanganates, Cajas and Sangay National Parks, in Ecuador. Within this species' range, extensive deforestation and firewood-cutting of tree-line vegetation has greatly reduced amount of habitat available. Distribution now spotty and local in both Colombia and Ecuador.

Bibliography. Bledsoe (1988), Chapman (1917, 1926), Dunning (1982), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sibley & Ahlquist (1990), Spencer (2008b), Strewe & Kreft (1999).

Genus *EUPHONIA* Desmarest, 1806

210. **Blue-hooded Euphonia**

Euphonia elegantissima

French: Organiste à capuchon **German**: Blaukappenorganist **Spanish**: Eufonia Elegante
Other common names: Elegant/Blue-rumped Euphonia

Taxonomy. *Pipra elegantissima* Bonaparte, 1838, Mexico.

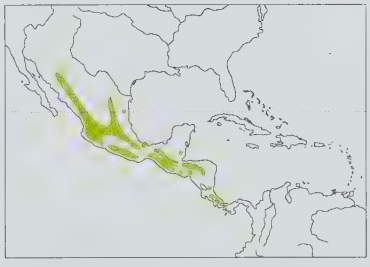
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Present species forms a monophyletic species group with *E. cyanocephala* and *E. musica*, and all formerly considered conspecific; widely separated geographically, the three do not differ greatly in voice or behaviour, although males differ somewhat in plumage, females less so. Race *vincens* poorly differentiated, and perhaps better subsumed in nominate. Three subspecies tentatively recognized.

Subspecies and Distribution.

E. e. rileyi (van Rossem, 1942) – NW Mexico (SE Sonora and NE Sinaloa).

E. e. elegantissima (Bonaparte, 1838) – W & C Mexico (from S Sinaloa, Guanajuato and S Tamaulipas) S, mainly in mountains, to Belize, C & S Guatemala, Honduras, El Salvador and CN Nicaragua.

E. e. vincens E. J. O. Hartert, 1913 – SW Nicaragua and mountains of Costa Rica and W Panama (E to Veraguas).



Descriptive notes. 10 cm; 13–17 g. Small-billed euphonia, male with orange-rufous underparts. Male nominate race has rufous forehead bordered behind by pencil-thin line of black; crown and nape bright turquoise-blue, the blue extending down side of neck behind ear-coverts; side of head and throat black; upperparts, including upperwing-coverts, flight-feathers and tail, glossy purplish-black; underparts tawny-orange, darkest on chest; underwing-coverts white; iris dark brown; bill blackish, greyish base of lower mandible; legs dusky grey. Female has forehead rufous, bright sky-blue crown and nape, blue curling down onto side of neck behind ear-coverts (as on male), side of head olive; upperparts bright olive-green; upperwing-coverts mostly olive-green, flight-feathers dusky, edged olive-green; tail dull dark olive-green; throat washed cinnamon, becoming yellowish-olive on breast and sides and greenish-yellow on centre of belly and undertail-coverts. Juvenile is like female, male with cinnamon-tinged chin and contrasting blue-black flight-feathers; immature male much like adult female, but slightly duller, and with blue restricted to crown (not reaching nape). Race *rileyi* male more steely-blue above, with duller hood, female greyer above and generally duller (less green and yellow) than nominate; *vincens* male has crown distinctly lighter blue than nominate, female intermediate between those of other races. Voice. Song a long, fast jumble of little trills, bubbly notes, whistles and chips in rambling fashion. Calls include variety of reedy and tinkling notes, some sharp, some soft and mellow; frequently a soft plaintive "pee".

Habitat. In Mexico occurs in open pine–oak (*Pinus–Quercus*) woodland, oak scrub, borders of broadleaf evergreen forest, and plantations, also scattered trees in clearings near forest and in all areas often in trees with mistletoe (Loranthaceae). In Costa Rica and W Panama mainly in humid

On following pages: 211. Golden-rumped Euphonia (*Euphonia cyanocephala*); 212. Antillean Euphonia (*Euphonia musica*); 213. Jamaican Euphonia (*Euphonia jamaica*); 214. Plumbeous Euphonia (*Euphonia plumbea*).

montane forest and along forested borders and second growth. Mainly at 1000–2500 m, in Mexico regularly down to 500 m, lower in non-breeding period, and in Costa Rica post-breeders regularly to as low as 750 m on Caribbean slope; locally from almost sea-level to 3050 m in Panama, but most numerous c. 1050–1500 m.

Food and Feeding. Feeds almost entirely on small soft berries, principally of mistletoe; exocarp sometimes removed before eating. Pairs or small groups, occasionally up to c. 9–10 individuals, spend long periods of time in or near clumps of mistletoe, and may fly off long distances in search of other trees with suitable clumps of mistletoe. Reported roosting associations of up to 50 or more individuals sleeping in close proximity in dense foliage, dispersing at dawn.

Breeding. Insufficient data on season. Rounded or globular nest with side entrance, finely woven with slender rootlets and dry grass stems, lined with finer grass; up to 18 m above ground in niche on high bank or in moss, *Tillandsia*, or epiphytes on trunk, limb or branch fork. Clutch 3 eggs, creamy white, thickly or sparsely dotted brownish or purplish, especially at larger end. No other information.

Movements. Birds from N part of range in Mexico may migrate S during coldest months; also descends to lower levels in non-breeding period. In Costa Rica regularly makes post-breeding descent on Caribbean slope, and in Panama post-breeding downslope movements into lowlands reported.

Status and Conservation. Not globally threatened. Fairly common over most of range. Survives in variety of semi-open or disturbed montane habitats, and also occurs in a number of protected areas, including Sierra de Manantlán Biosphere Reserve and Volcán Nevado de Colima and Cañon del Sumidero National Parks, among others, Mexico, Cerro El Baúl and Los Aposentos (near Chimaltenango), in Guatemala, and Celaque National Park, in Honduras. The species' range contains much suitable habitat which is unprotected, but with little short-term risk of development.

Bibliography. Anon. (1998), Baepler (1962), Binford (1968, 1989), Blake (1956), Carriker (1910), Davis (1972), Dickey & van Rossem (1938), Edwards (1972), Garrigues & Dean (2007), Howell & Webb (1995), Isler & Isler (1999), Land (1970), Monroe (1968), Ogilvie-Grant (1912), Rand & Traylor (1954), Ridgely & Gwynne (1989), Robins & Heed (1951), van Rossem (1945), Schaldach (1963), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).

211. Golden-rumped Euphonia

Euphonia cyanocephala

French: Organiste doré **German**: Goldbürzelorganist **Spanish**: Eufonia Culidorada

Taxonomy. *Pipra cyanocephala* Vieillot, 1819, Trinidad.

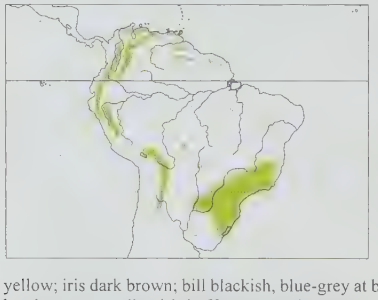
Species sometimes referred to by name *E. aureata*, but present name has priority. Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Present species forms a monophyletic species group with *E. elegantissima* and *E. musica*, and all formerly considered conspecific; widely separated geographically, the three do not differ greatly in voice or behaviour, although males differ somewhat in plumage, females less so. Taxonomic status of population of present species in SE Brazil, Paraguay and NE Argentina seems worthy of investigation because of its extreme isolation. On the other hand, proposed race *intermedia* (described from NE Colombia) is difficult to diagnose; measurements overlap with those of nominate, and no certain colour differences separate it from latter, into which it is therefore subsumed. Three subspecies recognized.

Subspecies and Distribution.

E. c. pelzelni P. L. Sclater, 1886 – S Colombia and W Ecuador (S to Chimborazo).

E. c. insignis P. L. Sclater & Salvin, 1877 – E slope of Andes in Ecuador (Azuay and Loja).

E. c. cyanocephala (Vieillot, 1819) – Sierra de Perijá (Colombia–Venezuela border) and Venezuela (Andes, coastal cordilleras, and locally SE Bolívar) E locally through C Guyana, Suriname and French Guiana; Trinidad; and Andes of Colombia (except S), probably E slope in Ecuador, entire E slope in Peru S to Bolivia (also extreme E Santa Cruz) and NW Argentina (S to Tucumán; sight records to Córdoba–San Luís border; isolated record N of Buenos Aires); also NC & SC Brazil (isolated records in Pará and W Mato Grosso); also SE Brazil (Bahia, S Goiás and S Mato Grosso S to Rio Grande do Sul), SE Paraguay and NE Argentina (W to E Chaco).



Descriptive notes. 11 cm; 15–16 g. Small euphonia with blue cap and golden rump. Male nominate race has forehead and face (from top of eye) extending back across ear-coverts and down to throat black; crown and nape bright turquoise-blue, the blue curling down from nape onto side of neck behind ear-coverts; mantle and back black with purplish to dark blue gloss, lower back and rump golden-yellow to orange-yellow, uppertail-coverts blue-black; upperwing-coverts and tertials dusky black with dark bluish tinge, flight-feathers dark brown to dusky with dull yellowish-olive margins and outer webs; underparts deep yellow; iris dark brown; bill blackish, blue-grey at base; legs dusky grey. Female has basal forehead band tawny to yellowish-buff, crown and nape turquoise-blue (as on male); otherwise mostly olive-green above, paler and brighter on rump; flight-feathers and tail dark fuscous, edged olive-green; side of head and ear-coverts olive-green, like back, chin to lower breast yellow-olive, turning more yellowish (olive-yellow) on belly and undertail-coverts. Juvenile is much like female, but duller, juvenile male with narrow basal forehead band dull orangish, and crown olive, strongly tinged blue and vaguely scaled greyish, juvenile female with forehead band yellowish. Race *pelzelni* is very slightly larger than nominate, male rump and underparts paler; *insignis* male differs in having forehead band orange-yellow with narrow black line behind, female has slightly greener back than nominate. Voice. Song in Venezuela and Colombia, lasting up to c. 10 seconds (occasionally to 30 seconds), a very fast, complex stream of twittery and squeaky notes mixed with low-pitched "chup" notes. Call a soft whistled "cheeer", slightly descending, much like call of *Chlorophonia cyanea*, but lower-pitched, and this note sometimes repeated several times in succession; in SE Brazil call described as a slow series of 3–4 whistles, song a fast, varied warble. In all areas, fast and complex song is often mixed with call notes.

Habitat. Forest borders, second-growth woodland, disturbed or partially open areas, and shady coffee plantations, mainly in mountains. Occurs in both humid and fairly dry regions, but generally not inside forest. In N Andean portion of range (Venezuela, Colombia) mainly 600–2500 m, occasionally or seasonally down to sea-level, and locally up to 3250 m in SW Colombia; mostly 1200–2700 m in Ecuador, with scattered records down to 700 m and as high as 3000 m; recorded at 500–2800 m in Peru and at similar elevations in Bolivia and N Argentina; in SE Venezuela and across C Guianan region mainly 500–1500 m; in SE Brazil and adjacent areas mainly lowlands and lower montane elevations.

Food and Feeding. Almost entirely frugivorous, apparently also some insects. One stomach contained only fruit pulp. Seeds pass rapidly through gut; mistletoe seeds (Loranthaceae) typically voided as long sticky, tapioca-like strings, which readily adhere to twigs and branches. Pairs or groups of 3–8 individuals spend much of their time in large clumps of fruiting mistletoe in canopy of trees, where rather quiet (or give soft calls) and keep mostly to themselves; occasionally joined by other euphonias in mistletoe, and only infrequently or incidentally associate with mixed-species flocks. After feeding in a tree, may fly off considerable distance to another site. Occasionally seen while apparently searching for insects in canopy foliage.

Breeding. Nests in Jan and Feb in Venezuela (Aragua and Trujillo); and two nests in Apr and May and 13 birds in breeding condition Dec–May in Colombia. Nest a globular dome of grass and moss, with side entrance, concealed on bank of road cutting or 4–8 m up on epiphyte-laden trunk or branch of small to large tree, most often at forest edge. Clutch 2 eggs, cream, marked light reddish-brown and black, mostly at larger end. No other information.

Movements. Believed to wander locally when not breeding. Possible seasonal movements to lower elevation, but not yet well documented.

Status and Conservation. Not globally threatened. Uncommon to fairly common; local. Occurs over a wide range of elevations and habitats, including many non-forest, forest-edge and human-altered habitats; found also in many protected areas. Because of severe deforestation in Atlantic coastal region of SE Brazil, and in NE Argentina, populations in this region are much more dependent upon existing reserves and parks, e.g. Itatiaia National Park, than elsewhere in its range.

Bibliography. Areta & Bodrati (2010), Belcher & Smooker (1937), Clements & Shany (2001), Descourtilz (1852), Dunning (1982), ffrench (1991), Fjeldså & Krabbe (1990), Ginés *et al.* (1951), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Krabbe *et al.* (2001), Lönnberg & Rendahl (1922), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Moore *et al.* (1999), Narosky & Di Giacomo (1993), Ogilvie-Grant (1912), Parker & Goerck (1997), de la Peña & Rumboll (1998), Remsen *et al.* (1987), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Stiles *et al.* (2002), Santos (1948), Schulenberg (2000b), Schulenberg *et al.* (2007), Sibley & Monroe (1990), Sick (1985, 1993), Souza (2002), Tostain *et al.* (1992), Zimmer (1943a).

212. Antillean Euphonia

Euphonia musica

French: Organiste louis-d'or **German**: Antillenorganist **Spanish**: Eufonia Antillana
Other common names: Blue-crowned Euphonia

Taxonomy. *Pipra musica* J. F. Gmelin, 1789, Santo Domingo, Dominican Republic.

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Present species forms a monophyletic species group with *E. elegantissima* and *E. cyanocephala*, and all formerly considered conspecific; widely separated geographically, the three do not differ greatly in voice or behaviour, although males differ somewhat in plumage, females less so. Three subspecies recognized.

Subspecies and Distribution.

E. m. musica (J. F. Gmelin, 1789) – Hispaniola and Gonâve I.

E. m. sclateri (P. L. Sclater, 1854) – Puerto Rico.

E. m. flavifrons (Sparrman, 1789) – Lesser Antilles on Barbuda, Antigua, Guadeloupe, La Désirade, Dominica, Martinique, St Lucia, St Vincent, and Grenada.



Descriptive notes. 10 cm; 12·4–16 g, eight birds from Guadeloupe 13·4–18·5 g. Small euphonia with short thick bill. Male nominate race has lores, side of head including ear-coverts, and chin and throat blackish-violet, small forehead band tawny-yellow, crown and nape lustrous sky-blue, blue of nape extending down behind rear ear-coverts; mantle and back black, glossed dark blue, rump and uppertail-coverts rich tawny-yellow; upperwing-coverts, flight-feathers and tail dull black, wing-coverts glossed dark blue, flight-feathers edged slightly paler blue; underparts, including undertail-coverts, rich tawny-yellow; iris dark brown; bill black, base of lower mandible blue-grey; legs dark grey. Female has yellow forehead, dull bluish crown and nape, olive upperparts; yellowish throat becoming dull olive-yellow on breast and rest of underparts. Juvenile resembles female, typically somewhat duller. Race *sclateri* male differs from nominate in having forehead patch slightly deeper yellow, rump bright yellow, and entire underside, including throat, paler yellow (no black on throat); *flavifrons* male is hen-plumaged, thus resembles female of nominate, mainly olive above with blue crown and nape, small yellow forehead patch and throat, olive-yellow below, slightly paler and yellower on throat and belly. Voice. Song a trilling, tinkling "tuc-tuc-tuc...", punctuated with sharp whistles, often in long rambling discourse for up to 20 minutes with little or no pause. Calls during foraging include a plaintive whistle, i.e. "whee", a scolding "chit-it", a hard metallic "chi-chink", and softer "tuc-tuc". Both sexes commonly give a sharp whistle followed by several rapid double notes (forming a chatter), especially when they fly.

Habitat. Occurs in dry to humid and wet forest and along borders and disturbed areas, wherever mistletoe (Loranthaceae) present. Recorded at all elevations from lowlands to high mountains throughout range; believed to breed mainly at higher elevations, and apparently primarily a wanderer or seasonal non-breeding visitor to lower elevations.

Food and Feeding. Small fruits, e.g. on St Vincent reported as eating buds of silk-cotton tree (*Bombax*); believed to eat catkins of *Cecropia* in Puerto Rico. Contents of 51 stomachs were vegetable matter, including seeds of several species of mistletoe. Occurs in pairs when breeding, but at other times in small groups of up to a dozen individuals during day; reported as roosting in groups of up to dozens during non-breeding season. Moves actively in treetops, remaining especially in dense foliage and in mistletoe clumps.

Breeding. Season Jan–Jul. Nest a grassy domed structure with side entrance, usually well concealed in moss and epiphytes in tree; on St Vincent, nest made from moss and rootlets, inner cup of dried grass and shredded plant material, placed 9 m up and attached to vine growing against trunk of forest palm; one nest in Puerto Rico was in thick shoots of a mango tree (*Mangifera*). Clutch 4 eggs, white, spotted with mauve. No other information.

Movements. Chiefly resident. Seasonal elevational movements between highlands and lowlands reported, as yet not well documented. Some intra-island movement recorded; race *flavifrons* a vagrant on St Barthélemy, St Christopher, Montserrat and the Grenadines.

Status and Conservation. Not globally threatened. Restricted-range species: present in Hispaniola EBA, Puerto Rico and the Virgin Islands EBA and Lesser Antilles EBA. Common in most of Hispaniola, including Gonâve I, and Puerto Rico; uncommon in Lesser Antilles. Population in Haiti threatened as a result of extensive deforestation. Lesser Antilles race (*flavifrons*) believed to

be extinct on Saba, from where no recent records, and perhaps generally in decline over much of range, e.g. few or no recent records from St Vincent.
Bibliography. Anon. (1998), Biaggi (1970), Bond (1928a, 1928b, 1961, 1982), Bowdish (1903), Clark (1905), Diamond (1973), Dod (1978), Leck (1972a), Olson & Angle (1977), Pérez-Rivera (1992a, 1992b), Raffaele (1983), Raffaele *et al.* (1998), Reynard (1982), Wetmore (1927), Wetmore & Swales (1931).

213. **Jamaican Euphonia**

Euphonia jamaica

French: Organiste de Jamaïque **German**: Gimpelorganist **Spanish**: Eufonia Jamaicana

Taxonomy. *Fringilla jamaica* Linnaeus, 1766, Jamaica.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.
Distribution. Jamaica.



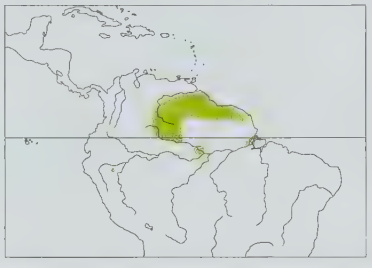
Descriptive notes. 11 cm; c. 17 g. Small, plain greyish euphonia with notably short, thick bill. Male is mainly bluish-grey (can look rather bluish in good light), narrow area at bend of wing yellow (usually hidden), upperwing-coverts, flight-feathers and tail dusky, tinged or glossed bluish; throat and underparts grey, slightly paler than upperparts, and becoming yellow on centre of lower breast and belly and buffy yellow on undertail-coverts; iris dark brown; bill pale bluish-grey, with black culmen, cutting edges and tip; legs dusky grey. Female is "bicoloured", with grey foreparts and olive rear parts; back, rump and tail olive; flight-feathers dusky, glossed green, outer primaries edged yellow, tertials mainly dull olive-green; head and underparts grey, head slightly darker, throat whitish, paler than head and chest, and belly and undertail-coverts tinged buff, flanks tinged olive. Immature is similar to female, but slightly duller. Voice. Song a sweet, musical "chur-chur-chur-chur-chur-chwit", last note rising, or sometimes last note omitted. Also variety of other notes, some chuckling, some mewing, some harsh or chattery, and others squeaky like those of a hummingbird (Trochilidae).
Habitat. Woodland, borders, open or shrubby areas with trees, gardens and orchards; most common in open second growth in hilly lowlands. From sea-level to c. 2250 m (Blue Mountain Peak).
Food and Feeding. Mostly small fruits and berries, especially mistletoe berries (Loranthaceae), last-mentioned forming a major part of diet; reported also as taking fruit of figs (*Ficus*), *Cecropia*, *Dunalia*, guava (*Psidium*), and fruit of cho-cho vines (*Sechium*). May forage in small flocks, or gather with other birds at feeding sites, where it sometimes acts aggressively; seasonally, gathers in small groups to roost. Forages in canopy and upper levels of trees; active, sometimes takes fruits in acrobatic manner.
Breeding. Reported season Feb–May. Nest built by both sexes, a domed structure with side entrance, made from mixture of grass, stems and vegetable down, much like that of other members of genus, often concealed in Spanish moss (*Tillandsia*) and at almost any height. Clutch 3–4 eggs, white, marked with lavender, purplish-red or reddish-brown, especially at large end. No other information.
Movements. Resident. Reported to undertake seasonal movements around the island.
Status and Conservation. Not globally threatened. Restricted-range species: present in Jamaica EBA. Common and widespread. No population trends available, but seems to be at little short-term risk. Probably occurs in most of Jamaica's numerous forest reserves (many of which are quite small). An important disperser of mistletoe seeds. Because it is so heavily frugivorous, this species may, especially when in flocks, damage cultivated fruit crops in gardens and orchards.
Bibliography. Bond (1961), Cruz (1974, 1981), Danforth (1928), Field (1894), Gosse (1847), Isler & Isler (1999), Jeffrey-Smith (1956), March (1863), Ogilvie-Grant (1912), Raffaele *et al.* (1998), Taylor (1955).

214. **Plumbeous Euphonia**

Euphonia plumbea

French: Organiste plombé **German**: Grauorganist **Spanish**: Eufonia Plúmbea

Taxonomy. *Euphonia plumbea* du Bus de Gisignies, 1855, la Nouvelle-Grenade; error = Guyana.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.
Distribution. E Colombia (Serranía Chiribiquete E to Vichada and Guainía), N Brazil (upper R Negro), and Venezuela S of R Orinoco E to French Guiana; small isolated populations in NE Peru (San Martín; possibly also N Loreto) and N Brazil in Amazonas (W of lower R Negro) and S Amapá.



Descriptive notes. 9 cm; 8·7–9·5 g. Small, plain euphonia lacking yellow forehead; bill short and stubby. Male has entire head down to throat and upper chest and entire upperparts glossy dark grey, sharply separated from bright yellow breast and lower underparts; upperwing-coverts and flight-feathers dusky, broadly edged olivaceous grey, tail dusky, washed olivaceous grey; sides and flanks somewhat mottled with grey, underwing-coverts white; iris dark brown; bill blackish, becoming grey at base; legs dark grey. Female is patterned like male, but duller, mainly yellowish-grey above, rump and uppertail-coverts paler and more yellowish, crown and nape grey; upperwing-coverts, flight-feathers and tail dark olive; throat and chest pale grey with faint yellow tinge, lower underparts olive-yellow, undertail-coverts pale olive, washed with yellow. Immature is much like female. Voice. Often heard calls include a single clear whistled "wheet", or doubled "dee-dee" and "dee, dee-dee", the two last-mentioned much like the "beem-beem" calls of many other members of genus. Songs and calls may be intermixed. Song, infrequently heard, a rather squeaky, jumbled "o'fiddle-de-wéét!" in S Venezuela (Amazonas); in a variation, described as "wéét sweet-a-swee-swee", first note whistled, rest rapid and jumbled.
Habitat. Occupies open scrubby woodland, savanna-forest borders, bushes and scattered trees in savanna, and scrubby vegetation around large rock outcrops, mainly in regions with white-sand soil. Primarily found in lowlands, up to 1000 m in SE Venezuela; elsewhere at similar elevations, and up to 1500 m.
Food and Feeding. Feeds mainly on small fruits and berries; unlike some congeners, seems not to show any particular affinity for mistletoe berries (Loranthaceae), which are scarce in this species' habitat. Most often seen in pairs or in families of 3–4 individuals; sometimes spends considerable time in a tree and then flies off swiftly to another tree, often some distance away.
Breeding. Apparently no information available.
Movements. Resident. Believed to wander rather widely seasonally, hence can be erratic and unpredictable in occurrence; no evidence of elevational movements.
Status and Conservation. Not globally threatened. Uncommon to fairly common; widely, if rather sparsely, distributed across white-sand regions of Roraiman and Guianan areas. Occurs in several large protected areas, including Canaima, Duida-Marahuaca, Jaua-Sarisariñama and Serranía de la Neblina National Parks (Venezuela), Kaieteur National Park (Guyana), Sipaliwini Nature Reserve (Suriname) and probably also Pico da Neblina National Park (NW Brazil). The species' range also includes extensive intact habitat which is unprotected, but with little short-term risk of development. Prominent among these unprotected areas are Kanuku Mts, in Guyana, and the extensive white-sand soil belt running through NC Suriname.
Bibliography. Gilliard (1941), Haverschmidt (1968, 1972a), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sick (1985), Snyder (1966), Souza (2002), Tostain *et al.* (1992).



PLATE 25

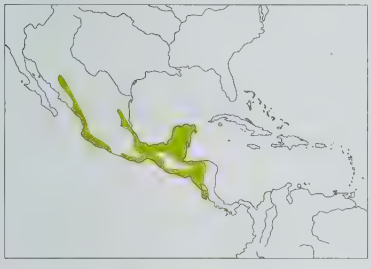
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215. Scrub Euphonia

Euphonia affinis

French: Organiste de brousse **German**: Buschorganist **Spanish**: Eufonia Matorralera
Other common names: Lesson's/Black-throated Euphonia; Pale-vented/Godman's Euphonia (*godmani*)

Taxonomy. *Tanagra* [*Euphonia*] *affinis* Lesson, 1842, Realjo, Nicaragua.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a monophyletic species group with *E. luteicapilla*, *E. chlorotica* and *E. trinitatis*. Three subspecies recognized.
Subspecies and Distribution.
E. a. olmecorum Dickerman, 1981– Gulf slope of Mexico from S Tamaulipas and E San Luis Potosí S to N Chiapas.
E. a. godmani Brewster, 1889 – Pacific slope of Mexico from SE Sonora S to C Guerrero.
E. a. affinis (Lesson, 1842) – Yucatán Peninsula and Cozumel I S through Belize and Guatemala to N Honduras; Pacific slope of Mexico from W Oaxaca S along coast to NW Costa Rica (Guanacaste).



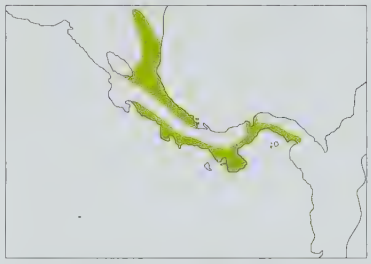
Descriptive notes. 9 cm; 8·5–12·8 g. Small, short-tailed euphonia with black-and-yellow pattern typical of many in genus; bill short and stubby. Male nominate race has forehead to eye bright yellow (appearing as small, relatively restricted patch), rest of head and down to foreneck glossy blue-black with purplish sheen; upperparts glossy blue-black, median and greater upperwing-coverts, flight-feathers and tertials blackish, somewhat glossed dark blue; breast, belly and undertail-coverts bright yellow, underwing-coverts white; tail blackish, inner webs of outer two tail feathers white (from below, showing as large oval-shaped patch on each side of tail); iris dark brown; bill blue-grey with blackish tip; legs dark grey. Female has forehead olive-yellow, becoming greyish on rest of crown and nape; upperparts olive, grey tinge on back; side of head and most of underparts olive-yellow, turning to yellow on belly and undertail-coverts. Juvenile is much like female, but male head olive and may show blue-black flight-feathers; immature male like adult female, but head olive; subadult male olive like female, typically acquires black on face and head after c. 1 year, thereafter may show variable amount of black mottling mixed with olive on back and underparts; male may require 2 years to gain adult plumage. Race *godmani* differs from nominate in having white (not yellow) undertail-coverts, female slightly paler overall, with centre of belly and undertail-coverts white, flanks yellowish, undertail with more white than in nominate; *olmecorum* male is very like male of nominate, female differs from nominate in being overall paler. Voice. Call of 1–3 pure thin whistles, "dee-dee-dee", sometimes followed by 2 or 3 more on same or slightly lower pitch; also gives shorter "whit-it-it-it" and longer "wheeee". Song, less often heard, a weak twittering and chirping medley, e.g. "wheetidy-titity-witity-titity". In Mexico slight vocal differences between nominate race and *godmani* have been noted, calls of latter being brighter and less plaintive.
Habitat. Variety of semi-open, drier or lightly wooded areas, including dry forest, forest borders, second growth, scrub, cultivated areas, and pastures with scattered trees, as well as humid forest borders, riverine forest, gardens and clearings; not found inside moist or humid forest. Reported from sea-level to 2250 m, mostly below 1000 m.
Food and Feeding. Primarily frugivorous, taking berries of mistletoe (Loranthaceae) and many other small fruits, including figs (*Ficus*), *Muntingia* (Elaeocarpaceae) and *Neea* (Nyctaginaceae); reported as feeding also on variety of cultivated fruits, such as oranges and bananas, when these opened by larger birds. Also some insects, and noted once with a large grasshopper (Caelifera). Ten stomachs all contained vegetable matter, mostly of mistletoe berries. Occurs in pairs and small groups, frequently in association with *E. hirundinacea*. Forages for insects by examining undersides of thin twigs, sometimes wagging its half-spread tail from side to side as it moves.
Breeding. Nest with eggs in May in Mexico; breeding reported in dry season, Nov–Apr, in Costa Rica. Covered, football-shaped nest with side entrance, made from grass stems, leaf petioles, bits of leaves, bark and fine rootlets, lined with fungal fibres, 3·5–8 m up on horizontal branch, in fork of sapling, or wedged in fork beneath large dead leaf of *Cecropia*. Clutch in Costa Rica 2–3 eggs, white to buffy white with reddish-brown spots or paler blotches, forming wreath or cap; eggs in Mexico nest reportedly pale greenish-blue. No other information.
Movements. Resident. Some local wandering likely during post-breeding period.
Status and Conservation. Not globally threatened. Widespread and fairly numerous throughout its mainly lowland range. Status in El Salvador, which is almost entirely deforested, is uncertain, although this species should formerly have occurred across at least W third of country. Can be expected to occur in numerous protected areas, especially in Mexico, N Guatemala, Belize and W Nicaragua. The species thrives also in drier settled or disturbed areas, so long as there are scattered trees and woodlots. Appears to be at little risk in the short term, although may be declining locally where destruction of tropical dry forest is extensive.
Bibliography. Andrle (1967), Brush (2009), Davis, L.I. (1972), Davis, J. (1960a), Dickerman (1981b), Dickey & van Rossem (1938), Edwards (1972), Eisenmann (1955), Garrigues & Dean (2007), Howell & Webb (1995), Klaas (1968), Land (1970), Ogilvie-Grant (1912), Paynter (1955), Rand & Traylor (1954), Rowley (1966), Russell (1964), Salvin & Godman (1883), Skutch (1980b), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Sutton (1951a, 1951b), Wetmore (1944).

216. Yellow-crowned Euphonia

Euphonia luteicapilla

French: Organiste à calotte jaune **Spanish**: Eufonia Coronigualda
German: Gelbscheitelorganist

Taxonomy. *Phonasca luteicapilla* Cabanis, 1861, Costa Rica.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a monophyletic species group with *E. affinis*, *E. chlorotica* and *E. trinitatis*. Monotypic.
Distribution. Caribbean lowlands from E Nicaragua S to NW Panama (Bocas del Toro, and around Canal Zone) and Pacific slope from NW Costa Rica (Guanacaste) S to E Panama (C Darién).



Descriptive notes. 9 cm; 11·4–14·5 g. Small, short-tailed euphonia with short stubby bill. Male has forehead and mid-crown to well behind eye yellow, forming large contrasting yellow crown patch; rest of head down to foreneck and entire upperparts glossy blue-black, upperwing-coverts, flight-feathers and tail blue-black (like back); breast to undertail-coverts entirely bright yellow, underwing-coverts white; iris dark brown; bill blue-grey with blackish tip; legs dark grey. Female is olive above, with yellowish tinge on forehead, plain olive-yellow below, slightly paler in centre, becoming duller on belly and undertail-coverts. Immature is like female; subadult male may have forecrown mottled olive, some black on face and throat, and has throat and chest yellowish, rest of underparts olive. Voice. Call a series of 2–3 clear high whistled notes that may be given at varying speed, "bee-bee-bee", or in longer series, e.g. "beebee, peepeepee", second part slightly lower in pitch. Staccato "tsit" notes in flight or as contact among members of foraging group. Song a short, dry sputtering series of notes, e.g. "pit ditrééa-twiddledee bee bee"; described also as a short wiry "chut-tsip ts'tsew tsiuweer" or similar phrase.
Habitat. In dry to humid regions, mainly in semi-open areas with scattered trees, pastures, cultivated areas, old clearings, and second growth. Occurs in humid areas mainly in Nicaragua and Costa Rica, where predominantly along forest borders and semi-open areas with scattered trees (not inside tall humid forest). In Panama found in dry and scrubby areas, dry wooded borders, or areas with extensive clearings and scattered trees; scarce in heavily forested areas. Lowlands and foothills to c. 900 m; rarely to 1600 m in Panama.
Food and Feeding. Mistletoe berries (Loranthaceae) and some other small fruits; probably some insects. Found singly, in pairs, and in groups of three or four individuals that may roam about over rather large areas; may gather with other species at fruiting trees. Generally stays high in trees, where it has been reported as examining small bare twigs for insects.
Breeding. Season mostly Feb–May (extreme dates Jan–Jul) in Costa Rica, and breeding reported in Mar in Panama; sometimes two broods in Costa Rica. Nest constructed by both sexes, in Costa Rica a small globular structure with narrow rounded side entrance, made from fine rootlets, petioles, dead leaves, moss and grass stems, lined with finer grasses and animal hair or other soft material, placed in cranny in stump, fence post or similar, or among orchids or epiphytes, or in cluster of twigs, 1–30 m (usually c. 2–3 m) above ground. Clutch 3 eggs, occasionally 2–4, white, heavily mottled with brown; incubation by female, period 13–14 days; chicks fed by both adults, by regurgitation, nestling period notably long, 22–24 days. Male may breed when still in subadult plumage.
Movements. Resident. Some seasonal elevational movement reported in Costa Rica.
Status and Conservation. Not globally threatened. Fairly common. Thrives in variety of drier semi-open areas, including areas partly opened up by human activities. Occurs also in numerous protected areas, including e.g. Santa Rosa, Palo Verde Carara, Manuel Antonio and Tortuguero National Parks (Costa Rica) and Chiriquí, Sarigua and Metropolitan National Parks (Panama). Found also in many unprotected areas, including e.g. rural Monteverde (Costa Rica), that are of little risk of development.
Bibliography. Carriker (1910), Davis (1972), Eisenmann (1955), Hartman (1955), Isler & Isler (1999), Ridgely & Gwynne (1989), Ross & Whitney (1995), Skutch (1954), Slud (1964), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984).

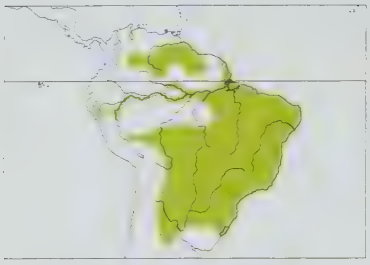
217. Purple-throated Euphonia

Euphonia chlorotica

French: Organiste chlorotique **German**: Purpurkehlorganist **Spanish**: Eufonia Golipúrpura

Taxonomy. *Tanagra chlorotica* Linnaeus, 1766, Cayenne, French Guiana.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a monophyletic species group with *E. affinis*, *E. luteicapilla* and *E. trinitatis*; has in the past been regarded as conspecific with last-mentioned, but differs in habitat and in female plumage. Geographical distribution of some races poorly defined, and ranges listed below somewhat tentative; further study required. Five subspecies recognized.
Subspecies and Distribution.
E. c. cynophora (Oberholser, 1918) – W & S Venezuela (S Táchira, and E to Amazonas and Bolívar E to R Caura and R Cuyuní) S to E Colombia (Meta), probably also N Brazil (N Roraima).
E. c. chlorotica (Linnaeus, 1766) – the Guianas and NC & E Brazil (E & S Amapá, and S of R Amazon from R Tapajós E through N Mato Grosso, Goiás and Minas Gerais to Bahia and Espírito Santo).
E. c. amazonica Parkes, 1969 – both banks of R Amazon E from SE Colombia and extreme NE Peru to NC Brazil (R Tapajós, at Santarem).
E. c. taczanowskii P. L. Sclater, 1886 – lowlands in N Peru (vicinity of R Marañón, both E & W of river) and extreme SE Peru and N Bolivia.
E. c. serrirostris d'Orbigny & Lafresnaye, 1837 – SE Bolivia and S Brazil (from S Mato Grosso, S Goiás and Rio de Janeiro) S to Paraguay, N Uruguay, and N & C Argentina (S to Buenos Aires).
Descriptive notes. 9–10 cm; 8–14·3 g. Small euphonia with short, thick bill. Male nominate race has bright yellow forehead and forecrown extending to just above rear of eye; rest of head and entire upperparts, including upperwing-coverts, glossy blue-black with (in good light) distinct purplish to slightly violet tinge; uppertail blackish, flight-feathers black with dark blue edges and dark blue tinge; chin to foreneck glossy blue-black, underparts bright yellow; underwing-coverts white, basal half of inner web of flight-feathers white, undertail duller than upper surface and with inner web of 2–3 outer pairs of feathers white (forming large white oval on each side of undertail); iris dark brown; bill blue-grey with blackish tip; legs dark grey. Female is olive with faint greyish tinge above, yellower on base of forehead, lores dusky; throat and underparts olive-yellow, central lower breast to belly whitish, with pale ash-grey on central belly. Immature male is like female, but mostly olive-yellow below; subadult male acquires black first on face, sometimes also black mottling on throat and underparts. Races differ rather little: *cynophora* male is strongly glossed violet above and

On following pages: 218. Trinidad Euphonia (*Euphonia trinitatis*); 219. Velvet-fronted Euphonia (*Euphonia concinna*); 220. Orange-crowned Euphonia (*Euphonia saturata*); 221. Finsch's Euphonia (*Euphonia finschi*).



on bib, has yellow of crown slightly more extensive than on nominate, underparts slightly deeper yellow, female with uniform olive-yellow underparts: *taczanowskii* male is slightly more purple above, forecrown paler yellow and ending above eye, underparts paler yellow; *amazonica* is similar to previous, but wing shorter and bill shorter, narrower and more slender, female also more greenish-yellow on forehead, lores and flanks and with yellow of forehead much less sharply demarcated; *serrirostris* is much like nominate, but yellow crown patch of male ends above (not behind) eye. Voice. Typical call a high, clear, whistled "teee, deee", this often lengthened to 3–4 notes, e.g. "teee, deee, deee", or occasionally only a single "teee", notes all on same pitch or first note slightly lower than the rest; essentially identical to calls of *E. trinitatis*. When excited, gives 1–4 rising, whistled "wheet!" notes. Infrequently heard song a jumbled series of squeaks, harsh notes and whistles. Harsh rattle also reported.

Habitat. In Amazon Basin occurs primarily along forest borders, and in river-edge and young river-island vegetation, as well as clearings with scattered tall trees; infrequently in canopy of forest. Elsewhere, in dry to humid regions in open woodland, gallery forest, forest borders, mangroves, second growth, scrub woodland, trees in pastures, in parks and gardens, and *caatinga* and *chaco* scrub. In all areas found primarily outside of forest or along forest borders, not inside forest. In E Brazil in thin, low woodland, *cerrado*, *caatinga* and palm groves, and in SE Brazil reported also from montane forest. Lowlands to c. 900 m in S Venezuela and to c. 500 m in E Colombia; c. 650–1100 m in Ecuador; to 1400 m in E Peru and 2000 m in Bolivia; in Brazil primarily in lowlands, but at higher elevations in SE coastal mountains.

Food and Feeding. Mistletoe berries (Loranthaceae), also wide variety of other small fruits, including those of figs (*Ficus*) and *Rhipsalis* (Cactaceae); some insects. Contents of ten stomachs were vegetable matter, including both fruits and seeds. Most often occurs in pairs or small family parties, less often in groups; regularly associates with other euphonias, especially in Amazonian region, and also often with mixed-species flocks. Generally forages high in tall trees, but may descend somewhat lower along forest borders. Like many congeners, feeds heavily on mistletoe berries, often spending long periods of time in mistletoe clumps high in canopy. Also examines tree branches for insects. In some areas believed to wander over wide areas.

Breeding. A nest in Paraguay was a globular domed structure with small circular side entrance, much like that of others of genus, mainly of fibres and dry leaves, lined with finer fibres, placed high up among four vertical twigs in crown of tall tree. In captivity, eggs greyish-white, marked with reddish-brown and grey, incubation by female, period c. 15 days, both adults feed chicks, by regurgitation. No other information.

Movements. Resident. Some seasonal movements in and out of dry Andean valleys (Peru) and in and out of Espírito Santo (E Brazil) reported; some seasonal wandering likely in all areas.

Status and Conservation. Not globally threatened. Widespread and fairly common to locally common. Found in wide variety of forest-edge and semi-open habitats. Occurs in many parks and reserves, and also in many unprotected areas that appear to be at little risk.

Bibliography. Beebe (1909), Belton (1985), Bertoni (1904), Bertonatti *et al.* (1994), Contreras (1979b), Descourtilz (1852), Dorst (1957b), Dunning (1982), Friedmann & Smith (1950), Haverschmidt & Mees (1994), Hellmayr (1935, 1936), Hilty (2003), Hilty & Brown (1986), Ingels (1971a), Ingels *et al.* (1976), Isler & Isler (1999), Lima (2006), Lysinger *et al.* (2005), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Narosky & Di Giacomo (1993), Naumburg (1930), Parker & Goerck (1997), Parkes (1969b), de la Peña (1996b), de la Peña & Rumboll (1998), Remsen (1976), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage, E. (1913), Snethlage, H. (1927, 1928a, 1928b), Snyder (1966), Souza (2002), Taczanowski (1884), Terborgh & Weske (1969), Wetmore (1926), Willis (1977), Zimmer (1943a).

218. Trinidad Euphonia

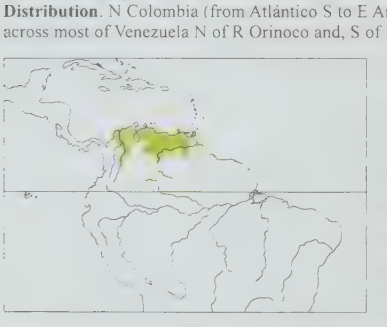
Euphonia trinitatis

French: Organiste de Trinidad **German**: Trinidadorganist **Spanish**: Eufonia de Trinidad

Taxonomy. *Euphonia trinitatis* Strickland, 1851, Trinidad.

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a monophyletic species group with *E. affinis*, *E. luteicapilla* and *E. chlorotica*; has in the past been regarded as conspecific with last-mentioned, but differs in habitat and in female plumage. Monotypic.

Distribution. N Colombia (from Atlántico S to E Antioquia and middle Magdalena Valley) and E across most of Venezuela N of R Orinoco and, S of it, locally in NC Bolívar; also Trinidad.



Descriptive notes. 10 cm; 8·8–14 g. Small euphonia with short stubby bill. Male is glossy dark steel-blue above, with bright yellow crown extending from bill to well behind eye; bib glossy blue-black, underparts bright yellow; white underwing-coverts and white on basal half of almost all flight-feathers; basal half of outer 2–3 tail feathers with white inner webs (forming two large white ovals on undertail); iris dark brown; bill pale bluish-grey with blackish culmen and tip; legs dark grey. Distinguished with difficulty from extremely similar *E. chlorotica* by yellow forecrown patch marginally more extensive posteriorly and, in good light, dark steel-blue upperparts without distinct purple tinge. Female is olive above, dull yellowish below, with pale ash-grey median underparts; differs from *E. chlorotica* in greyish (rather than olive-yellow) central underparts, but further study needed. Immature is mainly olive above and paler olive-yellow below; subadult male shows variable amount of black mottling on throat and head. Voice. Vocal, but can be difficult to locate. Often heard call a clear, whistled "teee, deee" on even pitch, or "duuu-dee" with first note slightly lower; call sometimes of 3–4 notes; sometimes gives single "teee" or the call note lengthened, e.g. "teeeee", or any combination of the above up to c. 4 notes in a series. Song a short jumble of musical and scratchy unmusical notes, mostly unaccented. Calls and songs often alternated. All vocalizations virtually identical to those of *E. chlorotica*, also quite similar to those of many other congeners.

Habitat. Dry to moist forest, gallery forest, light woodland, forest borders, scrubby or wasteland areas, and pastures and cultivated areas with scattered trees and tree-lined borders, also residential areas (cf. more forest-based *E. chlorotica*). Sea-level to c. 600 m; locally (or seasonally) to 1100 m in Colombia and to 1450 m in N Venezuela.

Food and Feeding. Small fruits and berries, especially mistletoe berries (Loranthaceae), also insects. Occurs in pairs and in small groups of 3–6 individuals, occasionally as many as ten, and may roost in gatherings of a dozen or more; groups of varying composition, sometimes mostly males, sometimes mostly female-plumaged birds; infrequently associates with mixed-species flocks (few form in areas that it inhabits), but readily joins other species to mob small owls (Strigidae), snakes and other predators. Forages from middle levels to canopy, and often perches quite high when calling. Wanders widely, taking many small fruits and berries. Gleans insects from high, bare twigs, spider webs, etc.

Breeding. Breeding reported in Apr in Colombia and Venezuela and Feb–Apr in Trinidad. Nest built by both sexes, a globular covered structure with small, circular side entrance, made mostly from grass, usually located in cluster of small twigs 1·4–12 m up near end of branch in tree. Clutch 3–4 eggs, pale cream or white, marked with shades of brown; incubation by female, chicks fed by both sexes; no information on duration of incubation and nestling periods.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common virtually throughout its range. Occurs in a number of reserves and protected areas, including Guatopo, Henri Pittier, San Esteban, Morrocoy and Terepaima National Parks (Venezuela) and Serranía de Macuira, Morichales de Paz de Ariporo and El Tuparro National Parks (Colombia). This species utilizes a wide variety of dry semi-open habitats that, although unprotected, are at little risk.

Bibliography. Allen (1905), Belcher & Smooker (1937), Cherrie (1916), Darlington (1931), ffrench (1991), Friedmann & Smith (1950), Hellmayr (1935, 1936), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Snow & Snow (1971), Thomas (1982), Zimmer (1943a).

219. Velvet-fronted Euphonia

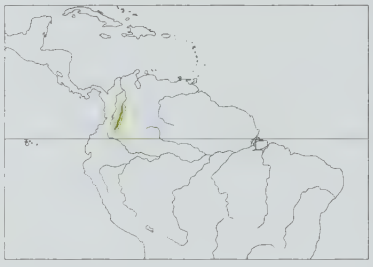
Euphonia concinna

French: Organiste du Magdalena **German**: Samtstirnorganist **Spanish**: Eufonia del Magdalena

Taxonomy. *Euphonia concinna* P. L. Sclater, 1855, "Bogotá".

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.

Distribution. WC Colombia, in upper Magdalena Valley from N Tolima (Honda) and adjacent Cundinamarca S to SW Huila (La Plata); recent record from middle Cauca Valley.



Descriptive notes. 9 cm; 9–12 g. Small euphonia with small, stubby bill. Male has small yellow forecrown patch extending rearwards just to eye, bordered in front by narrow band of black over bill (difficult to see in field); otherwise head to foreneck and upperparts, including upperwing-coverts, blue-black with purplish gloss; tail blue-black, flight-feathers black, usually small white spot at base of outer primaries (amount of white variable, sometimes absent); breast and lower underparts rich ochraceous to cinnamon-yellow; iris dark brown; bill pale bluish-grey with blackish culmen and tip; legs dark grey. Differs from similar *E. chlorotica* and *E. trinitatis* in having narrow black band across base of forehead and only small yellow patch on forecrown, also darker undertail with no white patches. Female has inconspicuous olive-yellow anterior superciliary stripe, with most of crown, ear-coverts and nape light olive-grey, becoming olive on rest of upperparts; uniformly dull yellowish, tinged olive, below. Immature apparently undescribed. Voice. Frequently heard call, by either sex, a clear high "dee-dee" or "tee dee-dee", much like that of many others of genus. Song, by male (possibly also female) a slightly gravelly and varied series of phrases, e.g. "p'wheeet-wheeet...pa'weet, whe'e'e't, whe'e'e't...pa'weet, p'bzrrrr, bzrrrr...", the "wheeet" notes rising in pitch, sometimes slightly burry; "bzrrrr" notes buzzy or rattling.

Habitat. Found in dry open and semi-open woodland, ranchland with scattered trees, fence rows with trees, and light woodland along streams. At 200–1000 m, and recorded locally to 1800 m in W Cundinamarca; principally in dry lower-elevation sites.

Food and Feeding. Small fruits and berries, especially mistletoe berries (Loranthaceae); probably some insects, too. Occurs in pairs or small family parties, most often seen apart from other species; less frequently loosely associated with a few other species. Like congeners, stays well up in trees and often feeds on mistletoe berries. Can be remarkably confiding and easy to see.

Breeding. Three birds in breeding condition in Jan–Apr in upper Magdalena Valley. No other information.

Movements. Resident. Limited observations suggest that pairs or families are sedentary, and not so apt to wander as do some other members of genus (e.g. *E. trinitatis*) that occur in dry semi-open areas.

Status and Conservation. Not globally threatened. Restricted-range species: present in Colombian Inter-Andean Valleys EBA. Fairly common very locally. Recent record from middle Cauca Valley needs confirmation; possibly relates to an escaped cagebird. There are no parks or reserves within this species' range, which does, however, include extensive scrub, ranchland, riverine woodland and dry semi-open areas which are at little risk of development and are apparently suitable for the requirements this species.

Bibliography. Hilty (2009a), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1964, 1966, 1970a), Miller (1947), Olivares (1969), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008).

220. Orange-crowned Euphonia

Euphonia saturata

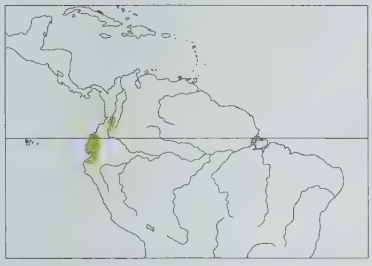
French: Organiste à calotte d'or **Spanish**: Eufonia Coroninaranja
German: Orangescheitelorganist

Taxonomy. *Phonasca saturata* Cabanis, 1861, "Bogotá".

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.

Distribution. Colombia on both slopes of W Andes (in Valle, probably also Cauca), and W Ecuador S to extreme NW Peru (Tumbes).

Descriptive notes. 10 cm. Small, relatively dark euphonia with rather short and thick bill. Male has entire crown (back almost to nape) deep orange-yellow; rest of head to foreneck and upperparts, including upperwing-coverts and flight-feathers, glossy blue-black with purplish tinge; uppertail



blue-black; breast and lower underparts, including undertail-coverts, deep orange ochraceous; undertail plain dark grey; iris dark brown; bill blackish, base of lower mandible pale grey; legs dark grey. Differs from similar *E. xanthogaster* in lack of white on underside of tail. Female is entirely dark olive above, dull olive-yellow below, slightly paler and more yellowish on throat and especially on belly and undertail-coverts, with sides and flanks tinged olive; undertail-coverts with faint olive tinge. Juvenile undescribed. Voice. Song a leisurely series of "tsit" notes, nasal "tcheeur" notes, and fast "tididit" phrases. Call a high, clear whistled "pee-deet", much like that of *E. trinitatis* and many other members of genus.

Habitat. Occurs in wide variety of semi-open areas with scattered trees, parks, tree-lined streamsides, woodlots, in dry valleys with deciduous forest, and locally along semi-humid and wet forest borders and humid clearings with trees. May be found with greater frequency in drier habitats in S Ecuador. Generally at 700–1300 m. locally up to c. 1800 m, in Colombia; from near sea-level to locally as high as 1500 m in Ecuador.

Food and Feeding. Few data available on diet; probably feeds mainly on small berries and fruits. Usually singly or in pairs that stay well up in trees in rather open areas; has been found with mixed tanager–honeycreeper flocks at c. 900 m on steep forested slopes in SW Colombia. Arboreal; behaviour much like that of other members of genus.

Breeding. Nest-building in Apr in S Colombia (Pialapi Valley, 1790 m, in SW Nariño: nest built by female, globular, with side entrance, made from grass, rootlets, bamboo leaves and moss, placed in epiphytes close to trunk at edge of pre-montane forest. No other information.

Movements. Little information. Recorded only Feb–Mar (single adult males) in Anchicayá Valley (at 1050 m), in W Colombia, suggesting seasonal or post-breeding dispersal.

Status and Conservation. Not globally threatened. Uncommon and local both in SW Colombia and in W Ecuador. May occur in a few protected areas, e.g. Farallones de Cali National Park and El Pangan Reserve, in W Colombia. The species' range includes a variety of habitats, some intact, some heavily intervened, in both Colombia and Ecuador; its utilization of wooded borders and semi-open areas should provide a buffer and a measure of protection against short-term risk.

Bibliography. Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Strewe (2001a), Zimmer (1943a).

221. Finsch's Euphonia

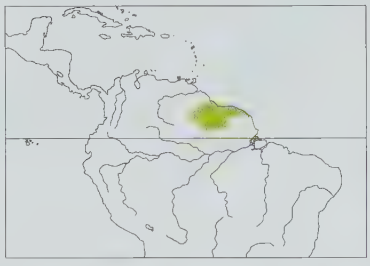
Euphonia finschi

French: Organiste de Finsch **German**: Finschorganist **Spanish**: Eufonia de Finsch

Taxonomy. *Euphonia finschi* P. L. Sclater and Salvin, 1877, Demerara, Guyana.

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.

Distribution. Venezuela (near Santa Elena de Uairén and specimen from near Cerro Roraima, both in extreme SE Bolívar), adjacent N Brazil (NE Roraima) and E across C Guyana, W & N Suriname and N French Guiana.



Descriptive notes. 9 cm; 10–11 g. Small euphonia with bill relatively short and thin for genus. Male has small dark yellow forecrown patch extending to rear of eye; rest of head to foreneck and upperparts, including upperwing-coverts and flight-feathers, glossy purplish-black, inner webs of flight-feathers white at base (forming small spot or patch not always visible when bird at rest; conspicuous white band in flight); uppertail dark steel-blue; breast and all of lower underparts deep tawny-orange, lower breast and sides tinged reddish-brown (burnt orange); undertail plain slate-grey; iris brown; bill pale blue-grey with blackish tip; legs and feet dark grey. Female is olive above, slightly yellowish on forecrown, with faint dusky area through eye; olive-yellow below, becoming plain dull yellow on centre of belly; no white in tail and no white band in wing. Juvenile apparently undescribed. Voice. Call a clear, whistled "dee-dee", this varied to "dee-dee-dee", or even to 4 notes, and overall much like that of *E. chlorotica* and *E. trinitatis*, but given a bit more slowly. Also a clear "beeee".

Habitat. Found primarily along gallery-forest borders, bushy savanna with scattered trees and, in Suriname, also along borders of humid forest in sandy-soil regions. In all areas seems strongly associated with sandy-soil savanna where patches of woodland and scattered trees present. To 1200 m in SE Venezuela, and presumably at similar elevations in adjacent Guyana; recorded at up to c. 400 m in Suriname and French Guiana.

Food and Feeding. Small fruits and berries, e.g. mistletoe berries (Loranthaceae); probably some insects. Pairs or small groups (possibly families), often consisting of several female-plumaged birds and an adult male, wander along gallery-forest borders and call and chatter from treetops, or fly off swiftly in bounding flight to visit distant fruiting trees and shrubs. One or several often perch together on high, bare twigs and call. In savannas of N Suriname has been seen to feed at berry-laden shrubs in association with *E. minuta*, *E. plumbea* and *E. chrysopasta*; in Sipaliwini Savanna of S Suriname has been found with *E. minuta*.

Breeding. Male with greatly enlarged gonads in mid-Apr in Suriname. No other information.

Movements. Resident. Any movements likely confined to short-distance seasonal wandering; has been found only irregularly at a site near Santa Elena de Uairén, in extreme SE Venezuela, suggesting some seasonal movement.

Status and Conservation. Not globally threatened. Generally uncommon and perhaps also very local throughout its range; can be difficult to find and seems nowhere very numerous. Occurs in a few protected areas, most notably the Central Suriname Nature Reserve (World Heritage Site). There appear to be few threats to the habitat occupied by this species, and it is likely, also, to survive in partly disturbed areas.

Bibliography. Davis (1980), Haverschmidt & Mees (1994), Hilty (1999, 2003), Isler & Isler (1999), Lovette & Bermingham (2002), Meyer de Schauensee & Phelps (1978), Penard & Penard (1910), Phelps & Phelps (1963), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Snyder (1966), Tostain *et al.* (1992), Young (1929).

PLATE 26

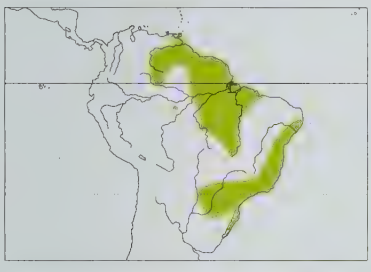

inches 2
cm 5
ssp hypoxantha
ssp laniirostris
ssp melanura
ssp purpurascens
ssp fulvicrissa
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222. Violaceous Euphonia

Euphonia violacea

French: Organiste teité **German**: Veilchenorganist **Spanish**: Eufonia Violácea

Taxonomy. *Fringilla violacea* Linnaeus, 1758, Suriname.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Race *rodwayi* weakly differentiated, and perhaps better subsumed in nominate. Three subspecies recognized.
Subspecies and Distribution.
E. v. rodwayi (T. E. Penard, 1919) – E & S Venezuela and Trinidad.
E. v. violacea (Linnaeus, 1758) – the Guianas, and N Brazil (N of R Amazon E of R Jamundá; S of Amazon from R Madeira E to Maranhão).
E. v. aurantiicollis A. Bertoni, 1901 – E Brazil (Piauí S to Goiás, Minas Gerais and Rio de Janeiro, then W to W Paraná and S to Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).



Descriptive notes. 10 cm; 12·5–17 g. Rather small euphonia with bill relatively heavy for the genus. Male nominate race has orange-yellow forecrown patch extending just to front edge of eye; rest of crown, side of head, nape and upperparts blue-black, highly glossed purplish; uppertail blue-black; upperwing-coverts glossy blue-black, flight-feathers dusky, tinged blue-black; throat and breast orange-yellow, fading into rich yellow of rest of underparts; underwing-coverts and basal half of inner webs of all except outer 2–3 flight-feathers white (usually concealed, sometimes visible in flight); underside of tail dull dark grey, inner webs of outer two or three feather pairs white (forming two large white oval patches on underside of tail); iris dark brown; bill blackish, basal two-thirds of lower mandible blue-grey; legs dark grey. Female has forehead yellowish, turning olive on crown and rest of upperparts, including upperwing-coverts; flight-feathers dusky, tinged olive; underparts bright olive-yellow, belly and undertail-coverts yellow; essentially identical to female of *E. laniirostris*. Immature is like female; subadult male olive above, forecrown yellowish, mottled olive, sides of head black, forming mask, throat yellow and median underparts yellow, sides, flanks and lower underparts olive. Race *aurantiicollis* differs from nominate in larger size, male with yellow on forehead broader, crown and nape frequently more strongly glossed with violaceous; *rodwayi* male differs little from nominate, but very slightly larger (some individuals almost as large as *aurantiicollis*). Voice. Songs incorporate mimicked notes and phrases of many other birds, including both oscine and non-oscine species, which are typically not separated from other phrases in song. Song elements vary widely in pitch, and quality of mimicked phrases also varies, some individuals giving long series of remarkably accurate imitations, others less so. Calls include variety of whistles and short trills, some musical, others unmusical, raspy or metallic. Songs incorporate many of the same whistles and trills in long rambling diatribes that also contain short rattles and various other notes.
Habitat. Humid forest, forest borders, second-growth woodland, shrubby clearings with taller trees, orchards, parks, and trees around buildings; in Brazil and elsewhere seems to require forest or some woodland within its territory. Lowlands, to as high as 1100 m in SE Venezuela.
Food and Feeding. Fruits; also, reported as taking nectar from *Psittacanthus* mistletoe (Loranthaceae) in Brazil, and *Allophyllus edulis* (Sapindaceae) fruit in Paraguay. In Suriname reported as eating berries of mistletoe (including *Phithirusa*), *Rhipsalis*, *Ficus* and *Trema*. In Trinidad study, of 206 observations of foraging, almost all (97%) involved fruit; of these, 62% were small berries of epiphytes and parasites, including a bromeliad, *Aechmaea mudicaulis* (18%), *Rhipsalis* (16%) and mistletoe (14%). Contents of stomachs entirely seeds and fruit. Found singly, in pairs and in small groups, alone or sometimes with other birds at fruiting trees or when mobbing small owls (Strigidae) and other predators. Forages from shrub level to treetops, mostly in upper levels and canopy of trees, and regularly perches in open atop large trees to call or rest. In Trinidad median foraging height was c. 6 m. Takes fruit by hovering or by hanging downwards, as well as perching upright. Berries swallowed whole, mashed to remove skin, or pieces pecked from larger fruits, such as catkins of *Piper* and *Cecropia*.
Breeding. Breeding reported Jan–Aug (mostly May–Jul) in Trinidad, Nov–Apr in Suriname and Oct in Brazil. Nest built by both sexes, a globular structure with small circular entrance on side, made from dead leaves, grass, rootlets, moss, etc., lined with ferns and grass, typically well hidden among epiphytes, in vines on tree trunk, occasionally in niche in roadside bank; sometimes appropriates unused nest of other species, e.g. Rusty-margined Flycatcher (*Myiozetetes cayanensis*). Clutch 3–5 eggs, dull white to pinkish-white with light to dark reddish spots, mostly at larger end; incubation by females alone, no information on duration; both adults feed young, nestling period unusually long for a small passerine, c. 21 days.
Movements. Resident. May wander seasonally in search of fruit.
Status and Conservation. Not globally threatened. Fairly common to common, and widespread. Occurs in a number of protected areas, ranging from Canaima National Park (Venezuela), Kaieteur National Park (Guyana) and Brownsberg, Voltzberg and Sipaliwini Nature Parks (Suriname) S to Iguazú National Park (Argentina) and Itatiaia and Tijuca National Parks (SE Brazil). The species' range also contains vast areas of suitable habitat which is unprotected (especially across E Amazonia), but unlikely to suffer any serious near-term damage.
Bibliography. Bankovics (2003), Belcher & Smooker (1937), Belton (1985), Bertoni (1901, 1919), Collins (2006), Dunning (1982), ffrench (1991), Gilliard (1941), Haverschmidt (1948, 1952, 1955, 1968), Haverschmidt & Mees (1994), Herklots (1961), Hilty (2003), Isler & Isler (1999), Layard (1873), Moojen *et al.* (1941), Narosky & Di Giacomo (1993), Novaes (1969, 1978), Parker & Goerck (1997), de la Peña & Rumboll (1998), Pinto (1944b), Restall *et al.* (2006), Ricklefs (1968, 1976), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sazima *et al.* (1993), Sick (1985, 1993), Snethlage, E. (1935a), Snethlage, H. (1927, 1928a, 1928b), Snow (1974), Snow & Snow (1971), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1979).

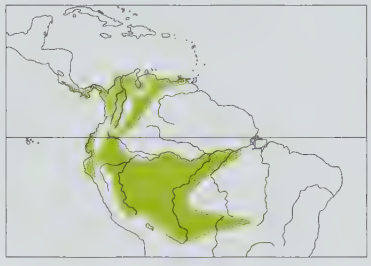
223. Thick-billed Euphonia

Euphonia laniirostris

French: Organiste à bec épais **German**: Dickschnabelorganist **Spanish**: Eufonia Piquigruesa

Other common names: Black-tailed Euphonia (*melanura*)

Taxonomy. *E.*[*uphonia*] *laniirostris* d'Orbigny and Lafresnaye, 1837, Yuracares, Bolivia.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Race *zopholega* doubtfully distinct from nominate. Five subspecies currently recognized.
Subspecies and Distribution.
E. l. crassirostris P. L. Sclater, 1857 – Pacific slope of Costa Rica (from Guanacaste) S to Panama (both slopes from Coclé E through Darién) and N Colombia (S on Pacific coast to C Chocó, throughout Cauca Valley and Magdalena Valley; also in Arauca and Boyacá), and across N & W Venezuela (E to W Sucre, and S in *llanos* almost to R Orinoco).
E. l. hypoxantha Berlepsch & Taczanowski, 1884 – Pacific coast of Ecuador S to NW Peru (S Cajamarca).
E. l. melanura P. L. Sclater, 1851 – E Colombia (from Meta and Vichada) S through E Ecuador and E Peru (S to San Martín and N Ucayali), and C Brazil (Acre and generally E across Amazon Basin S of R Amazon to W Pará).
E. l. zopholega (Oberholser, 1918) – EC Peru (Junín and Cuzco).
E. l. laniirostris d'Orbigny & Lafresnaye, 1837 – SE Peru and N Bolivia E to C Brazil (SE Amazonas and C Mato Grosso).



Descriptive notes. 10 cm; 13–16·5 g. Rather small euphonia with relatively thick bill deeper than that of most congeners. Male nominate race has yellow forehead to mid-crown (a little past eye); side of head, rear crown, nape and upperparts glossy blue-black; uppertail dark blue; upperwing-coverts and flight-feathers dusky, tinged dark blue; throat and entire underparts bright yellow; undertail dark grey, inner webs of outer 2–3 feather pairs mostly white (forming two large white ovals on undersurface of tail); iris dark brown; bill blackish, base of lower mandible blue-grey; legs dark grey. Female is yellowish olive-green above, greenish-yellow below, paler on undertail-coverts. Immature is similar to female; subadult male (second full year) is olive above, forecrown yellow with olive mottling, variable amount of black on side of head (usually forming mask), throat and chest yellow, sides, flanks and lower underparts mostly olive. Race *crassirostris* male is similar to nominate, but yellow of crown extends farther backwards, especially in centre; *hypoxantha* male differs in having whole crown lemon-yellow, and underparts lighter and brighter yellow; *melanura* male has crown like nominate, but underparts darker, orange-yellow, and undertail entirely dark grey (no white), female similar to nominate, but darker below; *zopholega* male is similar to nominate, but white ovals on undertail smaller. Voice. A good mimic of other birds' vocalizations, especially of alarm and contact calls. Song a long rambling series of original notes and mimicked notes of other birds. Both sexes, but especially males, give wide variety of calls, including loud, sharp, whistled "preet!", harsh, buzzy rattles, "tz'i'i'i'i't", and many semi-musical notes and phrases.
Habitat. Occurs in a wide variety of partly open habitats, including woodlots, clearings with trees, forest borders, gallery forest, second-growth woodland, plantations, cultivated areas, and trees around habitations in relatively dry to humid regions. Within Amazonian portion of range found mainly along forest borders of floodplain-forest or *várzea* forest, along river edges, in various age stages of river-island vegetation, and in trees in clearings and second growth. Lowlands up to 1200 m in Panama; to 1900 m in Venezuela; to c. 2200 m (most records below 1100 m; rarely to 2400 m) in Colombia, to c. 1500 m and on W slope locally to 1800 m in Ecuador; to 2000 m in Urubamba Valley, in Peru.
Food and Feeding. Small fruits and berries. Mistletoe (Loranthaceae) comprises a large proportion of diet, but also eats berries of melastomes, figs (*Ficus*) etc.; in Colombia recorded as eating fruits of *Aiphanes* (a spiny palm) and *Sapium* (Euphorbiaceae). Contents of five stomachs were vegetable matter, including fruit and seeds. Found mostly in pairs or small groups that forage and wander alone or sometimes associate with mixed-species flocks along wooded borders; also sometimes with other members of genus, especially around mistletoe. Like many euphonias, may rest or call from high or semi-open perch. Forages mostly in higher part of trees; occasionally drops low along shrubby borders.
Breeding. Breeding reported in Mar–Sept in Panama, and season probably similar in Costa Rica; Dec and Jan and birds in breeding condition in Apr–Jul in Colombia; nest-building observed in early Mar in SW Ecuador (at Tambo Negro, in Loja); two, rarely three, broods in a year reported. Nests of some pairs visited by possible helpers, but feeding of nestlings by latter not verified. Nest built by both sexes, but female may reweave much of her mate's contribution; a globular structure with small circular entrance on side, sometimes also with small porch or overhang, composed of fine twigs, fibres and leaves, lined with dry grass, usually built on or within 3 m of ground, occasionally much higher (to 15 m in Venezuela), generally well hidden in cavity in trunk, post, on epiphyte-covered or vine-covered limb, or branch fork; nest occasionally reused (such reused nests found to be lined with strips of dried *Heliconia* or banana leaves); reported also as appropriating nest of Great Kiskadee (*Pitangus sulphuratus*) built c. 6 m up and atop nest of a thornbird (*Phacellodomus*). Clutch 2–5 eggs, white or pinkish-white, speckled and marked with brown, especially at large end; at two nests, incubation period 14–16 days, chicks fed by both parents, nestling period 18–21 days. Male may breed in subadult plumage, when in second full year.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to common, and widespread, especially E of Andes. Occurs in numerous protected areas from Panama S to Bolivia, and thrives in variety of habitats, including second growth, wooded borders and disturbed and settled areas. Although vast majority of habitat where it occurs is unprotected, this species appears to be at little risk in the near term.
Bibliography. Barnard (1954), Beebe (1909), Best *et al.* (1996), Bond (1943), Borrero (1955), Brosset (1964), Burns (1997a), Burns *et al.* (2002, 2003), Coopmans *et al.* (2004), Davis (1972), Dunning (1982), Eisenmann (1955), Friedmann & Smith (1950, 1955), Garrigues & Dean (2007), Gilliard (1941), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Morton (1976), Moynihan (1962c), Munves (1975), Olivares (1963), Remsen (1976), Restall *et al.* (2006), Ricklefs (1976), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Roles (1971), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer &

On following pages: 224. Yellow-throated Euphonia (*Euphonia hirundinacea*); 225. Green-chinned Euphonia (*Euphonia chalybea*); 226. Fulvous-vented Euphonia (*Euphonia fulvicrissa*); 227. Spot-crowned Euphonia (*Euphonia imitans*); 228. Olive-backed Euphonia (*Euphonia gouldi*); 229. White-lored Euphonia (*Euphonia chrysopasta*); 230. Bronze-green Euphonia (*Euphonia mesochrysa*).

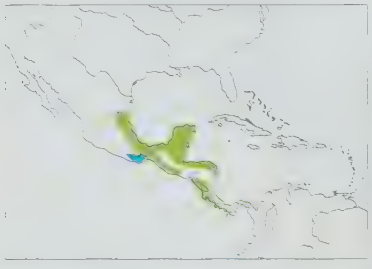
Phelps (1954), Schulenberg (2000c), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1969), Slud (1964), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Thomas (1982), Todd & Carriker (1922), Walker (2001), Weske (1972), Willis & Eisenmann (1979), Wyatt (1871), Yuri & Mindell (2002), Zimmer (1943a).

224. Yellow-throated Euphonia

Euphonia hirundinacea

French: Organiste à gorge jaune **German**: Schwalbenorganist **Spanish**: Eufonia Gorjiamarilla
Other common names: Bonaparte's Euphonia

Taxonomy. *Euphonia hirundinacea* Bonaparte, 1838, Guatemala.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Three further proposed Mexican races, *suttoni* (described from Rio Sabinas, near Gómez Farías, in SW Tamaulipas), *russelli* (from 2 km NE of Felipe Carrillo Puerto, in Quintana Roo) and *caribbaea* (from Monte Bello, N of Palomares, in Oaxaca), all now subsumed into nominate. Two subspecies recognized.
Subspecies and Distribution.
E. h. hirundinacea Bonaparte, 1838 – E & SE Mexico (from San Luis Potosí, S Tamaulipas, Puebla, N Oaxaca, Chiapas and Yucatán Peninsula) S through Belize, Guatemala, Honduras, El Salvador and E Nicaragua.
E. h. gnatho (Cabanis, 1861) – NW Nicaragua and Costa Rica (in Guanacaste, and C valley and Caribbean slope) S to W Panama (W Chiriquí).



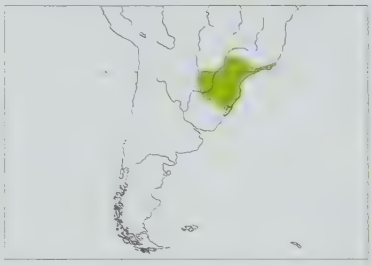
Descriptive notes. 10 cm; 11·6–17·8 g. Small euphonia with small yellow forecrown. Male nominate race has small bright yellow patch on forehead extending back to eye; rest of head and upperparts, including upperwing-coverts, glossy blue-black, uppertail blue-black; flight-feathers dusky, edged and tinged blue-black; throat and entire underparts bright yellow; underwing-coverts white; undertail dark dull grey, inner webs of outer 2–3 feather pairs mostly white (forming large, white, oval-shaped area on each side of undersurface); iris dark brown; bill blue-grey with blackish tip; legs dark grey. Female has top and side of head and upperparts olive; throat, centre of breast and lower underparts whitish to greyish-white, sides, flanks and undertail-coverts yellowish-olive. Juvenile male is much like female; immature male (especially older subadult) also resembles female, but generally with black mask or with black on crown and head (similar to that of adult male), or with crown mixed black and olive, otherwise like female, underparts yellow to yellowish, washed olive on sides. Race *gnatho* differs from nominate in having larger, more swollen bill, male with gloss more bottle-green (less bluish), female with more yellowish underparts. Voice. Song of male includes high shrill and squeaky notes often rapidly alternated in choppy pattern of 2–4 notes, some notes clear and bell-like, others plaintive; some songs reportedly included mimicked notes of other birds, but with repertoire much smaller than that of *E. violacea* (also a vocal mimic). Calls include rolling "cheek-chereeg", scratchy, unmusical "chee-cheet", metallic "weet", and bright "chi-chi-chit" or "ji-ji-jit"; also "sseeu" or "speeu"; also a variety of other sharp and liquid notes. Female gives thin, dry notes, some high-pitched, some trilled.
Habitat. Found in dry to humid regions, mainly along forest borders, second growth, shady plantations, and riverine forest; generally scarce or absent in regions of extensive humid forest including pine (*Pinus*) forest. Lowlands to c. 2100 m, mainly to c. 1500 m, in Mexico; primarily in plateau and hill country in El Salvador and C Costa Rica; presumed to occur in foothills between c. 900 m and 1200 m in W Panama.
Food and Feeding. Fruits and berries; probably also insects. Feeds heavily on mistletoe berries (Loranthaceae), and locally feeds heavily on figs (*Ficus*). Stomach contents have consisted of mistletoe berries. Nestling diet mostly fruit. Berries swallowed whole or mashed. Pairs or small groups reported as wandering over rather large areas when foraging; in Mexico often with *E. affinis*. Appears to search for insects by working along small branches, in foliage and at heads of palms, and investigates moss clumps and epiphytes.
Breeding. Breeding reported in May and Aug in Mexico, Jun in Belize, Mar–May in Guatemala, and mainly Apr–Jul at in Costa Rica (Monteverde). Nest a ball with side entrance, made from grass, fine tendrils and other vegetation, placed at variable height, from eye level to 15 m up, in niche in streambank, in roadside bank, on tree trunk, branches or palm frond, within epiphytes or in clump of moss. Clutch c. 5 eggs, white, lightly spotted brownish at larger end; incubation by female, period c. 16 days; chicks fed by both parents, by regurgitation, adults visit nest infrequently to feed young, usually arrive together, accompany one another to nest entrance in what may be distraction display; nestling period at least 17 days.
Movements. Resident over most of range; some local seasonal movements in response to food abundance likely. In Mexico, considered probably only non-breeding visitor, Oct to early May, on Pacific slope of Isthmus of Tehuantepec, in Oaxaca.
Status and Conservation. Not globally threatened. Fairly common to common from Mexico S; in Costa Rica uncommon and local in dry areas of NW and in C valley, common to abundant in some Pacific-slope valleys, in Nicoya Peninsula, and on Caribbean slope E to R Frío in N, and rare on Pacific slope S of Gulf of Nicoya. Status in Panama uncertain; sight records require confirmation, and specimens from the single published record cannot be located (the species remains unrecorded in adjacent SW Costa Rica). Occurs in a number of protected areas, including Palenque National Park, Selva el Ocote Special Biosphere Reserve and Calakmul and Punta Put Biosphere Reserves (Mexico), Tikal National Park (Guatemala), Crooked Tree Wildlife Sanctuary and Cockscomb Basin Forest Reserve (Belize), Capiro–Calentura National Park (Honduras) and Arenal National Park (Costa Rica). The species occurs widely also in unprotected areas, many of which consist of second-growth and disturbed habitat, but are at little immediate risk.
Bibliography. Andrle (1967), Cherrie (1892b), Davis (1972), Dickey & van Rossem (1938), Eaton & Edwards (1948), Edwards (1972), Eisenmann (1955), Garrigues & Dean (2007), Herrera *et al.* (2009), Isler & Isler (1999), Howell & Webb (1995), Klaas (1968), Land (1970), Monroe (1968), Richmond (1893), Ridgely & Gwynne (1989), Ross & Whitney (1995), Russell (1964), Sargent (1993), Skutch (1954, 1980b), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Sutton (1951a), Sutton *et al.* (1950), Wetmore (1943).

225. Green-chinned Euphonia

Euphonia chalybea

French: Organiste chalybée **German**: Bronzeorganist **Spanish**: Eufonia Bronceada
Other common names: Green-throated Euphonia

Taxonomy. *Tanagra chalybea* Mikan, 1825, Ypanema, São Paulo, Brazil.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Monotypic.
Distribution. SE Brazil (from Rio de Janeiro S to C Rio Grande do Sul) and adjacent E Paraguay (Canindeyú S to Guairá and Itapuá) and NE Argentina (Misiones and Corrientes).



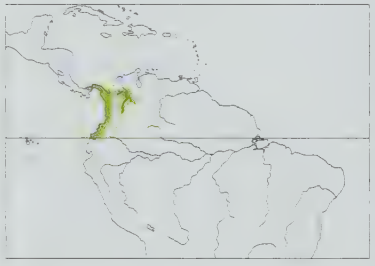
Descriptive notes. 11 cm; 18–20 g. Relatively large euphonia with noticeably thick bill. Male has small yellow frontal band, lores blackish; rest of head and upperparts, including upperwing-coverts, glossy dark greenish-blue; uppertail dark greenish blue, flight-feathers dusky, secondaries and tertials edged dark greenish-blue; chin and most of throat glossy dark greenish-blue, lower throat and rest of underparts bright yellow; undertail entirely dark dusky grey (no white); iris dark brown; bill bluish-grey with blackish tip; legs dark grey. Female is entirely olive above; side of head, side of neck and underparts mostly pale grey; chin, sides, flanks and undertail-coverts olive-yellow. Juvenile male resembles female. Voice. Call a short series, "chik chik chik chik chik", duration c. 1 second. Song a squeaky and raspy series of warbling notes, varying from moderate to high in pitch, delivered rapidly and generally without any mimicry.
Habitat. Primarily humid forest, wooded borders, tall second growth, and clearings with large trees. Lowlands to c. 900 m.
Food and Feeding. Fruits; also, insects, including caterpillars, and spiders (Araneae). Reported to favour epiphytic fruits, including those of *Rhipsalis* cactus; pokeweed berries (*Phytolacca*) and fruits of *Abutilon* also recorded. Found in pairs and in small monospecific groups; regularly with mixed-species flocks containing other tanagers and other birds along forest borders, and occurs also with feeding groups at fruiting trees. Stays mostly well up in trees. Searches branches for small food items. Otherwise, not especially well known.
Breeding. Breeding recorded in Oct in Brazil (Paraná). Nest a rounded structure of plant stems and leaves with side entrance, much as those of congeners; one nest in Brazil was placed among epiphytes c. 15 m up on large branch, one in Paraguay among orchids and epiphytes on limb near a house. Eggs believed to have been of this species were yellowish with red-brown spots. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Fairly common locally in SE Brazil Atlantic Forests from Rio de Janeiro S to Rio Grande do Sul. In E Paraguay recently found in Canindeyú, Alto Paraná, Caazapá, and Itapuá; and in NE Argentina recent records from Misiones and Corrientes. Much of area in which it lives is heavily deforested, and this species is believed to be declining. Occurs in numerous parks and other reserves, including Iguazú National Park (Argentina) and Iguaçu, Itatiaia and Serra da Bocaina National Parks (Brazil). Because of high rates of deforestation, unprotected forest and woodland sites remaining within this species' range are likely to be at risk in the near term.
Bibliography. Anon. (2010a), Belton (1985), Bertoni (1901), Butchart & Stattersfield (2004), Descourtilz (1852), Isler & Isler (1999), Narosky & Di Giacomo (1993), Nehrkorn (1899), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Souza (2002), Stattersfield & Capper (2000), Voss & Sander (1981).

226. Fulvous-vented Euphonia

Euphonia fulvicrissa

French: Organiste cul-roux **German**: Roststeißorganist **Spanish**: Eufonia Ventricanela

Taxonomy. *Euphonia fulvicrissa* P. L. Sclater, 1857, Santa Marta, Colombia; probably error = locality undetermined.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. This species has been considered to form a superspecies with *E. imitans*. Three subspecies recognized.
Subspecies and Distribution.
E. f. fulvicrissa P. L. Sclater, 1857 – C Panama (from Coclé and Colon on Caribbean side and Panamá on Pacific side) E to W Colombia (N Chocó).
E. f. omissa E. J. O. Hartert, 1913 – N base of Colombian Andes from Antioquia E to NW end of E Andes in Norte de Santander (including Sinú Valley, lower Cauca Valley and middle Magdalena Valley) and Pacific coast S to Cauca.
E. f. purpurascens E. J. O. Hartert, 1901 – SW Colombia (Nariño) S to NW Ecuador (Esmeraldas, Manabí and NW Pichincha).



Descriptive notes. 9 cm; 10·1–13 g. Rather small euphonia with tawny-rufous undertail-coverts. Male nominate race has small lemon-yellow patch on forehead extending back to just above eye; rest of head, throat to central chest and upperparts, including upperwing-coverts, glossy blue-black; flight-feathers dusky, tinged blue black; uppertail blue-black with slight gloss; breast, sides and flanks bright golden-yellow, median underparts cinnamon-yellow, vent and undertail-coverts yellowish-cinnamon; undertail dark grey, inner webs of outer two feather pairs mostly white, forming large, somewhat oval-shaped white patch on each side; iris dark brown; upper mandible and tip of lower mandible dusky blackish, rest of lower mandible blue-grey; legs dark grey. Female has small rufous patch on forecrown; hindcrown, nape and upper back bronzy olive-green with faint greyish gloss, lower back, rump and tail yellowish-olive; flight-feathers dusky, edged olive-yellow; underparts olive-yellow, brightest on sides; centre of belly and undertail-coverts contrastingly tawny-rufous. Juvenile apparently undescribed. Race *omissa* differs from nominate in having white ovals on underside of tail less extensive; *purpurascens* differs in having upperparts and uppertail with purplish gloss, no white on undertail. Voice. Commonest call a chattery rattle, "d'e'e'e'h, d'e'e'e'h", occasionally a single "d'e'e'e'h" or up to three rattles in a row (in Panama, "Ren-ren" an onomatopoeic local name for species based on this call). Also gives a rising whistle,

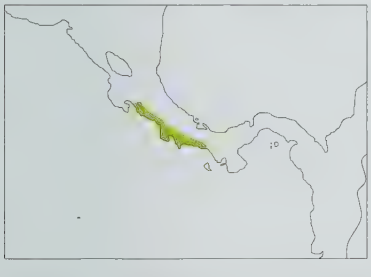
"wheet", and doubled "wheet-wheet", sometimes every few seconds. Song, in Colombia, consists of 1–3 soft, chattery rattles followed by 1–2 short, complex and squeaky phrases that rise in pitch, e.g. "du, d'u'u'u-d'u'u'u spze'e't'tic, spze'e't'tic...du'u, d'u'u'u-d'u'u'u spze'e't'tic..." and so on, continuing for up to a minute or more.
Habitat. Humid and wet forest, forest borders, and shrubby or overgrown clearings and second-growth woodland. In Panama occurs in humid lowland and foothill sites, in decreasing numbers to c. 900 m; in Colombia up to 1000 m (most records below 500 m).
Food and Feeding. Typically feeds on small fruits, less than 5 mm in diameter; also reported as taking arthropods. In Panama, known to eat catkins of *Piper* and *Cecropia* and fruits of *Lantana*, *Hamelia*, mistletoe (Loranthaceae), and *Lindackeria*. Occurs singly, in pairs and in small groups, and is regularly associated with mixed-species flocks. Commonly forages in upper levels of trees, but also regularly decends much lower to shrubs and small fruiting trees along forest borders and in clearings. On Barro Colorado (Panama), most records of foraging were at 10–25 m above ground level.
Breeding. In Colombia, 13 birds in breeding condition in Jan–Jul in N and two others in Apr in Antioquia. Covered nest with side entrance, like that of congeners; male and female building nest of fibrous material in thick hanging moss 12 m up in tree. No other information.
Movements. Resident. Minor elevational movement (seasonal or wandering individuals) possible, but documentation required.
Status and Conservation. Not globally threatened. Fairly common to common over most of range. Occurs in numerous protected areas, including Metropolitan, Soberanía, Chagres and Darién National Parks (Panama) and Los Katíos, Tatamá and Utría National Parks and privately held Reserva Natural El Paujíl (Colombia); possibly in Sanquianga National Park, in SW Colombia. This species occurs also in a variety of second-growth and forest-edge habitats, much of which, though unprotected, is likely to persist at least for the short term, despite ongoing forest clearance.
Bibliography. Davis (1972), Greenberg (1981a), Haffer (1975), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Leck (1971b), Lovette & Bermingham (2002), Moynihan (1962c), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Stiles *et al.* (1999), Wetmore *et al.* (1984), Willis (1980), Willis & Eisenmann (1979).

227. Spot-crowned Euphonia

Euphonia imitans

French: Organiste moucheté **German**: Stirnfleckenorganist **Spanish**: Eufonia Coronipinta
Other common names: Tawny-bellied/Tawny-tailed Euphonia

Taxonomy. *Tanagra imitans* Hellmayr, 1936, El Pózo, River Térraba, Costa Rica.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. This species has been thought to form a superspecies with *E. fulvicrissa*. Monotypic.
Distribution. Pacific slope of Costa Rica (from at least Carara and San José) S to W Panama (Chiriquí).



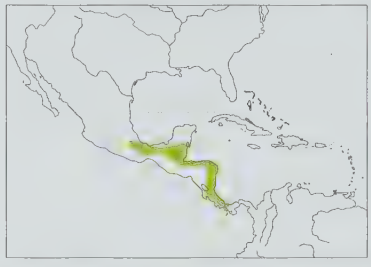
Descriptive notes. 10 cm; 14 g. Small euphonia with stubby bill. Male has bright yellow forehead patch extending back to rear edge of eye, yellow inconspicuously dotted with black (especially near mid-crown) and with a few weakly indicated hair-like black streaks; rest of head, throat, chest, side of neck, and upperparts steely blue-black; upperwing-coverts slightly glossed blue-black, flight-feathers and tail dusky with dark blue-black tinge, flight-feathers with white bases to inner webs of all but outermost two feathers; side of chest and lower breast to undertail-coverts bright yellow, underwing-coverts white; iris dark brown; bill blackish, basal half of lower mandible pale blue-grey; legs dark grey. Distinguished from similar *E. luteicapilla* mainly by thicker bill and much more restricted yellow crown patch (black forecrown dots difficult to see). Female has contrasting rufous-chestnut forehead; otherwise dark olive-green above, greyish-blue tinge on crown and nape and slight blue-grey tinge extending across back, uppertail-coverts slightly yellowish; upperwing-coverts and flight-feathers dusky, broadly edged yellowish-olive; mainly olive-yellow below, paler on throat, and with sharply contrasting tawny-rufous centre of lower breast, belly and undertail-coverts. Juvenile is like female, but duller, and without rufous colour. Voice. Calls include a rolling or rattled "tr'r'r'r'r" or "chu'r'r'r'r", most often doubled or given in a series of 3–4, all with metallic quality and very similar to call of *E. fulvicrissa*; rattles may be preceded by one or two descending, slurred whistles, "twerp". Also gives a sibilant "yerrlirr", and scolds with harsh, rolling "jurry-jurry". Song typically consists of a note or phrase repeated 5–8 times, followed by abrupt shift to another series; some songs are clear sweet warbles, others chaffy or wheezy and dry, e.g. "chip a cheer weet; chip tuck tuck; wee churee-cha...", and so on, sometimes continued for up to 30 minutes.
Habitat. Humid forest and adjacent forest borders, shady clearings and tall second growth. Lowlands and foothills to c. 1350 m.
Food and Feeding. Mainly small berries, also some larger fruits, nectar; also insects. Found mainly alone or in pairs, infrequently in groups of three or more individuals; regularly associated with mixed-species flocks. Forages from low to high levels, most often at middle strata or higher. Noted as eating bits of banana from feeders. Mashes small berries to discard skin, and pecks holes in or pieces from larger soft-bodied fruit. Searches mossy branches and tangles of dead leaves for insects. Observed to roost alone in little pockets of moss or in epiphytes on branches.
Breeding. Breeding recorded in Mar–Jun in Costa Rica; two broods may be attempted. In Costa Rica, both male and female seen building nest, a rounded or domed structure similar to that of congeners, side entrance may be covered by small overhanging porch, made from green moss, rootlets and ferns, lined with narrow strips of bark and/or fine vegetable fibres, and often placed in suspended tangle of epiphytes or in hanging branch; eight nests were 2–7·5 m above ground, two others were sited over a stream. Clutch 2–3 eggs, usually 2, white or pinkish-white, sparingly marked with brown, more heavily at larger end; incubation by female alone, period for one clutch was 18 days.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in South Central American Pacific Slope EBA. Uncommon to locally common in SW Costa Rica, numbers rapidly diminishing N to Carara; rare to locally uncommon in adjacent SW Panama. Few or no recent records in W Panama lowlands, which has been subject to severe deforestation; small numbers survive in forest fragments at higher elevations. Occurs in a few protected areas in Costa Rica, including Corcovado, Manuel Antonio and probably Carara National Parks, and the Wilson Botanical Garden (near San Vito). Although this species is not currently considered threatened, much of the native forest within its range has been destroyed and its now fragmented populations are in urgent need of monitoring.
Bibliography. Davis (1972), Eisenmann (1955), Garrigues & Dean (2007), Isler & Isler (1999), Ridgely & Gwynne (1989), Skutch (1972), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).

228. Olive-backed Euphonia

Euphonia gouldi

French: Organiste olive **German**: Olivrückenorganist **Spanish**: Eufonia Olivácea
Other common names: Gould's Euphonia

Taxonomy. *Euphonia Gouldi* P. L. Sclater, 1857, Guatemala.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Proposed race *loetscheri* (described from Dos Amates, NE of Catemaco, in Veracruz) considered inseparable from nominate. Two subspecies recognized.
Subspecies and Distribution.
E. g. gouldi P. L. Sclater, 1857 – Gulf–Caribbean slope of Mexico (S Veracruz E to S Quintana Roo, S to N Oaxaca and N Chiapas) S through N Guatemala and Belize to Honduras.
E. g. praetermissa (J. L. Peters, 1929) – extreme SE Honduras, E Nicaragua, E Costa Rica (locally also on Pacific slope in Guanacaste) and NW Panama (NW Veraguas).



Descriptive notes. 9–10 cm; 10·9–16 g. Small euphonia with thick and stubby bill, both sexes with drab female-type plumage. Male nominate race has yellow on forehead extending back to top of eye, sometimes with light black flecks; rest of head and upperparts, including tail, olive-green with bluish-grey gloss, uppertail-coverts plain olive-green (no gloss); upperwing-coverts bronzy olive-green, primary coverts black, flight-feathers dusky, sharply edged greenish-yellow; face, throat and chest olive, sides and flanks irregularly mottled yellow and olive, lower breast, belly and undertail-coverts contrastingly tawny-rufous; some individuals (not all) have minor amount of white on inner webs of outer two tail feathers (visible from below as white oval on each side of tail); iris dark brown; bill blackish, basal half of lower mandible blue-grey; legs dark grey. Female differs most obviously from male in having forehead dark rufous (not yellow), rest of upperparts olive with slight grey tinge (not glossy); yellowish-olive below, sides and flanks darker olive, vent and undertail-coverts dark rufous. Female differs from very similar female of *E. imitans* in having duller forecrown less sharply defined along rear edge, often a diffuse dusky supraloral line, more olive-green (less grey) nape and back, and absence of rufous on most of belly. Juvenile is much like adult of respective sex, but tinged dusky on crown and nape; older birds (presumed immature) show some yellow (male) or rufous (female) on forecrown while still duller than adult; adult plumage acquired within a few months of age. Race *praetermissa* is similar to nominate, but differs in decidedly smaller size (wing 52–56 mm; nominate 55–60 mm), and, on average, less extensive chestnut in abdominal area. Voice. Commonest calls are a rolling "churrr-churrr" or "chur-chur-chur" with metallic quality, and rougher "dee-dee-dee" with throaty or burred quality; lacks clear whistled "beem beem" calls typical of "black-and-yellow" euphonias. Song, from high, partly open perch (as bird wags or twitches tail from side to side), a rambling medley of whistles, chatters and staccato notes, some dry and chaffy, some musical, often sustained for long periods of time.
Habitat. Tall humid and wet lowland and foothill forest, and tall second growth and shady clearings adjacent to or within rainforest. Mainly sea-level up to c. 500 m; recorded up to 1200 m in Guatemala.
Food and Feeding. Known to eat wide variety of small berries, including *Anthurium* (Araceae), *Miconia* and other melastomes, *Trema* (Cannabaceae), *Urera* (Urticaceae), mistletoes (Loranthaceae), and catkins of *Cecropia*. Four stomachs contained small-seeded fruits. Captives show distinct preferences based on ripeness, accessibility and fruit type. Occurs singly and in pairs, somewhat less often in little groups; regularly with mixed-species flocks. Stays mainly in canopy, but occasionally descends to middle levels. Most fruit taken while bird perched, rarely while in flight. Swallows fruits whole, or mashes them and discards skin, and sometimes also seed, before swallowing pulp.
Breeding. Breeding reported in May in Belize and Feb–Jul in Costa Rica. Nest a globular structure with side entrance, made from thin roots, rhizomes, green moss, and fine palm and other fibres, lined with fine grasses or other fibres, placed 2–15 m up in clump of moss or epiphyte or built within suspended vegetation on hanging branches, vines or rootlets. Clutch 2–4 eggs, usually 3, dull white with brown spots and blotches, mostly in wreath at larger end. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to locally common. A Caribbean lowland species, population now much reduced by loss of rainforest in region. Occurs in a number of protected areas, including Palenque National Park (Mexico), Tikal National Park (Guatemala), Crooked Tree Wildlife Sanctuary, Caracol Archaeological Reserve, Cockscomb Basin Forest Reserve and Chan Chich Nature Reserve (Belize), Capiro–Calentura National Park (Honduras), Indio-Maíz Biological Reserve (Nicaragua), La Selva Biological Station (Costa Riva) and Bastimentos National Park (Panama). The species' range formerly included much forest outside protected areas, but few large areas of suitable lowland forest now remain, except in N Guatemala and E Nicaragua.
Bibliography. Carriker (1910), Davis (1972), Edwards (1972), Eisenmann (1955), Garrigues & Dean (2007), Hanson (2008), Howell, S.N.G. & Webb (1995), Howell, T.R. (1957), Isler & Isler (1999), Land (1970), Moermond & Denslow (1985), Monroe (1968), Ridgely & Gwynne (1989), Ross & Whitney (1995), Russell (1964), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Strauch (1977), Tashian (1952), Wetmore *et al.* (1984).

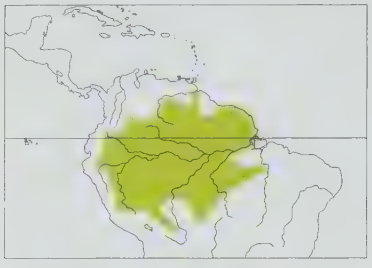
229. White-lored Euphonia

Euphonia chrysopasta

French: Organiste fardé **German**: Zügelorganist **Spanish**: Eufonia Maquillada
Other common names: Golden-bellied Euphonia

Taxonomy. *Euphonia chrysopasta* P. L. Sclater and Salvin, 1869, lower Ucayali, Peru.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Two subspecies recognized.

Subspecies and Distribution.
E. c. nitida (T. E. Penard, 1923) – extreme E Colombia (along R Orinoco), S Venezuela (S of Orinoco) E to French Guiana, and N Brazil N of R Amazon.
E. c. chrysopasta P. L. Sclater & Salvin, 1869 – SE Colombia (from Meta) S through E Ecuador and E Peru to N Bolivia, and W & C Brazil (E to R Xingu and, in E Pará, to R Tocantins).



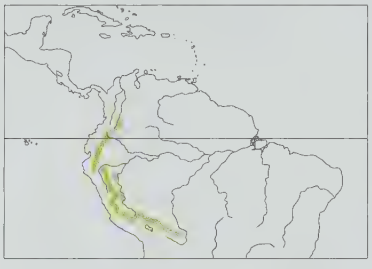
Descriptive notes. 9–10 cm; 11–16·2 g. Small, comparatively plain euphonia, male with female-type plumage, bill noticeably thick and with cutting edges not quite straight (like slightly crooked grin). Male nominate race has base of forehead to chin and cheeks ashy whitish-grey, forming fairly conspicuous oval-shaped area of white surrounding bill (like a "milk moustache"); forecrown olive, with narrow dusky border at front, rest of crown and nape greyish; upperparts, including upperwing-coverts, olive-green with bluish-grey gloss, uppertail-coverts paler; uppertail olive; flight-feathers dusky, edged and tinged olive-green; mostly yellow below, slight olive tinge on sides and becoming clear yellow on centre of belly and undertail-coverts; undertail plain greyish (no white); iris dark brown; bill blackish, basal half or more of lower mandible greyish; legs horn-grey. Female is much like male above, but considerably duller, with whitish around bill less extensive, side of head yellowish-olive; mostly grey below, with sides, flanks and undertail-coverts olive-yellow. Juvenile apparently undescribed. Race *nitida* is slightly smaller than nominate, male having less grey on crown and nape, slightly duller underparts. Voice. Calls include variety of smacking notes and short whistles; one of commonest calls a rather loud buzzy "spitz wéet!" repeated over and over, and a sharp, smacking "spitz!". Lacks clear whistled calls of "black-and-yellow" euphonias. Male's song, often from high bare twig in open (may nervously twitch or wag tail to one side, sometimes accompanied by bobbing of entire rear body up and down as it sings) a jumble of "chit, sit, spitz, week" and other notes, sputtering on in fits and starts, sometimes for several minutes, with pauses of varying length, e.g. "p-pfits'et cheéu...sit, fits...pa'fits-a-whew!...", and so on. Some songs appear to be patterned, others more random in choice of notes and phrases.
Habitat. Canopy of humid *terra firme* and *várzea* forest, tree-scattered shady clearings, forest borders and tall second-growth woodland. Lowlands to c. 1000 m, occasionally to 1300 m.
Food and Feeding. Fruits and insects. One stomach contained only seeds. Usually seen in pairs, less often singly or in small groups of up to about six individuals; at times joins mixed-species flocks. Forages in clumps of mistletoe (Loranthaceae) high in forest canopy or in fruiting trees, where sometimes with other members of genus; typically stays high up and searches for insects by foraging on long slender bare twigs, sometimes going out to tip. Occasionally descends low along forest borders and in clearings with trees when visiting fruiting shrubs and other small trees.
Breeding. Breeding reported in Aug in Ecuador, and numerous records in Aug and Sept in SE Peru. Nest built by both sexes, covered and football-shaped, with side entrance, made from various grassy material, moss, bits of leaves and ferns, even dry leaves, placed 5–35 m or more above ground (most often quite high) in crevice, or hidden in epiphytes, moss and ferns on side of large limb in canopy, sometimes on side of spiny palm trunk. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Common and widespread across Amazonia. Occurs in a number of large protected areas, including Tinigua, Serranía de Chiribiquete, La Paya, Cahuinarí and Amacayacú National Parks (Colombia), Yasuní National Park and Cuyabeno Wildlife Reserve (Ecuador), Alto Purús and Manu National Parks and Pacaya-Samiria National Reserve (Peru), Madidi National Park (Bolivia) and Serra do Divisor, Jaú and Amazonica National Parks (Brazil). The species' range also includes extensive intact habitat which, though unprotected, is at little near-term risk.
Bibliography. Dick *et al.* (1984), Dunning (1982), Gyldenstolpe (1945b), Hellmayr (1910), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Naumburg (1930), O'Neill (1974), Pearson (1975c), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg (2000c), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977), Zimmer (1943a).

230. **Bronze-green Euphonia**

Euphonia mesochrysa

French: Organiste mordoré **German**: Grünscheitelorganist **Spanish**: Eufonia Verdosa

Taxonomy. *Euphonia mesochrysa* Salvadori, 1873, no locality = Bogotá.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. Three subspecies recognized.
Subspecies and Distribution.
E. m. mesochrysa Salvadori, 1873 – Colombia (at head of Magdalena Valley in Huila; E slope of E Andes from E Cundinamarca and W Meta) S to E Ecuador (Napo and Morona-Santiago).
E. m. media (J. T. Zimmer, 1943) – N & C Peru on E slope of Andes (Amazonas and Cajamarca) S to Cuzco (R Chanchamayo).
E. m. tavarae (Chapman, 1925) – SE Peru (S from R Tavara) S on E slope of Andes to Bolivia (to Cochabamba and extreme W Santa Cruz).



Descriptive notes. 9–10 cm; 12–15 g. Small and rather drab euphonia with thick and stubby bill. Male nominate race has narrow dark olive band (inconspicuous) over bill, bordered above on forehead by bright yellow patch; mid-crown olive, rear crown greyish fading to olive on nape; upperparts olive with strong grey-blue gloss, uppertail dusky olive; upperwing-coverts olive-green, primary coverts blackish, flight-feathers dusky, outer ones edged yellow-green, inner feathers and tertials progressively more broadly edged olive-green; throat, chest and sides yellowish-olive; rest of underparts deep ochre-yellow; tail entirely dark grey below (no white); iris dark brown; bill blackish above, most of lower mandible bluish-grey; legs dark grey. Female is like male above, but entire forecrown to mid-crown olive (no yellow), and rear crown and nape strongly tinged greyish; throat, chest and upper breast duller olive-yellow, centre of lower breast and belly light grey, sides, flanks and undertail-coverts dull olive-yellow. Juvenile undescribed. Race *media* is much like nominate, male differing in darker coloration, yellow of forehead wider and darker, back of head darker grey, olive of back darker, olive of throat also darker and more restricted, and yellow of underparts darker and more extensive, female also darker than nominate female; *tavarae* male differs from nominate in numerous subtle ways, including slightly paler forehead, dark band at base of forehead wider, throat darker and more olive and contrasting more with yellow of belly, which is less orange-tinted. Voice. Rather quiet; lacks loud whistles of "black-and-yellow" euphonias, and all vocalizations somewhat ventriloquial. Call a soft burry "tr-r-r-r-r", sometimes doubled or tripled, or notes may be shorter, e.g. "tr-r-r tr-r-r"; also utters weak high "chip" note, this also sometimes doubled or given in longer series. Song 1–3 low whistled notes followed by a series of low burry trills, "whut tr-t-t tr-t-t tr-r-r" or "whu-téé-wur-pur'r'r't"; song sometimes accompanied by "chip" notes.
Habitat. Humid and wet montane forest (cloudforest). Occurs in steep hillside forest and along forest borders, and visits small trees and shrubs in clearings and landslides and along roadsides. Recorded mainly at 800–2150 m, less often down to c. 600 m in foothills; in Ecuador 1100–1800 m, locally to 900 m; in Peru mainly 1000–2000 m, locally down to 450 m (in Puno); one record in NE Peru (Loreto) at 150 m.
Food and Feeding. Fruits and berries; probably some insects. Apparently feeds mainly on berries of smaller trees and shrubs with low but prolonged fruiting periods, e.g. melastomes and *Cecropia*. Two stomachs contained only fruit. Rather quiet and timid, most often seen when it comes to feed on berries at small forest-edge melastome shrubs or other small fruiting trees, either with temporary feeding associations or with mixed-species flocks containing *Tangara*, *Chlorospingus* and other small tanagers; frequently follows mixed flocks. In Peru reported as searching small clumps of moss, lichens and epiphytes on branches and large limbs, occasionally on tree trunks, and frequently seen in mistletoe.
Breeding. No information.
Movements. Little information. Some seasonal or irregular elevational movement in response to changing resource levels likely.
Status and Conservation. Not globally threatened. Uncommon. Can be found in a number of protected areas on E Andean slope, including Cordillera Los Picachos National Park (Colombia), Sangay National Park (Ecuador), Manu National Park (Peru) and Madidi National Park (Bolivia). Although E slope of Andes has suffered extensive deforestation, wide areas of unprotected intact habitat remain which unlikely to be at risk in the near term.
Bibliography. Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Parker *et al.* (1982), Remsen *et al.* (1987), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Stiles *et al.* (2002), Schulenberg (2000a), Schulenberg *et al.* (2007), Taczanowski (1884), Zimmer (1943a).

PLATE 27 ➤



231. White-vented Euphonia

Euphonia minuta

French: Organiste cul-blanc **German**: Weißbauchorganist **Spanish**: Eufonia Culiblanca

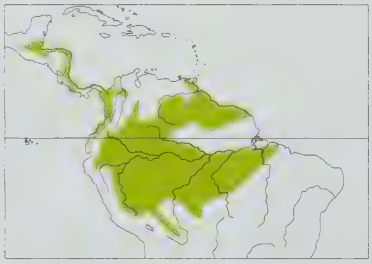
Taxonomy. *E.[uphona] minuta* Cabanis, 1848, Guyana.

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. The two races are so similar that species may be better treated as monotypic. Two subspecies tentatively recognized.

Subspecies and Distribution.

E. m. humilis (Cabanis, 1861) – extreme SE Mexico (Palenque, in Chiapas) very locally E to C Guatemala and S Belize and N Honduras, and S on Caribbean slope from E Nicaragua to Panama, and on Pacific slope from SW Costa Rica E to Panama (Veraguas), N base of Andes in Colombia (E to C Magdalena Valley) and S on entire Pacific coast to NW Ecuador (to S Pichincha).

E. m. minuta Cabanis, 1848 – E base of Venezuelan Andes (in Táchira) and SE Colombia (from Meta and Vaupés) S through Ecuador and Peru to C Bolivia (Santa Cruz), and generally E across S & E Venezuela, the Guianas, and Amazonian Brazil (E to mouth of R Amazon, and S to S Amazonas and C Pará; once in E Mato Grosso).



Descriptive notes. 9 cm; 7·9–11·5 g. Very small, compact euphonia with distinctive white undertail-coverts, and short, thick bill. Male nominate race has small bright yellow patch on forehead (not extending back to eye); rest of head down to foreneck, and upperparts, including uppertail and upperwing-coverts, glossy blue-black, head and nape glossed purplish; flight-feathers dusky, edged dark blue; breast and belly bright yellow, sometimes with a little dusky mottling on flanks; middle belly and undertail-coverts white, underwing-coverts white; inner webs of outer three pairs of tail feathers white (forming large oval-shaped white patch on each side of undersurface); iris dark brown; bill black, basal two-

thirds of lower mandible blue-grey; legs dark grey. Female has head and upperparts, including wings and tail, olive; throat dingy greyish-white, chest, upper breast, sides and flanks olive-yellow, centre of lower breast, belly and undertail-coverts white (appearance of broad diffuse breastband). Juvenile resembles female, but duller. Race *humilis* male differs from nominate in having yellow forehead patch larger, and chest and upper breast slightly darker, richer yellow. Voice. One of commonest calls is a sharp "veet", also a sputtery "wee-chu". Song surprisingly loud and forceful for so small a bird, a shrill series of sharp and staccato notes, "tu, véévéét, ch-véét, cheewit, chewit, ...véét...ch-véét, tsik, veéé, vic-squik, squik-squik, veéé..." and so on; louder "véét" and "veéé" notes are characteristic of almost all songs, even though song patterns may vary. Both sexes call frequently when nest-building.

Habitat. Humid and wet lowland tropical forest, along forest borders, less frequently in canopy of large trees in clearings adjacent to tall forest. Most numerous in lowlands up to c. 500 m, although recorded to 1500 m in Costa Rica; to 1000 m locally in Colombia, 700 m in W Ecuador and c. 1000 m in Peru.

Food and Feeding. Feeds heavily on mistletoe berries (Loranthaceae); also small fruits, and insects. Seen singly, in pairs, and sometimes in varying-sized groups that may be composed mostly of males or female-plumaged birds, groups tending to wander over large areas and usually staying in forest canopy. Spends long periods of time in or near clumps of mistletoe, sometimes in association with other members of genus; also regularly follows mixed-species flocks in canopy, where it takes small fruits and searches for insects by hopping or sidling along, or executing "about-face" turns as it hops, especially, along bare, thin twigs, mostly on outer branches. Has habit of frequently wagging partly spread tail to one side.

Breeding. Breeding reported in Feb–Jul in Costa Rica; two broods sometimes attempted. Nest much like that of congeners, globular with small circular side entrance, composed mostly of green moss, small ferns and orchid roots, lined with fine, pale-coloured plant fibres, located 3–18 m up amid mosses and other epiphytes on large branch of canopy tree. Clutch 3–5 eggs, white, heavily spotted and blotched with brown. No other information.

Movements. Mainly resident. Some early wet-season (Jun) wandering to higher elevations reported in Costa Rica; in W Colombia, upslope movement (to 1050 m) in R Anchicayá Valley in Jun–Aug.

Status and Conservation. Not globally threatened. Widespread and fairly common across Amazonia; local and uncommon in N of range (Central America), e.g. scarce and often irregular in Panama. Populations (mainly Caribbean) in Central America and on Pacific slope in SW Costa Rica and adjacent SW Panama much less numerous and now local, e.g. there appear to be no recent lowland records from heavily deforested lowlands of W Panama; elsewhere in Panama the species is scarce and often irregular in occurrence. Extensive deforestation in portions of NW Colombia suggest that populations there are now fragmented and in decline, and all populations W of Andes are worthy of investigation. Found in numerous protected areas in Amazonia, and faces no serious threats in this region.

Bibliography. Anderson *et al.* (1998), Carriker (1910), Clark (1913b), Davis (1972), Dunning (1982), Eisenmann (1955), Fry (1970), Garrigues & Dean (2007), Haverschmidt & Mees (1994), Hilty (1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Jahn *et al.* (2002), Land (1970), Pinto (1944b), Remsen (1976), Remsen *et al.* (1987), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg (2000c), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1972, 1976), Slud (1964), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Willis (1977, 1980), Zimmer (1943a).

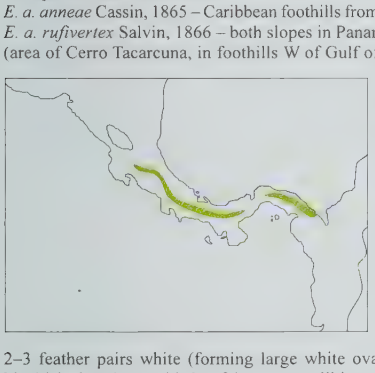
232. Tawny-capped Euphonia

Euphonia anneae

French: Organiste à couronne rousse **Spanish**: Eufonia Coronirrufa
German: Braunscheitelorganist

Taxonomy. *Euphonia Anneae* Cassin, 1865, Santa Rosa, Costa Rica.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a superspecies with *E. xanthogaster*. Two subspecies recognized.

Subspecies and Distribution.
E. a. anneae Cassin, 1865 – Caribbean foothills from Costa Rica E to W Panama (Volcán de Chiriquí).
E. a. rufivertex Salvin, 1866 – both slopes in Panama (from Veraguas) E to extreme NW Colombia (area of Cerro Tacarcuna, in foothills W of Gulf of Urabá).



Descriptive notes. 11 cm; three birds from Panama 14·4–15·4 g (mean 14·9 g). Relatively small euphonia with thick bill. Male nominate race has most of crown rich rufous-chestnut, rest of head down to foreneck, and upperparts, including upperwing-coverts, glossy blue-black, nape, back, shoulders and wing-coverts strongly glossed purplish; flight-feathers dusky, edged dark blue, basal half of inner webs of most flight-feathers white, uppertail dark blue-black; breast to most of belly rich yellow, centre of rearmost belly and undertail-coverts white, underwing-coverts white; underside of tail dark grey, middle half of inner webs of outer 2–3 feather pairs white (forming large white oval on each side of tail); iris brown; bill dusky blackish, basal two-thirds of lower mandible greyish; legs horn-grey. Female has forecrown contrastingly dull rufous fading to grey nape and olive sides of crown; upperparts, including wing-coverts, olive-green, primary coverts duskier, flight-feathers and tail dusky, edged olive-yellow; chin, side of head and side of throat yellowish, tinged olive, centre of throat, breast and belly grey to greyish-white, becoming bright olive-yellow on sides, yellowish on flanks, and buff to ochre on belly and undertail-coverts. Immature is much like female, but duller. Race *rufivertex* male is very similar to nominate, but slightly smaller, and underparts, especially centre of chest, more orange-tinged, female very like nominate, but deeper grey underparts and less yellowish on flanks. Voice. Pair-members continually utter a thin, sharp "chip" when attending nest. Long, sustained song typically a note or phrase repeated 2–4 times before changing, e.g. "whee whee whee, wheer wheer, nah-a-a-ak, nah-a-a-ak, eeeenk eeenk eeenk, seeet seeet..." and so on, some phrases sputtering, others perhaps imitative; lacks metallic rolling or trilled notes prominent in songs of *E. imitans* and *E. gouldi*; also lacks the loud whistled notes of many of the "black-and-yellow" euphonias.

Habitat. Mainly dense humid and wet pre-montane and montane forest (cloudforest), forest borders, tall second-growth woodland, treefall gaps, and crowns of small to large trees in clearings. Mostly 600–1700 m in N half of Caribbean slope of Costa Rica; 900–2000 m in S half of Caribbean slope. Outside breeding season may wander to as low as c. 300 m; extreme records at 50 m and 2100 m likely to refer to vagrants or wanderers.

Food and Feeding. Mainly small berries, including mistletoe (Loranthaceae), various species of melastome, figs (*Ficus*), Ericaceae, and especially *Anthurium*; also insects. Often mashes berries and discards skins before swallowing pulp. Found in pairs and small groups, occasionally singly, and often with mixed-species flocks containing *Tangara* tanagers. Forages mainly in canopy and higher levels of forest, sometimes lower along forest borders and gaps. Spends a small amount of time in searching surface of small, high, bare twigs for insects.

Breeding. Season reported as Mar–Jun in Costa Rica; a laying female in Mar in Panama. Nest a globular structure with small side entrance much like that of congeners, composed of mosses and fibres, usually placed in cranny on epiphyte-laden branch or in moss on hanging vine, or similar site; nests recorded 8–11 m up at forest edge. No other information.

Movements. Mainly resident. Some seasonal movements to higher or lower elevations outside breeding season.

Status and Conservation. Not globally threatened. Restricted-range species: present in Central American Caribbean Slope EBA and Darién Lowlands EBA. Common in Costa Rica; apparently local and less numerous in Panama. Occurs in a few protected areas, among them Braulio Carillo and Tapantí National Parks (Costa Rica), Santa Fé, Soberanía, Chagres and Darién National Parks (Panama) and Los Katíos National Park (Colombia). Although deforestation within its range is extensive and ongoing, some large tracts of intact forest remain locally, although unprotected, these are likely to provide a buffer against near-term risk.

Bibliography. Carriker (1910), Davis (1972), Eisenmann (1955), Garrigues & Dean (2007), Haffer (1975), Hilty & Brown (1986), Isler & Isler (1999), Restall *et al.* (2006), Ridgely & Gwynne (1989), Ross & Whitney (1995), Salaman *et al.* (2008), Slud (1964), Stiles & Skutch (1989), Strauch (1977), Wetmore *et al.* (1984), Wolfe *et al.* (2009).

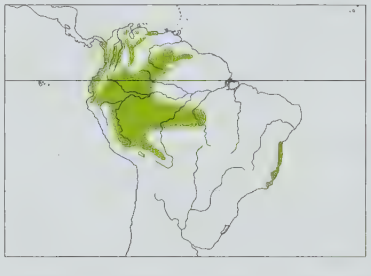
233. Orange-bellied Euphonia

Euphonia xanthogaster

French: Organiste à ventre orange **German**: Gelbbauchorganist **Spanish**: Eufonia Ventrinaranja
Other common names: Black-throated Euphonia ("*E. vittata*")

Taxonomy. *E.* [*uphone*] *xanthogaster* Sundevall, 1834, Rio de Janeiro, Brazil.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a superspecies with *E. anneae*. Described taxon *E. vittata* believed to have been a hybrid between present species and *E. pectoralis*. Nominate race, geographically remote from all others, may be better kept apart as a monoptypic species; among other races, geographical differences in voice, in particular of W Amazonian *dilutior* and *brunneifrons* when compared with Andean races, suggest that more than a single species may be involved; in contrast, proposed race *lecroyana* (described from R Chiquito in Táchira, Venezuela) is better lumped with *badissima* due to minimal differences; several other races are poorly differentiated and seem barely recognizable; thorough taxonomic review required. Race *oressinoma* intergrades with *badissima* in N Colombia (W of Ocaña, in Norte de Santander). Eleven subspecies currently recognized.

Subspecies and Distribution.
E. x. chocoensis Hellmayr, 1911 – extreme E Panama (Cerro Pirre, Altos de Quía, Cerro Sapo and R Jaqué) and Pacific Colombia W of Andes (S from Chocó) S to NW Ecuador (N Esmeraldas, Imbabura).
E. x. quitensis (Nelson, 1912) – W Ecuador (S from Pichincha) and NW Peru.
E. x. exsul Berlepsch, 1912 – NE Colombia (Boyacá; N end of Sierra de Perijá), and N cordilleras of Venezuela from Carabobo E to Miranda (Cerro Negro) and N Monagas (Caripe).
E. x. badissima Olson, 1981 – Perijá Mts (Colombia–Venezuela border) and Andes of Venezuela (Lara S to Táchira) and adjacent Colombia (Norte de Santander and Boyacá).
E. x. oressinoma Olson, 1981 – W & C Andes of Colombia (and once on W slope of E Andes in Santander).
E. x. brevirostris Bonaparte, 1851 – E Colombia (upper Magdalena Valley; generally E of Andes from Norte de Santander S to Meta) S to E Ecuador and E Peru (W of Ucayali Valley), E to S Venezuela, C Guyana and NW Brazil (R Uaupés, Tahuapunto).
E. x. dilutior (J. T. Zimmer, 1943) – SE Colombia and NE Peru (Ucayali Valley).
E. x. cyanonota Parkes, 1969 – W & C Brazil from R Juruá (João Pessoa; Lago Grande) and R Purús to R Tapajós.
E. x. brunneifrons Chapman, 1901 – SE Peru (Cuzco and Puno).
E. x. ruficeps d'Orbigny & Lafresnaye, 1837 – Bolivia (La Paz and Cochabamba).
E. x. xanthogaster (Sundevall, 1834) – coastal E Brazil (C Bahia S to C Rio de Janeiro).



Descriptive notes. 9–11 cm; 9–16 g. Variable species with thick, stubby bill. Male nominate race has forehead to slightly beyond mid-crown deep yellow, rest of head and nape glossy blackish, throat purplish-black; upperparts, including upperwing-coverts and flight-feathers, glossy blue-black; uppertail blue-black; breast and lower underparts yellow, belly tinged ochre (not conspicuous); underwing-coverts white; tail grey below, inner webs of several pairs of outer feathers white (forming large white oval-shaped area on each side of undersurface); iris brown; bill mostly black, lower mandible blue-grey with dark tip; legs dark grey. Female has forecrown olive-yellow, mid-crown olive, and distinctly contrasting grey on hindcrown and nape; upperparts olive, upperwing-coverts olive to dusky, edged olive, primary coverts dusky, flight-feathers and tail dusky, feathers edged olive; side of head olive, throat, chest and median underparts grey, contrasting with olive to olive-yellow sides and flanks; belly and undertail-coverts, tinged buff. Subadult male is like female, but by end of first year acquires black mask and sometimes varying amounts of black on head; apparently acquires adult plumage by end of second year. Races differ mainly in colour and pattern of plumage, especially of male, first six

On following pages: 234. Rufous-bellied Euphonia (*Euphonia rufiventris*); 235. Chestnut-bellied Euphonia (*Euphonia pectoralis*); 236. Golden-sided Euphonia (*Euphonia cayennensis*).

below having yellow forehead (like nominate), last four having rufous forehead: *chocoensis* differs from nominate in smaller size, yellow underparts only faintly tinged ochraceous; *oressinoma* is similar to previous in colour, but larger (wing longer, usually more than 63 mm, as opposed to less than 60 mm), bill larger; *brevirostris* male differs from preceding two in having forehead and lower underparts darker, more ochraceous (less yellow), cap plusher, more velvety, without noticeable dark bases of feathers, and bill smaller than *oressinoma*; *quitensis* male has larger yellow cap and darker ochraceous underparts than *oressinoma*; *dilutior* male is much like *brevirostris*, but wing shorter and yellow colours paler, female differs from *brevirostris* in greyer breast (also shorter wing); *cyanonota* male is most like last, but upperparts steel-blue, rather than strongly violaceous, with violaceous only on nape (violaceous colour extends from nape to uppertail-coverts on *dilutior*), and forehead patch possibly does not extend so far back on crown; *brunneifrons* male has forehead patch rufous, is distinctively ochraceous yellow below; *exsul* male has rich orangish-chestnut forecrown, and breast and mid-line of belly very deep fulvous (almost chestnut), female rich buff from breast to undertail-coverts and forecrown tinged chestnut (not yellowish); *badissima* is much like previous, but male has chestnut of forecrown darker, less orangish, and fulvous portions of underparts darker and somewhat more extensive, female forecrown darker and more restricted; *ruficeps* male is very like last, but underparts less deep fulvous. Voice. In Colombia and Venezuela call a nasal, gravelly "nay nay" or nasal, complaining "chee dee" (2–4 notes); song a rambling disconnected "deeu deeu...deet deet deet... jew jew... chu chu chu...jew, ju-du-du-du..." and so on. Elsewhere over range has several different vocalizations, and, in particular, lowland birds of W Amazonia seem to have an almost completely different repertoire of calls and songs, lacking the nasal "nay nay" and other nasal notes of Andean birds; those in foothills in SE Peru differ yet again. Significance of these regional vocalizations (dialects?) has not been examined, but might be worthy of study; some are dramatically different, suggesting that some form of vocal isolation may be occurring.

Habitat. In all areas occurs in humid and wet forest, along forest borders, gaps, treefalls, and in scattered trees in humid clearings. In Andes also in pre-montane and montane rainforest (cloudforest), as well as along wooded borders and in shady plantations. In Amazonia found in both *várzea* and *terra firme* forest, and at least in some areas (e.g. Loreto, in Peru) mainly in forest or older second growth, less in clearings, and scarce or absent on river islands and in young river-edge vegetation. In Venezuela confined to foothills and mountains, mostly 900–1500 m in coastal cordillera, 350–2250 m elsewhere; in Colombia elevational ranges vary from sea-level on Pacific coast to mountains above 300 m (mostly 1300–2100 m in NE Colombia), in Ecuador in lowlands on both sides of Andes and locally to at least 1500 m; in Peru occurs in Amazonian lowlands, and on E slope of Andes to c. 2000 m; widespread in lowlands of W Amazonian Brazil; locally on coast and in mountains of E Brazil from Bahia S to Rio de Janeiro.

Food and Feeding. Fruits and berries; some insects, also spiders (Araneae). Contents of five stomachs were vegetable matter, including mistletoe berries (Loranthaceae) and fig (*Ficus*) fruits. In study in Colombia (R Anchicayá at 900–1100 m, in W Valle), recorded as eating more than 40 species of fruit (89% of all feeding records); melastome fruits of various species comprised 56% of all fruit eaten, *Miconia* berries accounting for 73% of all melastome fruits eaten; also took fruiting spikes of arums (Araceae; 11%), fruits of epiphytes and mistletoe (10%), and catkins of *Cecropia* (8%). Flowers (or flower parts), including catkin-like flower buds of arums and flowers of melastome *Topobea brachyura*, comprised 6% of all feeding records; insect captures comprised 5% of foraging records. Usually occurs in pairs, and in almost all areas pairs are regular members of mixed-species flocks in canopy or upper levels of forest, also sometimes much lower; also readily comes to favourite fruiting trees or shrubs with other frugivores, especially *Tangara* tanagers and other euphonias. In lowland forest found primarily in canopy, but regularly lower along forest borders; in Andes often forages at lower levels. In W Valle (Colombia) study, foraged from about eye level in bushes to canopy, but more at intermediate levels inside forest, where median foraging height was c. 4·5 m (295 observations). Typically perched on branches or twigs, occasionally hovered to take small fruits (3–8 mm in size), and clung to fruiting spikes or picked at capsules of large fruits. Captured insects mostly by sallies or flutter-pursuits to air; noted also as picking insects and/or spiders (Araneae) from spider webs, and occasionally reached up, stretching, to take small insect prey from a leaf surface or a petiole. Foraging records from Peru and Bolivia similar, but median foraging height was c. 9 m (31 records).

Breeding. In Colombia, seven nests in Nov–Apr in W Valle and birds in breeding condition in May–Jul in Perijá Mts; adult feeding young in Nov in C Peru (Pasco), and fledglings at two sites mid-Feb to early Mar in SW Ecuador (El Oro; Loja). Nest a domed (covered) grass-and-moss structure with side entrance, usually a few metres above ground. Male may breed when in subadult (mostly greenish) plumage. No other information.

Movements. Primarily resident. Some seasonal wandering has been noted, but no significant movements reported.

Status and Conservation. Not globally threatened. Widespread and generally common W of Andes and in Amazonian lowlands. Occurs in many protected areas; found also in many unprotected sites that appear not to be at at risk, at least in the short term. Isolated nominate race in SE Brazil occurs in a region now heavily deforested; this population should be monitored closely.

Bibliography. Angehr *et al.* (2004), Aveledo Hostos & Pérez Chinchilla (1994), Best *et al.* (1996), Davis (1972), Donegan & Dávalos (1999), Dunning (1982), Haffer (1970), Hilty (1997, 2003, 2009a), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), McCarthy (2006), Meyer de Schauensee (1964, 1966, 1970a), Miller (1963), Moore *et al.* (1999), Morton (1979a), Munn & Terborgh (1979), Olivares (1969), Olson (1981b), Ottavio *et al.* (2008), Phelps (1954), Remsen (1976), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schäfer & Phelps (1954), Schulenberg (2000a), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Terborgh & Weske (1969), Walker (2001), Weske (1972), Wetmore (1939), Zimmer (1943a).

234. Rufous-bellied Euphonia

Euphonia rufiventris

French: Organiste à ventre roux **German**: Rotbauchorganist **Spanish**: Eufonia Ventrirrufa

Taxonomy. *Tanagra rufiventris* Vieillot, 1819, locality unknown = Iquitos, Peru.

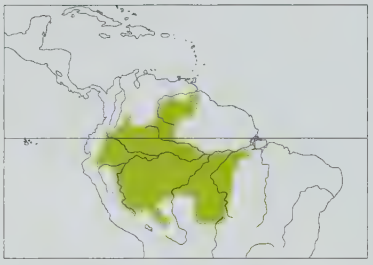
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a superspecies with *E. pectoralis* and *E. cayennensis*. Two subspecies recognized.

Subspecies and Distribution.

E. r. carnegiei Dickerman, 1988 – S Venezuela S to headwaters of rivers Orinoco, Ventuari, Cauca, Paragua and Cuyuní.

E. r. rufiventris (Vieillot, 1819) – E Colombia S to E Ecuador, SE Peru (Carabaya) and N Bolivia (R Surutú, in Santa Cruz), and Amazonian Brazil (E to R Negro and vicinity of R Xingu).

Descriptive notes. 10 cm; 13–18 g. Smallish euphonia with short, stout bill, male distinctive in having no yellow forehead patch and no white in tail. Male nominate race has head to throat and centre of chest and entire upperparts, including shoulder and upperwing-coverts, glossy dark steel-blue; flight-feathers and tail dusky, edged and tinged dark steel-blue; rest of underparts orange, this



colour extending up on side of chest, where more golden-yellow; golden-yellow pectoral patch (usually hidden beneath wing); iris dark brown; upper mandible and tip blackish, cutting edge of upper mandible and all except tip of lower mandible pale blue-grey; legs dark grey. Female is darkish olive above, with yellowish tinge on forehead and greyish on nape; chin yellowish, throat and underparts mostly grey, sides and flanks olive-yellow, undertail-coverts contrastingly tawny. Juvenile undescribed. Race *carnegiei* male differs from nominate in darker blue upperparts and darker tawny on lower underparts (belly, flanks, undertail-coverts), female overall darker, more olive (less yellow-green), than nominate, and often with weak metallic blue gloss on upperparts. Voice. Commonest call a rough, low-pitched rattle, "j'a'a'a'a, j'a'a'a'a, j'a'a'a'a", the series varying from two to six rattles, and with gravelly quality; at a distance could be mistaken for a large cicada (Cicadidae). Song not definitely described, but two female-plumaged birds in top of 30-m tree gave what was possibly a duet; one gave a series of "zeet" notes, the other "zit-zit, wit-wit, what-eeeee" ("wit" notes lower-pitched), this short series repeated over and over for several minutes, the two birds turning first one way, then the other, and flicking tail from side to side.

Habitat. Canopy of humid and wet *terra firme* and *várzea* forest, and regularly found along forest borders, tall second-growth woodland and occasionally tall shade trees in humid clearings. Lowlands to 1100 m on tepuis of S Venezuela; elsewhere mainly lowlands up to c. 500 m; in small numbers in foothills to 700–900 m in Ecuador and to 1000 m in Peru.

Food and Feeding. Variety of small fruits and berries, including mistletoe berries (Loranthaceae). Contents of four stomachs were vegetable matter, including fruit pulp and *Cecropia* seeds. Most often mashes fruit before swallowing. Most often seen alone or in pairs (seldom small groups), and a regular member of mixed-species flocks in canopy of lowland rainforest; in general not particularly conspicuous, perhaps because it usually stays so high. Often twitches tail to one side. Only infrequently associates with other members of its genus around mistletoe clumps. Forages mostly in canopy or subcanopy, and spends much time in and around epiphytes, including especially large bromeliads, high in canopy and in emergent trees. Noted as taking small berries from a large bromeliad c. 34 m up in canopy in NE Peru.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common, and widespread across W & C Amazonia. Occurs in numerous protected areas, and its range encompasses extensive intact forest habitat that, while unprotected, faces little or no threats in the short term.

Bibliography. Dickerman (1988), Dunning (1982), Gilliard (1941), Haffer (1970), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Laubmann (1936), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Naumburg (1930), O'Neill (1974), Parker *et al.* (1982), Pearson (1977), Remsen *et al.* (1987), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schubart *et al.* (1965), Schulenberg (2000c), Schulenberg *et al.* (2007), Sick (1985, 1993), Snethlage (1914), Souza (2002), Terborgh & Weske (1969), Zimmer (1943a).

235. Chestnut-bellied Euphonia

Euphonia pectoralis

French: Organiste à ventre marron **Spanish**: Eufonia Ventricastaña

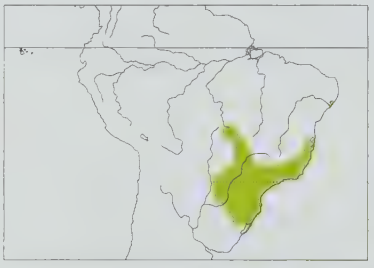
German: Braunbauchorganist

Other common names: Black-throated Euphonia ("*E. vittata*")

Taxonomy. *Pipra pectoralis* Latham, 1801, Rio de Janeiro, Brazil.

Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a superspecies with *E. rufiventris* and *E. cayennensis*. Described taxon "*E. vittata*" believed to have been a hybrid between present species and *E. xanthogaster*. Monotypic.

Distribution. E & SE Brazil (Alagoas; C Mato Grosso and S Bahia S to Santa Catarina), adjacent E Paraguay and NE Argentina (Misiones).



Descriptive notes. 11 cm; 15–16·5 g. Rather small euphonia with thick bill, male distinctive in having no yellow forehead patch and no white in tail. Male has head to breast and entire upperparts, including upperwing-coverts, highly glossed metallic blue; flight-feathers and tail dusky, edged and tinged metallic blue (less so on primaries); belly and lower underparts dark chestnut except for metallic blue thighs, golden-yellow pectoral tuft often protruding beneath wing; iris dark brown; tip and variably rest of upper mandible blackish, cutting edge of upper mandible most of lower mandible blue-grey; legs dark grey. Distinguished from similar *E. rufiventris* mainly by much darker coloration, especially on lower underparts. Female has forecrown dull yellowish, rest of crown to central nape grey, upperparts olive; mostly grey below, sides and flanks yellow-olive, vent and undertail-coverts dark rufous. Juvenile undescribed. Voice. Call a series of up to five coarse, low-pitched rattles, "j'a'a'a'a, j'a'a'a'a, j'a'a'a'a...", delivered rather slowly; much like that of *E. rufiventris*. Song a short, harsh series of warbled notes that may include imitations of other birds.

Habitat. Canopy of humid forest, along forest borders and in tree-scattered clearings. Sea-level to 1550 m in mountains in SE Brazil; lowland in adjacent NE Argentina.

Food and Feeding. Small fruits, including those of melastomes, epiphytes, epiphytic cacti, *Cecropia*, palms, and *Solanum*; observed also to take small arthropod prey from bark surfaces. Seen to probe at flowers for nectar and/or insects, and to take sugar water from hummingbird (Trochilidae) feeders. Usually singly, in pairs or in small groups, and regularly with mixed-species flocks. Forages from middle heights to canopy; often perches in the open, or in open trees such as *Cecropia*, where it is active and easily seen. Behaviour in general similar to that of *E. rufiventris*, although can be more conspicuous.

Breeding. Breeding reported in Jan in SE Brazil (Rio de Janeiro) and Aug in Paraguay. Dome-shaped nest with small side entrance, made from mosses and ferns, much like those of congeners,

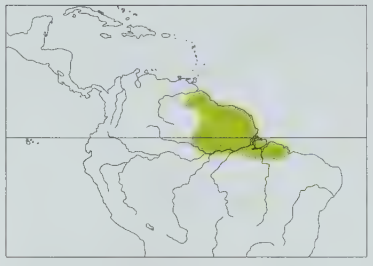
c. 2 m or a bit higher above ground and concealed on side of trunk, in suspended roots of epiphytic fern, amid epiphytes on large limb or in branches of bush; two were in niche on steep bank. One nest contained 3 eggs. No other information.
Movements. Resident. Reports that this species may wander or undertake seasonal elevational movements in part of range need confirmation.
Status and Conservation. Not globally threatened. Fairly common and widespread in SE Brazil and in extreme NE Argentina and E Paraguay. Deforestation extensive over most of its range, but generally numerous in remaining forests. Occurs in a number of protected areas, e.g. Iguazú National Park (Argentina) and adjacent Iguaçu National park (Brazil); and Itatiaia, Serra dos Órgãos and Tijuca National Parks, Augusto Ruschi (Nova Lombardia) Biological Reserve and other protected areas in coastal Atlantic range. Relatively little intact habitat remains outside protected areas.
Bibliography. dos Anjos & Schuchmann (1999), Belton (1985), Bertoni (1901, 1919), Davis (1945b, 1946), Descourtilz (1852), Diamond & Lovejoy (1985), Dunning (1982), Haffer (1970), Holt (1928), Isler & Isler (1999), McCarthy (2006), Narosky & Di Giacomo (1993), Nitzsche (1994), Parker & Goerck (1997), de la Peña & Rumboll (1998), Ridgely & Tudor (1989, 2009), Rocca & Sazima (2008), Sick (1985, 1993), Snethlage & Schreiner (1929), Souza (2002), Willis (1979).

236. **Golden-sided Euphonia**

Euphonia cayennensis

French: Organiste nègre **German**: Cayenneorganist **Spanish**: Eufonia Negra

Taxonomy. *Tanagra cayennensis* J. F. Gmelin, 1789, Cayenne, French Guiana.
Recent molecular-genetic analysis indicates that genus belongs in family Fringillidae. May form a superspecies with *E. rufiventris* and *E. pectoralis*. Monotypic.
Distribution. SE Venezuela (E Bolívar), the Guianas, and NE Brazil from Manaus E (on both sides of R Amazon) to Pará and N Maranhão.
Descriptive notes. 11 cm; 11·8–16 g. Smallish, relatively short-tailed, stout-billed euphonia, male distinctive with almost wholly dark plumage. Male is entirely dark glossy steel-blue above and below, including wing-coverts and entire underparts; flight-feathers and tail dusky, edged and tinged dark steel-blue; long golden-yellow feathers of pectoral patch usually protrude conspicuously in front of and below bend of wing; iris dark brown; upper mandible blackish, with blue-grey along basal half, lower mandible blue-grey with blackish tip; legs dark grey. Female has forehead tinged yellowish, otherwise crown and entire upperparts olive; underparts, including belly and undertail-coverts, almost entirely grey, with olive-yellow on sides and flanks. Juvenile undescribed. Voice. Call a low, coarse, gravelly "j'a'a'a'a" repeated 2–6 times, sometimes quickly; almost identical to



that of *E. rufiventris*. Also gives longer, faster, and buzzy rattle, "bjjjjjjjjjjjjjjjjj", c. 2 seconds, and a higher, softer and nasal "ruee-e-et", run together and rather like that of several other members of genus. A possible duet consisting of a short flat whistle and series of short "tu" notes, along with burry notes in random order, has been reported.
Habitat. Occurs in canopy of humid lowland forest and forest borders, in some areas also in scrubbier, drier, and lower-canopied patches of savanna forest, as well as second growth. Found in lowlands up to c. 600 m, locally up to 1100 m.
Food and Feeding. Food is not well documented; mostly small berries and fruit, and probably some insects. Two stomachs contained only berries. Often encountered singly or in pairs, much less frequently in small groups; wanders alone or sometimes associates with other euphonia species or mixed-species flocks in canopy or upper levels of rainforest. Sometimes comes quite low to small fruiting shrubs along forest borders. Often wags or twitches its tail to one side, or from side to side in mechanical fashion. Not regularly seen around mistletoe (Loranthaceae), but does take eat mistletoe berries on occasion.
Breeding. Breeding recorded in Nov in Brazil (Pará). Nest in Brazil rounded or covered and with side entrance, much like those of congeners, made from moss and root fibres, lined with fine vegetable fibres, placed 1 m up; two reported cases of use of abandoned tyrant-flycatcher (Tyrannidae) nest, one a nest of Ochre-bellied Flycatcher (*Mionectes oleagineus*) located inside forest, the other of a *Myiozetetes* species c. 1 m up in fruit tree in second growth. Clutch 3–5 eggs, whitish with a few red spots; female observed to be incubating in the *Myiozetetes* nest. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common; in most areas present at low density. Occurs in several large protected areas, including Canaima National Park (Venezuela), Kaieteur National Park and Iwokrama Forest Reserve (Guyana), Brownberg Nature Park and Raleighvallen/Voltsberg Nature Reserve (Suriname); Guyana Amazonian Park (French Guiana), and Montanhas do Tumucumaque National Park (Brazil). In addition, the species' range includes large amounts of intact unprotected forest that is at little immediate risk.
Bibliography. Beebe (1916), Boesman (1998), Gilliard (1941), Haffer (1970), Haverschmidt & Mees (1994), Hilty (2003), Ingels (1975), Isler & Isler (1999), Layard (1873), Meyer de Schauensee & Phelps (1978), Novaes (1970), Pinto (1944b), Restall *et al.* (2006), Ridgely & Tudor (1989, 2009), Sick (1985, 1993), Snethlage (1935a), Snyder (1966), Souza (2002), Tostain *et al.* (1992), Willis (1977).



Genus *CHLOROPHONIA* Bonaparte, 1851

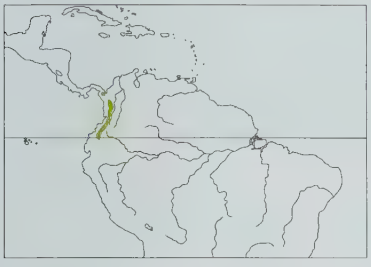
237. **Yellow-collared Chlorophonia**

Chlorophonia flavirostris

French: Organiste à col jaune **German**: Halsbandorganist **Spanish**: Clorofonia Acollarada
Other common names: Yellow-collared Tanager

Taxonomy. *Chlorophonia flavirostris* P. L. Sclater, 1861, locality unknown, possibly west Ecuador. Genus has sometimes been merged with *Euphonia*; recent molecular-genetic analysis indicates that both genera belong in family Fringillidae. Two races proposed, *minima* (described from La Guayacana, in Nariño) and *boehmi* (based on aviary bird, origin uncertain), but nomadic behaviour of this species suggests that recognition of geographical races is problematic. Treated as monotypic.

Distribution. Extreme E Panama on Cerro Pierre (once), W slope of W Andes of Colombia from Risaralda–Antioquia border (Alto de Pisones on Cerro Caramanta) S to W Ecuador (S to Pichincha).
Descriptive notes. 10 cm; 11–12·4 g. Small, with short tail, chunky shape, stubby bill and colourful plumage. Male has glistening emerald-green head, throat and chest, prominent yellow eyering (particularly conspicuous against whitish iris), and yellow collar that completely encircles neck (yellow on side of neck often hidden beneath bend of wing); upperparts and upperwing-coverts glistening emerald-green, rump and uppertail-coverts bright yellow; flight-feathers dusky, edged emerald-green, tertials and tail extensively green; narrow partially concealed line of chestnut on side of chest, separating green of bib from bright yellow centre of breast, belly and undertail-coverts; sides and flanks bright green; iris greyish-white; bill bright orange to salmon-orange; legs bright orange. Female is mainly uniformly grass-green (duller than male), flight-feathers dusky, edged green, tertials and tail extensively grass-green, centre of breast fading to yellow, and belly and undertail-coverts bright yellow; bill and eyering similar to those of male but duller, eyering and pale iris conspicuous. Immature resembles female, but bare parts even duller; age stages and plumage sequence unknown (most flocks composed predominantly of individuals in female-like plumage). Voice. A rather quiet species, uttering soft "pek" notes when foraging. In flight, also occasionally when perched, a soft, plaintive "peeeeeeee", often repeated over and over. A weak chattering vocalization is possibly a song.



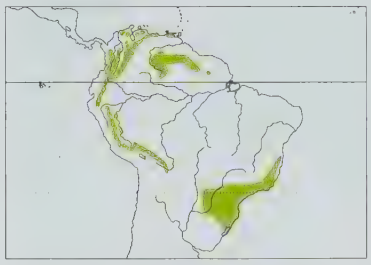
Habitat. Found mainly in canopy of humid to very wet (pluvial) lowland and pre-montane forest, along forest borders and in taller, older second-growth woodland, especially on steep slopes. Although regularly occurs down to edge of coastal plain in Pacific Colombia, seems not to range widely in lowland forest and is perhaps only seasonal or local there. Lowlands (c. 100 m) to 1900 m (most records from near base of foothills to c. 1200 m) in Colombia; c. 450–1500 m in Ecuador.
Food and Feeding. Almost exclusively small berries and fruit; recorded as eating at least those of nine species, figs (*Ficus*) comprising 40% of all fruit records, *Miconia* berries 37%, and documented as feeding also on fruiting stalks of *Schefflera* (Araliaceae). In one study, observed to capture insect prey only twice in 82 observations. One stomach contained only fluid. Occurs mainly in pairs or parties of 3–7 individuals that forage alone or associate for varying amounts of time with mixed-species flocks containing other tanagers. In Colombia, gathers seasonally in much larger flocks of up to 30 individuals, rarely of more than 100, composed mostly of birds in female-like plumage, which move mostly independently of mixed-species flocks. Also often comes to favourite fruiting trees to forage when other tanagers and small frugivores are present, sometimes remaining well after other species have departed. Forages mostly in crowns of tall trees; median foraging height c. 14 m. When foraging, perches rather horizontally on branch or twig, moves in active but deliberate fashion in outer foliage, and hops from branch to branch to locate small berries; takes these mainly while perched, occasionally snatches them in flight. Noted as perching on large fruits. Observed to hang downwards from a leaf petiole to peer beneath a leaf when apparently searching for insects.
Breeding. In Colombia, nest being built in Apr at Cerro Caramanta (c. 1550 m), on Risaralda–Antioquia border, dome-shaped, 8 m up in fork of small dead tree; another under construction in early May in Pialapi Valley (1740 m) forest border, in SW Nariño, male accompanied female, only female carried material, closed nest of moss and grass with side entrance, placed c. 14 m up in canopy and near trunk of mossy *Alchornea* (Fabaceae). No other information.
Movements. Wanders both horizontally and elevationally; at times disperses in pairs or small groups, at other times gathers in large flocks. Movements believed to be primarily over short distance; altitudinal movements may be seasonal. In Anchicayá Valley (1050 m), in Colombia, present in all months but numbers varied dramatically; Jun–Jul flocks of 30–80 in valley foothills at 100–200 m. In Ecuador, believed to be present mainly Dec–Apr in vicinity of Chiriboga road and near Mindo.
Status and Conservation. Not globally threatened. Restricted-range species: present in Darién Highlands EBA and Chocó EBA. Uncommon to common locally or seasonally. This species was virtually unknown in the wild three or four decades ago; despite bright plumage, easily overlooked because of soft calls and habit of remaining within foliage. Occurs in a few protected areas, including Farallones de Cali National Park and possibly El Pangán Bird Reserve, both in Colombia. Has small global range, and deforestation has reduced, and continues to reduce, the amount of habitat available to it, especially in departments of Cauca and Nariño, in Colombia, and in adjacent Ecuador. While the population may not, at present, qualify for threatened status, this species should be monitored.
Bibliography. Buchi (1984), Burns (1997a), Burns *et al.* (2002, 2003), Capparella (1986), Dunning (1982), Gyldenstolpe (1941a), Hesse & Hesse (1982), Hilty (1977, 2009a), Hilty & Brown (1986), Ingels (1979), Isler & Isler (1999), Moore *et al.* (1999), Restall *et al.* (2006), Ridgely (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Strewe (2001a).

238. **Blue-naped Chlorophonia**

Chlorophonia cyanea

French: Organiste à nuque bleue **German**: Grünorganist **Spanish**: Clorofonia Nuquiazul
Other common names: Blue-naped Tanager

Taxonomy. *Pipra cyanea* Thunberg, 1822, locality uncertain, possibly Rio de Janeiro, Brazil.
Genus has sometimes been merged with *Euphonia*; recent molecular-genetic analysis indicates that both genera belong in family Fringillidae. Nominate race extremely isolated geographically; other races may be better split off as a distinct species. Races *psittacina*, *frontalis* and *minuscula* are all very similar, and may not warrant subspecific separation. Seven subspecies tentatively recognized.
Subspecies and Distribution.
C. c. psittacina Bangs, 1902 – Santa Marta Mts, in N Colombia.
C. c. frontalis (P. L. Sclater, 1851) – mountains of N Venezuela (Falcón and Lara E to Miranda).
C. c. minuscula Hellmayr, 1922 – mountains of NE Venezuela (Anzoátegui, Monagas and Sucre).
C. c. intensa J. T. Zimmer, 1943 – W slope of W Andes (in Caldas and Valle), in Colombia.
C. c. longipennis (du Bus de Gisignies, 1855) – Andes from W Venezuela (S from S Lara) S generally through Colombian ranges (except W slope of W Andes), Ecuador and Peru to Bolivia (to Cochabamba and W Santa Cruz).
C. c. roraimae Salvin & Godman, 1884 – tepuis of S Venezuela (Amazonas and Bolívar) E to Guyana and in mountains of extreme NW Brazil (R Padauiri, on Venezuela border).
C. c. cyanea (Thunberg, 1822) – SE Brazil (S from S Bahia) S to E Paraguay and NE Argentina (Misiones).
Descriptive notes. 11 cm; 11–15 g. Short-tailed, with chunky shape, stubby bill and colourful plumage. Male nominate race has head, throat and chest glistening emerald-green, bold bright turquoise-blue ocular ring, narrow cobalt-blue nuchal collar, feathers of mantle, scapulars and marginal to median upperwing-coverts green, broadly edged blue, central back to uppertail-coverts blue, lighter and brighter on rump, flight-feathers dusky, edged bright green, tail dusky with green-blue edges; breast and lower underparts bright yellow, underside of tail grey; iris dark brown; bill blackish; legs dark grey. Female is much duller and plainer than male, mainly green, ocular ring and narrow nuchal collar blue, breast and lower underparts dull greenish-yellow. Immature male is similar to female, but may lack blue on nape. Race *roraimae* very similar to nominate but has yellow base of forehead; *longipennis* male similar to nominate but with blue of upperparts extending barely (or not at all) onto scapulars and wing-coverts, underparts brighter yellow; *intensa* very similar to previous, but underparts much duller yellow; races *psittacina*, *frontalis* and *minuscula* all very similar and doubtfully separable, male with lower forehead yellow and back green, but hindneck and rump blue, as in all races, and female dull golden-olive below; *minuscula* is somewhat smaller



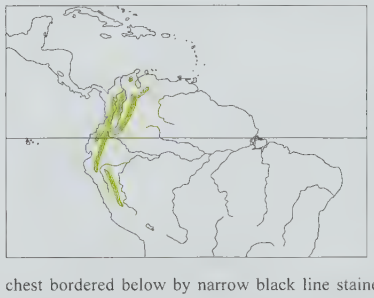
than the other two, with underparts duller in male. Voice. Calls include a soft nasal "ek" or "enk" note, apparently mainly as for contact when birds are perched or foraging; also a soft pleading "pleeeeee" (much like that of *Euphonia cyanocephala*) during foraging, and especially just before taking flight. Other vocalizations include a nasal "peent" and short, gravelly rattle. Song, in all areas, a choppy and rather unmusical series of call notes, liquid whistles, soft notes and sharp or smacking notes at fairly brisk pace.
Habitat. In most areas found mainly in humid and wet pre-montane and montane forest, at forest borders, and in tall or older second-growth woodland, sometimes also in tall trees in clearings; locally in lowlands (near Andes) in W Amazonia and found almost down to sea-level in SE Brazil. In Venezuela, recorded at 700–2500 m in mountains N of R Orinoco and at 500–1800 m in tepuis in S; 600–2100 m (mostly above 1400 m) in Colombia, and mainly 800–1700 m (one record in E lowlands possibly involved a vagrant) in Ecuador; mainly 900–2100 m in Peru, but at least seasonally ranges out into Amazonian lowlands of SE, where small numbers as low as 300 m.
Food and Feeding. Almost exclusively fruit; some insects. Takes variety of small berries, especially those of *Miconia*, and in Paraguay takes fruit of *Allophyllus edulis*. Size of fruit recorded in diet ranges from 3 mm to 10 mm; pecks pieces from the larger fruits. Contents of five stomachs were vegetable matter, including mistletoe seeds (Loranthaceae) and other seeds and fruit. Occurs in pairs or, more often, in families or groups up to about twelve individuals. Often spends long periods of time in clumps of mistletoe, moving around relatively little; sometimes moves quite actively, following mixed-species flocks containing *Tangara* and other tanagers. Forages mainly from middle levels to high in canopy, and generally inconspicuous except for occasional soft calls. Has been noted as gleaning for insects on mossy limbs and sallying to foliage. Takes fruit mostly by reaching or leaning over to grasp it while perched.
Breeding. In Colombia, three nests found in May in Santa Marta Mts, nest-building observed Jan and Jun and four begging juveniles in May and Jul in Valle, and twelve birds in breeding condition in Apr and May in N & W; nest-building in Nov in C Peru (Pasco); male and female gathering nest material in late Nov in NE Argentina (Puerto Iguazú). Grassy ball-shaped nest with side entrance, placed in crevice in vertical bank or cliff. Clutch 3 eggs, white, sprinkled with chestnut, more heavily at large end; nestlings fed apparently by regurgitation. No other information.
Movements. Some seasonal movements, especially elevational shifts in mountains; in Peru, individuals present at least Jun–Aug in R Madre de Dios area (near Boca Manu), suggesting some seasonal movement between highlands and lowlands. More information on seasonal movement required.
Status and Conservation. Not globally threatened. Rare to locally fairly common. Widespread in montane regions, although distribution somewhat patchy, with abundance variable. Occurs in numerous protected areas in every country where it occurs. The species' range also includes considerable intact habitat which, although unprotected, is at relatively little risk in foreseeable future. Deforestation in Andean and Atlantic coastal portions of range is the greatest threat to this species. In SE Brazil present in a number of protected areas, among them Augusto Ruschi (Nova Lombardia) Biological Reserve and Itatiaia, Tijuca and Iguaçu National Parks, but in this region relatively little habitat outside protected areas is available to this species.
Bibliography. Álvarez-Rebolledo *et al.* (2003), Barrowclough & Escalante-Pliego (1990), Belton (1985), Bertoni (1901, 1919), Di Giacomo *et al.* (1995), Euler (1900), Fjeldså & Krabbe (1990), Gilliard (1941), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Kleefisch (2011), LaVerde *et al.* (2005), Lysinger *et al.* (2005), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Narosky & Di Giacomo (1993), Ottavio *et al.* (2008), Parker & Goerck (1997), de la Peña & Rumboll (1998), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Salaman, Donegan & Caro (2008), Salaman, Stiles *et al.* (2002), Santos (1948), Schäfer & Phelps (1954), Schulenberg (2000a), Schulenberg *et al.* (2007), Sick (1985, 1993), Snyder (1966), Souza (2002), Todd & Carriker (1922), Wetmore (1939), Zimmer (1943a).

239. **Chestnut-breasted Chlorophonia**

Chlorophonia pyrrhophrys

French: Organiste à ventre brun **Spanish**: Clorofonia Pechicastaña
German: Schwarzbrauenorganist
Other common names: Chestnut-breasted Tanager

Taxonomy. *Euphonia pyrrhophrys* P. L. Sclater, 1851, "Bogotá".
Genus has sometimes been merged with *Euphonia*; recent molecular-genetic analysis indicates that both genera belong in family Fringillidae. Monotypic.
Distribution. Sierra de Perijá (Colombia–Venezuela border), and Andes of W Venezuela (S from Trujillo) S to Colombia (Norte de Santander; locally in W & C ranges), Ecuador (S on W slope to Pichincha, on E slope locally to Loja), and on E slope S to Peru (on Piura–Cajamarca border, and locally from Amazonas S to Huánuco).



Descriptive notes. 12 cm; 16–18 g. Short-tailed, short-billed and chunky, with colourful, strongly marked plumage. Male has base of forehead green, rest of crown and nape rich cyanine-blue, narrowly bordered dark red (often looks black) at front and side; narrow nape band paler blue; lores, ocular area, side of head and neck, and throat and chest glistening emerald-green; mantle, back and upperwing-coverts bright green, rump bright yellow; primary coverts and flight-feathers blackish, edged bright green, tertials mainly green; central tail feathers dusky, narrowly edged green, outer feathers with broader green edgings; green of chest bordered below by narrow black line stained with chestnut (this border sometimes partly concealed); underparts bright yellow, median band down breast and belly and entire undertail-coverts deep chestnut (some males have broader band extending almost to sides and flanks, partly

On following pages: 240. Blue-crowned Chlorophonia (*Chlorophonia occipitalis*); 241. Golden-browed Chlorophonia (*Chlorophonia callophrys*); 242. Puerto Rican Tanager (*Nesospingus speculiferus*).

obscuring the yellow in this area); iris dark brown; bill blackish, base of lower mandible pale grey; legs dark grey. Female is duller than male, and mainly green; crown and nape turquoise-blue, bordered by narrow chestnut line along front and side of crown, with lowermost forehead, lores, side of head (including ear-coverts) and throat and chest bright green; back and rump green (slightly darker than throat), upperwing-coverts dusky, broadly edged and tinged dark green, flight-feathers blackish, basal two-thirds of feathers edged dark green, tertials mostly green; breast and belly dull yellowish, rather sharply cut off from green of throat and chest. Immature is mostly dull green, with breast and belly yellowish. VOICE. Commonest call a soft, nasal "neck-nuur" repeated over and over, or occasionally 3–4 notes in the series; contact call a nasal, downslurred whistle, "teeeur", sweet but penetrating in quality and much like that of *Euphonia cyanocephala*. Song a long, rambling and rather weak series of call notes and various soft, sharp and nasal notes, "tut-tut-tut too-dée too-dée..." or "na-déar, na-déar... to-d'leép", with variations.

Habitat. Humid and wet montane forest, especially heavily epiphyte-laden forest (cloudforest), along forest borders and in older second-growth woodland. Occasionally in stunted forest almost up to tree-line. At 1800–3000 m in Venezuela; 1400–2700 m in Colombia; mostly 1500–2750 m (rarely to 3000 m) in Ecuador; c. 1500–2500 m (most records above 1700 m) in Peru.

Food and Feeding. Mostly berries of mistletoe (Loranthaceae), also berries of various species of Ericaceae, and observed to eat fruit of figs (*Ficus*) in Colombia; occasionally insects. Found mainly in pairs, somewhat less often in families or small groups; much more often independent of mixed-species flocks than with them, and rather infrequently with other birds at fruiting trees. Forages mostly in mossy canopy, often spending long periods of time in large epiphytic clumps and not moving much; occasionally peers at twigs, epiphytes and moss for small insects.

Breeding. Nest-building in Mar in Venezuela. Both sexes observed to bring material, nest apparently a tight, domed structure of tendrils and fibres, with small side entrance, placed in niche c. 6 m up on high wet road bank at forest edge. No other information.

Movements. Resident. Perhaps some local movements in response to food abundance; reported as occurring locally or seasonally to as high as 3000 m in Ecuador.

Status and Conservation. Not globally threatened. Rare to uncommon over most of range. Probably declining. Present in numerous protected areas, including Sierra Nevada National Park (Venezuela), Farallones de Cali National Park and Tambito Nature Reserve (Colombia) and Tingo Maria National Park (Peru). The species' range also includes intact unprotected montane forest, at least some of which appears to be at relatively low near-term risk. Deforestation and the fragmentation of existing montane forest continue to be the two most pressing problems facing this species.

Bibliography. Donegan & Dávalos (1999), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1983, 1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg *et al.* (2007).

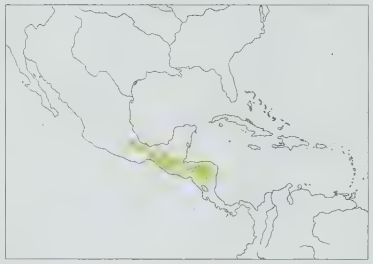
240. **Blue-crowned Chlorophonia**

Chlorophonia occipitalis

French: Organiste à calotte bleue **Spanish**: Clorofonia Coroniazul
German: Blauscheitelorganist
Other common names: Blue-crowned Tanager

Taxonomy. *Euphonia occipitalis* du Bus de Gisignies, 1847, Mexico.
Genus has sometimes been merged with *Euphonia*; recent molecular-genetic analysis indicates that both genera belong in family Fringillidae. Forms a superspecies, and formerly considered conspecific, with *C. callophrys*. Monotypic.

Distribution. E Mexico (from Veracruz) S to N Nicaragua.



Descriptive notes. 13 cm; 25–27·5 g. Short-tailed, with stubby bill, chunky shape and predominantly green-and-yellow plumage. Male has rather small, circular turquoise-blue central crown patch and narrow turquoise-blue nuchal collar; rest of head, throat and chest glistening emerald-green; upperparts, including upperwing-coverts, glistening green (slightly darker than head); primary coverts and flight-feathers black, broadly edged green (wingtips black), tertials bright green; tail green above, grey below; black and chestnut line along lower border of chest (often partly concealed); breast, belly and undertail-coverts bright yellow, yellow extending up narrowly in front of bend of wing; sides and flanks green; iris light brown to brown; upper mandible dusky with some pale bluish-grey at base, lower mandible pale bluish-grey with dusky tip; legs dark grey. Female has crown patch turquoise-blue, as on male, and narrow nuchal band light cerulean-blue, both areas of blue less extensive than on male; otherwise mainly glistening green above, wing as on male, mainly green below, becoming yellow on centre of mid-breast and belly, with undertail-coverts yellow. Juvenile is like female, but duller and may lack blue. VOICE. Most common calls include a rather low, nasal "enk" and "enk-it", and a plaintive downward-inflected whistle, "eeeeeee" (described also as a cooing "peeu" or "hoo"), this sometimes preceded by one to several soft liquid "whuit" notes. Song a long, rather breezy series of "turdle-dee" phrases mixed with rougher, lower-pitched "chup" or "dit" notes, which may possibly be delivered in duet.

Habitat. Humid montane forest, shady plantations, and scattered trees in clearings. Recorded at 500–2500 m, mostly 1000–2000 m; reported at nearly sea-level during winter months.

Food and Feeding. Diet believed to be almost entirely fruit; possibly some insects. Feeds heavily on mistletoe berries (Loranthaceae) and other small berries. Usually in pairs when breeding, but at other times in small groups, occasionally up to nearly a dozen, that stay together mostly high in trees and wander in search of food; may gather temporarily with other birds at fruiting trees, but otherwise generally independent of mixed-species flocks. Forages in canopy. Reported as occasionally searching for insects on mossy branches.

Breeding. Nests found in Apr in Mexico. Nest built by both sexes, a rounded or domed structure with small side entrance, constructed from bark, moss, epiphytic stalks and other fibres, lined with fine fibres, placed 3 m up in bromeliads and epiphytes. Clutch 3 eggs, white with reddish and grey markings, especially at large end; in captivity up to 5 eggs laid, incubation period 15 days, both adults fed young by regurgitation, nestling period 21 days.

Movements. Resident. Some post-breeding wandering or seasonal movements from higher to lower elevations, but poorly documented.

Status and Conservation. Not globally threatened. Common to fairly common in Mexico. Occurs in a few protected areas, including El Triunfo National Park (Mexico), Celaque, Cusuco and La Muralla National Parks (Honduras) and probably several national parks in Guatemala. The species' range has decreased because of extensive deforestation within region, but some intact unprotected habitat remains within its existing range.

Bibliography. Álvarez del Toro (1964), Andrle (1967), Blake (1953), Davis (1972), Dickey & van Rossem (1938), Gourlay (1974), Grotelüschen (2003), Howell & Webb (1995), Isler & Isler (1999), Land (1970), Lowery & Dalquest (1951), Monroe (1968), Nehrkorn (1899), Rowley (1984).

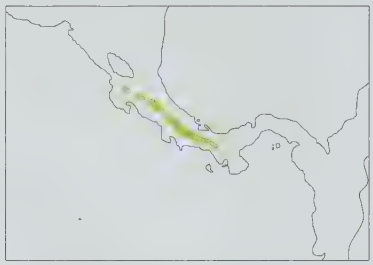
241. **Golden-browed Chlorophonia**

Chlorophonia callophrys

French: Organiste à sourcils jaunes **Spanish**: Clorofonia Cejidorada
German: Goldbrauenorganist
Other common names: Golden-browed Tanager

Taxonomy. *Triglyphidia callophrys* Cabanis, 1861, Costa Rica.
Genus has sometimes been merged with *Euphonia*; recent molecular-genetic analysis indicates that both genera belong in family Fringillidae. Forms a superspecies, and formerly considered conspecific, with *C. occipitalis*. Monotypic.

Distribution. Mountains of Costa Rica and W Panama (Chiriquí and Veraguas).



Descriptive notes. 13 cm; c. 24 g. Short-tailed, short-billed, chunky tanager with predominantly green-and-yellow plumage. Male has forehead and long broad supercilium golden-yellow, centre of crown and nape pale violet-blue, narrow nuchal collar turquoise; side of head down to chest, and upperparts glistening emerald-green, eyering turquoise; upperwing-coverts green, flight-feathers blackish, outer feathers narrowly edged green and inner feathers more broadly edged green, tertials mostly green with part of inner web dusky; tail green above, grey below; narrow (often partly concealed) line bordering bottom of bib chestnut mixed black, sharply separating green of bib from bright yellow of breast, belly and undertail-coverts; flanks green; iris brown; upper mandible dusky with some grey at base, lower mandible grey with dusky tip; legs dark grey. Female has yellow forehead, light blue central crown patch extending to narrow dull blue-violet band across nape (often partly concealed); side of head, throat and upperparts glistening green, upperwing-coverts green, flight-feathers and tail blackish, outer remiges narrowly edged green and inner ones (secondaries), tertials and tail broadly edged green; green of throat changes to yellow on mid-breast, belly and undertail-coverts; sides, flanks and thighs strongly tinged green; female very similar to female of *E. occipitalis*, but mid-crown duller and darker, dull blue-violet. Immature male in first year is similar to female, but crown brighter, forehead and supercilium yellowish-green, and foreparts brighter green. VOICE. In Costa Rica, call described as a soft, lamenting "koow" or "keeeu"; contact calls include variety of soft nasal notes, e.g. "neck", and "jip" and "jup", with rising inflection. Song a jumble of short but clear and melodious notes, rather disconnected, all given rather softly.

Habitat. In canopy and along borders of tall, wet forest (cloudforest), especially mossy, epiphyte-laden trees; wanders to canopy of scattered tall trees in forest clearings, less often also in lower second growth when small berries present. In Costa Rica, from c. 900 m up to tree-line on Caribbean slope and c. 1500 m to tree-line on Pacific slope, and seasonally lower, especially on Caribbean slope.

Food and Feeding. Mainly fruits of mistletoes (of genera *Gaiadendron*, *Psittacanthus*), berries of Ericaceae, Araceae, Marcgraviaceae and other epiphytes, as well as figs (*Ficus*); small number of insects. Rear of body often contorted or wiggled from side to side when defecating sticky strings of seeds. Rather quiet and easily overlooked. In pairs when breeding, but for much of year found in small loose groups of up to a dozen; occasionally for short periods with mixed-species flocks. Often spends long periods of time in a single epiphyte-covered tree if sufficient numbers of small berries. Takes insects by hopping and leaning down to peer under twigs.

Breeding. Season Feb–Jun in Costa Rica; second nesting may be attempted within two weeks of fledging of first brood. Nest built by both sexes, a globe-shaped structure with small entrance hole on side (walls 0·6–1 cm in thickness, inner chamber c. 8–9 mm in diameter and height), consisting mainly of moss or with moss, grasses, liverworts, cow hair, vegetable hair and even dried orchids, typically located amid bromeliads and other epiphytes 11–30 m up on branch or trunk, also reported 2 m up on vertical road-cut bank and 200 m from forest in Costa Rica. Clutch at least 3 eggs, dull white, spotted with red-brown blotches in wreath around larger end; incubation by female alone, sometimes fed at nest by male (by regurgitation), no information on duration of incubation period; chicks fed by both sexes, by regurgitation, nestling period 23–25 days.

Movements. Not well documented. Small groups wander somewhat when not breeding. Some seasonal elevational movements, individuals descending well below breeding zone during rainy months when fruit scarce.

Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Fairly common to locally common in Costa Rica; uncommon in Panama. Has experienced extensive habitat loss from deforestation. Remains fairly common to common locally in Costa Rica, uncommon in Panama. Occurs in numerous protected areas, including Poas, Volcán Irazú, Braulio Carrillo and Chirripó/La Amistad National Parks (Costa Rica) and La Amistad and Volcán Barú National Parks (Panama). The species' range does not include a large amount of intact habitat outside protected areas. While it is not considered to become at risk in the near future, populations would seem to warrant monitoring, especially in the small Panama portion of its range, where deforestation is severe.

Bibliography. Bangs & Griscom (1932), Buskirk (1976), Carriker (1910), Davis (1972), Garrigues & Dean (2007), Hartman (1955), Isler & Isler (1999), Peralta (2007), Powell (1979), Ridgely & Gwynne (1989), Skutch (1953, 1954), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984), Wheelwright *et al.* (1984).

Genus *NESOSPINGUS* P. L. Sclater, 1885

242. **Puerto Rican Tanager**

Nesospingus speculiferus

French: Pleureur de Porto Rico **German**: Brustfleckentangare **Spanish**: Tangara Puertorriqueña

Taxonomy. *Chlorospingus* (?) *speculiferus* Lawrence, 1875, Puerto Rico.
Recent molecular-genetic studies indicate that this genus and *Chlorospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. Monotypic.
Distribution. Slopes of Sierra de Luquillo (in Carite-Guavate State Forest), in Puerto Rico.



Descriptive notes. 18–20 cm; 28·7–40 g. Large size, rather drab plumage, with contrasting white throat, and fairly stout bill. Has head to below eye, including ear-coverts, dusky brown (hooded appearance); narrow, slightly irregular moustachial line blackish-brown; upperparts dull olive-brown; upperwing-coverts brown (slightly paler than back), primary coverts blackish, flight-feathers dusky, edged brown, small white spot at base of primaries; throat white, contrasting with slightly duller breast and lower underparts, which are faintly streaked and smudged brown, heaviest across lower breast; sides, flanks, belly and under-tail-coverts dull whitish, strongly tinged grey to greyish-brown; iris dark brown; bill dark brownish-grey, lower mandible often paler; legs dark grey. Sexes similar. Immature is more brownish than adult overall, especially below, and with no white wing spot. Voice. Noisy. Often gives loud, sharp "chewp" or "chuck", sometimes extended into a chatter of varying length, "chi-chi-chit"; also "tsweep, tsweep", which may be a song. Also a soft short twitter, and thin sigh like heavy exhalation.
Habitat. Undisturbed humid pre-montane and montane forest, also second growth, palm forests, thickets and coffee plantations at lower elevations. Recorded from c. 200 m upwards to tops of mountains, at c. 1330 m. Roosts communally in palms or bamboo clumps.
Food and Feeding. Wide range of food items, including arthropods and fruits; noted as eating *Cecropia* and palm fruits. Stomach contents have included orthopterans, weevils (Curculionidae), spiders (Araneae), moths and caterpillars (Lepidoptera), lizards, frogs, fruit, and a few hard grass seeds. Except when nesting, usually found in loose groups up to twelve or more individuals, mostly keeping well hidden in dense foliage when foraging; such groups often the dominant species in mixed flocks, which may contain up to twelve other species (including many North America migrants). Forages from canopy down to forest understorey, often rather high up. Moves and flutters along twigs, examines leaves and undersides of limbs. Seldom flies far, but flight strong and undulating.
Breeding. Season Jan–Aug. Few nests reported. Open, cup-shaped nest, loosely woven from feathers and grass, placed at low to moderate height in small tree; three reported nests were 2–10 m above ground and far out on a tree limb. Clutch 2–3 eggs, cream-coloured, heavily speckled brown. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Puerto Rico and the Virgin Islands EBA. Locally common. Common in many (but not all) of Puerto Rico's higher mountain forests. Occurs in Luquillo Mts, the W mountains around Maricao, including adjacent coffee plantations, and at one protected site, Carite-Guavate State Forest. Present also in El Yunque National Forest, and can be found along Puerto Rico Road 191 above the El Portal Rainforest Center. Occurs locally in disturbed second-growth forest at middle-level elevations near Cidra. Curiously, is absent in vicinity of Toro Negro, in heart of Central Mts, even though much suitable habitat appears to exist there. Is now absent also from haystack-hills region, although formerly occurred there. Within its restricted range, commoner at higher elevations, where more suitable habitat exists, and somewhat local at middle elevations; not found in lowlands. During 19th century this species was known only from a few higher-elevation sites, its decline apparently associated with near-complete deforestation of the island during that period. More recently, it has expanded into other suitable habitats and is apparently more numerous now than in recent past.
Bibliography. Biaggi (1970), Bond (1956, 1961), Burns *et al.* (2002, 2003), Gundlach (1882), King (1970), Oberle (2008), Olson & Angle (1977), Oniki (1975), Pérez-Rivera (1993, 1998), Raffaele (1983, 1989), Raffaele *et al.* (1998), Waide & Narins (1988), Wetmore (1922, 1927).


ssp regionalis
ssp albifrons
ssp phaeocephalus
ssp nigriceps
ssp ophthalmicus
243
ssp wetmorei
ssp falconensis
ssp flavopectus
ssp cinereocephalus
ssp punctulatus
ssp fulvigularis
PLATE 29
inches 2
cm 5
244
245
246
ssp livingstoni
ssp semifuscus
typical
247
"zeledoni"
248
ssp parvirostris
ssp huallagae
ssp olivaceiceps
ssp flavigularis
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ssp signatus
251
250
ssp marginatus
ssp hypophaeus
ssp canigularis

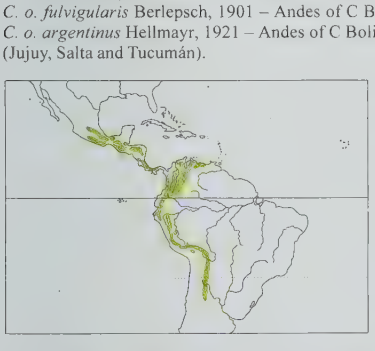
Genus *CHLOROSPINGUS* Cabanis, 1851

243. **Common Bush-tanager**

Chlorospingus ophthalmicus

French: Chlorospin des buissons **German**: Finkenbuschtangare **Spanish**: Clorospingo Común
Other common names: Brown-headed Bush-tanager; Dotted Bush-tanager (*punctulatus*); Yellow-breasted Bush-tanager ("*flavopectus* group"); Buff-breasted Bush-tanager (*cinereocephalus*)

Taxonomy. *Arremon ophthalmicus* du Bus de Gisignies, 1847, Jalapa, Veracruz, Mexico.
Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. This species forms a monophyletic group with *C. tacarcunae* and *C. inornatus*; has been regarded as conspecific with former. Subspecific taxonomy complex and not fully understood; some races at least as distinct as are several other taxa in genus that are currently regarded as full species; DNA data reveal five major clades among Mexican populations alone, as supported by morphological analyses, but vocal information and equivalent data from S populations have not yet been analysed. Race *punctulatus* has sometimes been treated as a full species, as also have *cinereocephalus*, and the "*flavopectus* group" (also including *trudis*, *nigriceps*, *exitelus*, *macarenae* and *phaeocephalus*). Numerous racial limits poorly defined, and taxonomy of the species, as a whole, in need of review. Proposed race *persimilis* (described from R Guajolote, SW of San Miguel Suchixtepec, in Oaxaca, Mexico) is regarded as synonymous with *albifrons*. Twenty-six subspecies currently recognized.
Subspecies and Distribution.
C. o. ophthalmicus (du Bus de Gisignies, 1847) – Atlantic slope of E Mexico (SE San Luis Potosí and W Veracruz S to NE Oaxaca).
C. o. wetmorei Lowery & Newman, 1949 – Sierra de Tuxtla (E Veracruz), in S Mexico.
C. o. albifrons Salvin & Godman, 1889 – Sierra Madre del Sur (Guerrero and Oaxaca), in S Mexico.
C. o. dwighti Underdown, 1931 – Caribbean slope in S Mexico (Chiapas) and Guatemala.
C. o. postocularis Cabanis, 1866 – Pacific slope in S Mexico (Chiapas) and Guatemala.
C. o. honduratius Berlepsch, 1912 – El Salvador and Honduras.
C. o. regionalis Bangs, 1906 – Nicaragua and E Costa Rica.
C. o. novicius Bangs, 1902 – SW Costa Rica and W Panama (Chiriquí).
C. o. punctulatus P. L. Sclater & Salvin, 1869 – W Panama (Veraguas E to Panamá).
C. o. ponsi Phelps, Sr & Phelps, Jr, 1952 – NW Venezuela (E slope of Sierra de Perijá).
C. o. falconensis Phelps, Sr & Gilliard, 1941 – N Venezuela (Sierra de San Luis, in Falcón, and Sierra de Aroa, in Yaracuy).
C. o. venezuelanus Berlepsch, 1893 – W slope of Venezuelan Andes (from Lara S to Táchira).
C. o. jacqueti Hellmayr, 1921 – N & SW Venezuela (Miranda and E slope of Andes from Lara S to Táchira) and W slope of E Andes (Norte de Santander) in Colombia.
C. o. eminens J. T. Zimmer, 1946 – E slope of E Andes in Colombia (S part of Norte de Santander and Boyacá).
C. o. flavopectus (Lafresnaye, 1840) – W slope of E Andes in Colombia from Santander S to vicinity of Bogotá.
C. o. trudis Olson, 1983 – W slope of E Andes at La Pica (between San Andrés and Málaga), in E Santander (Colombia).
C. o. nigriceps Chapman, 1912 – Colombia on E slope of W Andes at N end, both slopes of C Andes (S of *exitelus*), and W slope of E Andes (S of *flavopectus* and *trudis* to upper end of Magdalena Valley).
C. o. exitelus Olson, 1983 – both slopes of N end of C Andes in Antioquia (Colombia).
C. o. macarenae J. T. Zimmer, 1947 – Macarena Mts, in S Meta (Colombia).
C. o. phaeocephalus P. L. Sclater & Salvin, 1877 – both slopes of Andes in Ecuador.
C. o. hiaticolus O'Neill & T.A. Parker, 1981 – Andes of N Peru (S to Pasco).
C. o. cinereocephalus Taczanowski, 1874 – Andes of C Peru (Junin, probably also N Cuzco).
C. o. peruvianus Carriker, 1933 – Andes of S Peru (Cuzco and Puno).
C. o. bolivianus Hellmayr, 1921 – Andes of N Bolivia (Cordillera de La Paz S to N end of Cordillera de Cochabamba).
C. o. fulvigularis Berlepsch, 1901 – Andes of C Bolivia (S Cordillera de Cochabamba).
C. o. argentinus Hellmayr, 1921 – Andes of C Bolivia (headwaters of R Mizque) S to N Argentina (Jujuy, Salta and Tucumán).



Descriptive notes. 13–14 cm; 13–18 g (*bolivianus*), 16–22·5 g (*hiaticolus*), 15·1–18·5 g (*jacqueti*), 19·1–28·4 g (*flavopectus*). Variable bush-tanager, generally olive above, with grey to occasionally blackish head, grey to white underparts, with throat pale or dark and plain or well marked, and usually with distinct breastband. Nominate race has head brownish, prominent white eyering and postocular stripe, dark brown patch on ear-coverts, and some whitish on loral area; otherwise yellowish-olive above, including wing and tail; throat and underparts whitish, strongly tinged pale yellow on chest, sides, flanks and undertail-coverts, sometimes dark flecks on side of throat; iris brown; bill dusky grey; legs dark grey. Sexes similar. Immature is generally browner above, dingier and darker below, and with duller, less pronounced postocular spot. Races differ in plumage colour (especially head, throat and pectoral band), iris colour, presence or absence of white postocular mark, and other markings: *albifrons* differs from nominate in having a more sienna-brown head, with buffy-white supraloral area, extensive loral area blackish, throat light cinnamon-buff, often with dark strokes forming a malar stripe, and darker yellow-ochre pectoral band; *postocularis* is similar to nominate, but crown greyish, lores dusky, postocular stripe shorter, has indistinct dusky lateral crownstripe, dusky lores and whitish throat; *dwighti* differs from nominate in having crown slate-grey, becoming blackish laterally, producing two rather broad but not sharply defined lateral stripes, also back somewhat darker and more citrine (less greenish), middle of belly more greyish; *honduratius* is like *postocularis*, but crown uniformly greyish (no dusky lateral crownstripe); *regionalis* is like nominate, but head greyish with browner tinge on forecrown, rear ear-coverts paler, throat with dull brownish mottling; *novicius* is like nominate, but head and loral area dusky brown, malar area buff, and prominent white postocular spot partly surrounding eye (but no stripe), and whitish throat; *punctulatus* differs from nominate in having head very dark blackish-brown, olive of upperparts tinged rufescent (not yellowish), and chestband darker yellow; *eminens* has prominent white postocular spot and almost clean white throat; *exitelus* lacks postocular spot; *falconensis* has white postocular spot, iris pale grey; *flavopectus* has greyish head, dark iris, almost clean white throat (no spots), and no postocular spot; *jacqueti* has whitish iris and prominent white postocular spot; *macarenae* is closest to *flavopectus*, but crown slightly darker brownish-grey, throat darker buff and more spotted, chest and sides darker yellow, and whitish belly; *nigriceps* has dusky head, white iris and no white postocular; *phaeocephalus* is one of dingiest races, has pale yellowish to orangish iris, lightly dotted buff throat, and no postocular; *ponsi* has white postocular; *trudis* has almost unspotted white throat and no postocular spot; *venezuelanus* has sooty-black head, whitish iris, white postocular, and whitish throat thickly dotted black; *cinereocephalus* has dark brownish-grey crown, yellowish to pale grey iris, no white postocular, and chestband yellow-buff (not yellow); *peruvianus* has grey head, pale iris, no white postocular, buff-white throat with spots, and chest and sides pale yellow; *bolivianus* has blackish head, white iris, white postocular, dusky cheek, dingy throat and prominent buff chestband; *argentinus* is like previous, but has dingy brownish (not dusky) crown and side of head, dark iris, small white postocular, and deeper ochraceous pectoral band; *fulvigularis* has both throat and, especially, chest strongly washed ochraceous, iris variable, some pale-eyed and others dark-eyed. Voice. Call notes include buzzy "tzit" repeated over and over, longer trilled "ts'i'i'i'i'i'i't" and "chup". Dawn songs vary considerably over range: in Costa Rica repeats a piercing "seeek" or "tseer" for minutes on end from high perch, sometimes inserting a twitter; in Venezuela (races *jacqueti* and *venezuelanus*) a long, monotonic "chup, chup, chup...", 1 note per second for up to several minutes; dawn songs of "*flavopectus* group" (in Colombia) and of *cinereocephalus* (in Peru) more complex, typically a series of "chit" notes of increasing volume, then an accelerating series of higher-pitched "chid-it" notes and ending with lower-pitched churring "trrrrrrrrrrr" trill as volume diminishes. Dawn songs of S races (e.g. *phaeocephalus* and *hiaticolus*) also are complex, and may change from single notes to double notes, accelerate, or include churring trills. In most areas true song appears to be confined mainly to the dawn period. Alarm or aggressive notes include "tuck" or "sreeee"; during foraging often rather vocal, giving variety of sharp notes, e.g. "tsip, tseep", and a sharp "tsweek" that rushes into a rapid, descending twitter; also a rattling "tsrrrr" and a staccato "cut" in interactions.
Habitat. Humid montane forest and forest borders, especially mossy, epiphyte-laden forest, tall second growth and bushy clearings and pastures in forested areas. Recorded mostly at 1000–2600 m, locally higher and lower; in N of range c. 400–2300 m, but reported to 3500 m in Mexico; to 3000 m in Guatemala, Venezuela and Bolivia; in Andes generally at higher average elevations than in Middle America, mostly 1000–2300 m in Venezuela, 1000–2700 m in Colombia, 1500–2500 m on E slope and 700–1450 m on W slope in Ecuador, and 1100–2650 m in Peru. In Colombia, race *trudis* found at 2800 m.
Food and Feeding. Small berries and fruit, in Costa Rica including fruits of Ericaceae, Melastomataceae and Gesneriaceae; also small arthropods. Of 49 stomachs examined, one contained only vegetable matter and 29 only animal matter, and 19 contained both; contents included beetles (Coleoptera), other insects, seeds, and fruit juice. In pairs when breeding, otherwise in families or groups of up to about ten individuals that are often joined by other understorey species; also, readily joins temporary feeding associations of birds at fruiting trees and shrubs. Active and restless, frequently flicks wings and tail when foraging. Forages alertly from about eye level up to subcanopy, but often fairly low, especially inside forest, where typically hops outwards along branches into leafy terminal sections. Peers, pecks and perch-gleans on bare or mossy substrates, epiphytes and leaves, and squeezes bases of corollas for nectar; occasionally drops to ground or hangs downwards or upside-down to gain access to curled leaves, also flutters after or chases fleeing insects. Gulps small berries and fruit, mashes tough-skinned fruits, or pecks at large ones.
Breeding. Season Apr–Jun in Mexico, Mar–Jun in Costa Rica (up to two broods or two attempts), in breeding condition Mar to mid-Jul in W Panama, eight birds in breeding condition Apr–Jun in Colombia, and four in breeding condition in Oct and breeding reported in Nov in S Peru (Puno); in general follows pattern typical of many tropical species, most breeding in first half of year in N part of range, more dispersed or bimodal near equator, and predominantly in latter half of year S of equator. Bulky nest of moss, grass, leaves and rootlets, lined with fine fibres and fragments of vegetation, well hidden on bank at ground level or to 16 m up in moss or epiphytes in tree; if second nesting attempted, new nest built. Clutch normally 2 eggs, infrequently 3 (mainly in N part of range), sometimes only 1 (in S of range), dull white marked with shades of brown, cinnamon and red, sometimes concentrated at large end; incubation by female, period c. 14 days; chicks fed by both adults, nestling period c. 13–14 days.
Movements. Resident.
Status and Conservation. Not globally threatened. Common virtually throughout its wide range. Deforestation a threat locally, but this species survives even in bushy second growth and along narrow forest corridors.
Bibliography. Álvarez-Rebolledo & Córdoba-Córdoba (2002), Anon. (1983, 1998), Binford (1989), Bonaccorso *et al.* (2008), Burns (1997b), Buskirk *et al.* (1972), Cadena, Córdoba-Córdoba *et al.* (2007), Chapman (1917, 1926), Clements & Shany (2001), Davis (1972), Dickey & van Rossem (1938), Edwards (1967), Fjeldså & Krabbe (1990), García-Moreno *et al.* (2004), Garrigues & Dean (2007), González-García (2007), Hartman (1955), Hartman & Brownell (1961), Hellmayr (1936), Hilty (2003, 2009b), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Klicka *et al.* (2007), Land (1970), Losada-Prado *et al.* (2005), Lowery & Dalquest (1951), Meyer de Schauensee (1966, 1970a), Moynihan (1962a, 1962c), Narosky & Di Giacomo (1993), Ogilvie-Grant (1912), Olson (1983b), O'Neill & Parker (1981), Oniki (1972), de la Peña & Rumboll (1998), Peterson *et al.* (1992), Price & Dagleish (2006), Renner (2009), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ross & Whitney (1995), Rowley (1966, 1984), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Sánchez-González *et al.* (2007), Schulenberg (2000b), Schulenberg *et al.* (2007), Sclater & Salvin (1879), Skutch (1967a), Slud (1964), Stiles & Skutch (1989), Walker (2001), Weir *et al.* (2008), Weske (1972), Wetmore (1939), Wetmore *et al.* (1984), Worth (1939), Zimmer (1947b).

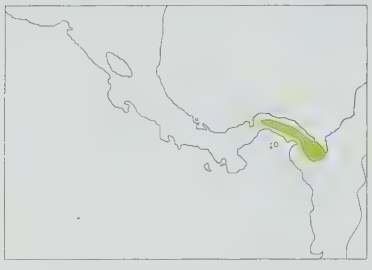
244. **Tacarcuna Bush-tanager**

Chlorospingus tacarcunae

French: Chlorospin du Tacarcuna **Spanish**: Clorospingo del Tacarcuna
German: Tacarcunabuschtangare

On following pages: 245. Pirre Bush-tanager (*Chlorospingus inornatus*); 246. Dusky Bush-tanager (*Chlorospingus semifuscus*); 247. Sooty-capped Bush-tanager (*Chlorospingus pileatus*); 248. Short-billed Bush-tanager (*Chlorospingus parvirostris*); 249. Yellow-throated Bush-tanager (*Chlorospingus flavigularis*); 250. Yellow-green Bush-tanager (*Chlorospingus flavovirens*); 251. Ashy-throated Bush-tanager (*Chlorospingus canigularis*).

Taxonomy. *Chlorospingus tacarcunae* Griscom, 1924, Mount Tacarcuna, east slope, eastern Panama.
Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. This species forms a monophyletic group with *C. ophthalmicus* and *C. inornatus*; has been regarded as conspecific with former. Was formerly treated sometimes as conspecific with *C. flavigularis*. Monotypic.
Distribution. Cerros Jefe and Azul (C Panamá), Cerro Brewster (W San Blas) and Cerros Mali and Tacarcuna (Darién), in Panama, and slopes of Cerro Tacarcuna in adjacent Colombia (NW Chocó).



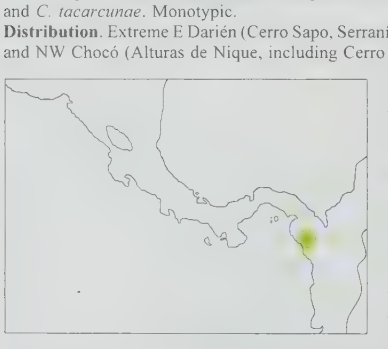
Descriptive notes. 13 cm; male 18·2–20 g, one female 17·8 g. Head and upperparts, including upperwing-coverts, olive, bend of wing pale yellow; flight-feathers dusky, outer feathers edged greenish-yellow, secondaries edged olive, tertials dark olive-green; tail dusky, tinged olive and edged olive-green; throat yellow, becoming dull yellow on breast and yellowish-white on centre of lower breast and belly; sides, flanks and undertail-coverts strongly tinged olive, underwing-coverts white; iris whitish to pale orange-yellow; bill blackish; legs brownish-grey, feet grey. Sexes similar. Immature is similar to adult, but duller, and with dark iris. Voice. Most distinctive call, during foraging, a penetrating and forceful "tseeeu!", descending slightly; other, less distinctive call notes represent minor variations on this dominant call. No dawn song recorded.
Habitat. Humid forest and forest borders, including low, wet elfin forest in mountains; at 850–1000 m in C Panama and 1000–1500 m in E Panama.
Food and Feeding. Stomach contents include small green caterpillars and chitinous insect parts. Forages in pairs or small groups, often with other species in small understorey mixed flocks; seems to form the dominant (nuclear) species in some flocks. Forages from understorey up to subcanopy or even canopy levels.
Breeding. Female carrying nest material in Feb (Darién) and pair building nest in mid-Apr in Panamá (Cerro Jefe, 859 m). On Cerro Jefe, both members of pair carried material, including pale strips of grass or palm leaves, to base of bromeliad; nest c. 6·5 m up in cavity formed by bromeliad on top of limb. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Darién Highlands EBA. Fairly common very locally in E Panama. Deforestation a threat within the range of the two small W populations; settlement and deforestation has not yet reached E Panama population. May occur in Darién National Park, in Panama, and in or close to Los Katíos National Park, in Colombia, although area near latter park is well protected.
Bibliography. Bradley (2005), Christian (2001), Davis (1972), Hellmayr (1936), Hilty & Brown (1986), Isler & Isler (1999), Restall *et al.* (2006), Ridgely & Gwynne (1989), Salaman *et al.* (2008), Wetmore *et al.* (1984).

245. Pirre Bush-tanager

Chlorospingus inornatus

French: Chlorospin du Pirré **Spanish**: Clorospingo del Pirre
German: Schwarzwangen-Buschtangare
Other common names: Mount Pirr(i)e Bush-tanager

Taxonomy. *Hylospingus inornatus* Nelson, 1912, Mount Pirre, 5200 feet [c. 1580 m], eastern Panama.
Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. This species forms a monophyletic group with *C. ophthalmicus* and *C. tacarcunae*. Monotypic.
Distribution. Extreme E Darién (Cerro Sapo, Serranía de Jungurudó and Cerro Pirre), in E Panama, and NW Chocó (Alturas de Nique, including Cerro Nique), in NW Colombia.



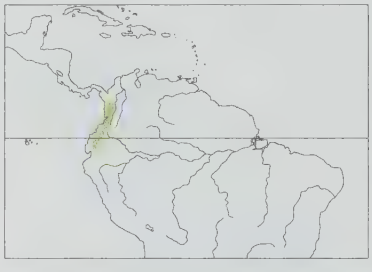
Descriptive notes. 15 cm; 20–36 g. Crown and side of head to below eye are dark grey, contrasting with olive-green of upperparts, including upperwing-coverts; flight-feathers dusky, outer feathers edged dark green (basal half of outer web), inner ones more broadly edged olive, tertials mostly olive; central tail feathers dusky, outer ones with progressively more olive on edges and webs; throat dull yellowish-white, becoming darker olive-yellow on breast, sides and flanks; centre of lower breast, belly and undertail-coverts clear yellow; iris whitish to pale orange-yellow; bill black; legs slaty-grey to fuscous black. Sexes similar. Juvenile undescribed. Voice. Gives three different thin, buzzy, high-pitched notes, including "spéétza", a simple "tsip" and "chuweet?", any one of them uttered singly, repeated up to four times (most often), or the three given in various combinations. Dawn song unrecorded.
Habitat. Canopy and borders of humid forest and stunted montane woodland; favours vine tangles and bamboo in stunted woodland. Up to at least 1700 m in Panama; recorded at 780–1560 m in Colombia.
Food and Feeding. Fruits and small arthropods. Of seven stomachs examined, three contained only vegetable matter and two only animal matter and four contained both; contents included fruit, larvae, and insect remains. Usually found in groups of 3–6 individuals, with mixed-species flocks or independently of them. Forages mostly from middle to upper levels of trees and bushes, and frequently in canopy of montane forest. Searches for insects along smaller branches and in foliage. Gleans from leaves and tree-fern fronds, and picks at mosses on branches, and noted as hanging suspended from lower side of twigs.
Breeding. No information.
Movements. No information; local movements unlikely.
Status and Conservation. Not globally threatened. Restricted-range species: present in Darién Highlands EBA. Common at higher elevations, where it is the only bush-tanager within its limited range; e.g. fairly common above c. 1200 m on Cerro Pirre. Recently found to be common in Serranía de Jungurudó, a site that represents a range extension for this species in E Panama. Despite small global range, there are no current threats from deforestation. Occurs within remote and largely inaccessible Darién National Park (Panama). Threats to this region are at present minimal, but the park, because of its remoteness, largely lacks effective protection.
Bibliography. Angehr *et al.* (2004), Barbour & Brooks (1923), Bond & Meyer de Schauensee (1944), Davis (1972), Griscom (1929), Hilty & Brown (1986), Restall *et al.* (2006), Ridgely & Gwynne (1989), Robbins *et al.* (1985), Stattersfield *et al.* (1998), Wetmore *et al.* (1984).

246. Dusky Bush-tanager

Chlorospingus semifuscus

French: Chlorospin ombré **German**: Graubrust-Buschtangare **Spanish**: Clorospingo Oscuro
Other common names: Dusky-bellied Bush-tanager

Taxonomy. *Chlorospingus semifuscus* P. L. Sclater and Salvin, 1873, near Quito, Ecuador.
Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. Two subspecies recognized.
Subspecies and Distribution.
C. s. livingstoni J. Bond & Meyer de Schauensee, 1940 – W slope of W Andes of Colombia from S Chocó (upper R San Juan) S to Cauca (Munchique area).
C. s. semifuscus P. L. Sclater & Salvin, 1873 – SW Colombia (Pacific slope in Nariño) and W slope in Ecuador (S to W Cotopaxi).



Descriptive notes. 14–15 cm; 17–23 g. Drab, undistinguished bush-tanager. Nominate race has crown and side of head dark grey, tiny white postocular spot sometimes present; upperparts, including upperwing-coverts, dark olive; flight-feathers dusky, edged yellowish-olive, tertials and tail mostly dark olive; throat and underparts mainly brownish-grey (paler than crown), paler on centre of belly, sometimes with ochraceous-olive wash forming a diffuse pectoral band, flanks and undertail-coverts tinged olive; iris light reddish-brown to intense brownish-red; bill blackish; legs dark grey. Sexes similar. Juvenile is duller than adult, with faint grey streaks on belly. Race *livingstoni* is overall darker than nominate, more smoky grey (less brownish) on head and smoky olive on upperparts, greyer (less brownish-tinged) below, iris yellowish-white. Voice. Dawn song a series of high "tsit" notes changing to "tsit-it" notes and gradually into slightly buzzy trill; described also as a series of high-pitched notes, almost like those of a hummingbird (Trochilidae), that gradually speed up and gain strength, becoming quite "spanking" before ending in dry sputter. In SW Nariño (Colombia) groups of males formed dense linear song leks, regularly spaced along ridges, from which they sang at dawn and again in late afternoon during most of year, with peak May–Aug. Call an extremely high-pitched "chip", often repeated, and a thin penetrating trill.
Habitat. Wet montane forest, especially wet, foggy and epiphyte-laden forest; stays mainly inside forest, but visits fruiting shrubs at forest borders. Recorded at 900–2500 m in Colombia (W Cauca) and mostly 1200–2300 m in Ecuador. Typically, more at lower levels and in interior of forest than *C. ophthalmicus* and *C. canigularis*.
Food and Feeding. Insects, and small fruits and berries. Forages in pairs and in small groups, often with mixed-species flocks as well as independently of them; participation in flocks occurs throughout year, but reduced during peak singing period and during singing hours. Forages in active alert manner, hopping along smaller branches and perch-gleaning, also taking small fruits and berries, much like other members of genus.
Breeding. Nest-building in Apr, nest with chicks in Jun, and stub-tailed fledglings seen with adults in Apr (four separate pairs) and Jun (two pairs) in SW Nariño, in Colombia. Groups of singing males found to occupy small circular territories at ridgetop song assemblies, sites usually reoccupied in subsequent years by same males; fruit resources may permit males to remain on territories for long periods, and nest-sites believed to be far from the ridgetop assemblies. Partners apparently form pair-bond and male participates at least in nest-site selection and feeding of young, suggesting that a system of linear singing assemblies is superimposed upon a social system that is otherwise typical of genus. At La Planada Nature Reserve (SW Nariño), female carried grass and dry bamboo leaves to a nest 7·5 m up and c. 2 m from trunk, cup-nest embedded in moss and epiphytes. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Fairly common to common throughout rather narrow elevational zone. Generally more numerous at higher elevations. In Ecuador, unconfirmed sightings farther S, in El Oro, require corroboration. Can be found in Farallones de Cali and Munchique National Parks and La Planada and Tambito Nature Reserves, in Colombia. Deforestation and forest fragmentation is accelerating throughout its small global range.
Bibliography. Best *et al.* (1993), Bohórquez & Stiles (2002), Donegan & Dávalos (1999), Dunning (1982), Echeverry-Galvis & Córdoba-Córdoba (2007), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Moore *et al.* (1999), Orejuela & Cantillo (1990), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Strewe (2001a).

247. Sooty-capped Bush-tanager

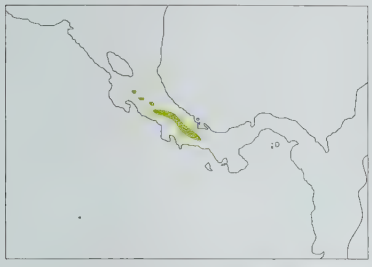
Chlorospingus pileatus

French: Chlorospin à sourcils brisés **Spanish**: Clorospingo Cejiblanco
German: Weißbrauen-Buschtangare
Other common names: Pileated Bush-tanager; Volcano Bush-tanager ("*zeledoni*")

Taxonomy. *Chlorospingus pileatus* Salvin, 1865, Volcán Irazú, Costa Rica.
Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus

Arremonops in family Emberizidae. The form "*zeledoni*", originally described as a separate species, now considered to be only a colour morph of present species; known only from Volcán Irazú and Volcán Turrialba, in Costa Rica. Birds from Cerro Flores, in E Chiriquí (Panama), supposedly with yellower underparts and whiter central abdomen, described as race *diversus*, but appear inseparable from those in rest of species' range. Monotypic.

Distribution. Mountains from C Costa Rica S to W Panama (Volcán de Chiriquí).



Descriptive notes. 14 cm; 16–24·1 g. Distinctive bush-tanager with head boldly striped black and white. Head is sooty black, with broad white lateral crownstripe beginning just in front of eye and extending to side of neck, often with offshoot towards eye of varying extent; upperparts, including upperwing-coverts, olive; flight-feathers dusky, edged olive-yellow, tertials more broadly edged olive-yellow; tail olive; throat whitish with numerous tiny black spots (inconspicuous), contrasting sharply with broad olive-yellow breastband, olive-yellow colour extending to sides, flanks and undertail-coverts; centre of lower breast and belly yellowish-white; individuals from volcano area of Irazú and Turrialba (in C Costa Rica) tend to be duller and greyer overall and lack yellow tinge on underparts ("*zeledoni*"); iris reddish-brown; bill blackish; legs dull brownish to lead-grey or fuscous black. Sexes similar. Juvenile is yellowish with blurry olive streaking below. Voice. Calls include high, thin, lisping "tsit" notes, sometimes in continuous stream or followed by "t-z-z-z-z-z-zit, chat-t-t-t-, zwee-zwee-zwee..." and so on; also a high, double "zit" or "zeet", and variety of high, scratchy notes such as "tsip" and "tseep"; also short chatter and a twitter. At dawn, sometimes more irregularly and briefly at other times, male sings scratchy, rapid "see-chur see-chur see-chur see see see-chur"; song described also as a pleasant, somewhat sibilant, fast "sit-sit swiee-d-d-d-d-d-d sit-a-wit", high-pitched, but final part slightly lower, mainly during breeding period.

Habitat. Mossy humid and wet montane and elfin forest and tall second growth, occasionally patches of woodland in pastures if near tall forest; also ranges locally into shrubby *páramo*. Recorded at c. 1500–2850 m, or up to tree-line; in Costa Rica, commonest above 2000 m in Cordillera de Talamanca and mainly above 1600 m in Cordillera de Tilarán.

Food and Feeding. Small arthropods; fruits, especially *Miconia*, *Fuchsia*, blackberries (*Rubus*) and Ericaceae. Found in pairs or in small loose flocks of up to about six individuals when breeding, at other times associates in larger groups, occasionally up to 20–40 birds; pairs, families or groups also joined by other species, especially Ruddy Woodcreeper (*Dendrocincla homochroa*), New World warblers (Parulidae) and other smaller species. Forages mostly from near ground to middle of canopy (c. 12 m up), most commonly at 3–6 m. When foraging, is restless and active, habitually flicking wings and tail, and sometimes remarkably confiding. Searches by hopping along mossy branches and up through dense shrubbery, poking and pecking in moss, lichens and bromeliads for food items; also tears at arboreal curled dead leaves.

Breeding. Season reported as Feb–Jul in Costa Rica. Defends a breeding territory. Possibly sometimes a co-operative breeder, several adults seen at single nest. Nest a soft, bulky cup of mosses, liverworts and beard lichen (*Usnea*), lined with fine grasses or fine, black rootlets, placed in crevice, atop a vertical bank, or under tuft of moss in dense low shrub, or in epiphytes on branch to 11 m up. Clutch 1–2 eggs, white, speckled and blotched with pinkish-brown, mostly at large end; no information on incubation and nestling periods; three or more adults may attend nestlings.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Common above c. 2000 m; fairly common down to 1600 m locally, e.g. Cordillera de Tilarán (Costa Rica). Deforestation is widespread within the notably small global range of this species.

Bibliography. Burns (1997a), Burns *et al.* (2002, 2003), Carriker (1910), Davis (1972), Garrigues & Dean (2007), Hartman (1955), Isler & Isler (1999), Johnson & Brush (1972), Moynihan (1962a, 1962c), Ridgely & Gwynne (1989), Skutch (1967a), Slud (1964), Stiles & Skutch (1989), Wetmore *et al.* (1984), Wolf (1976).

248. **Short-billed Bush-tanager**

Chlorospingus parvirostris

French: Chlorospin à bec court **Spanish**: Clorospingo Bigotudo
German: Kurzschnabel-Buschtangare
Other common names: Yellow-whiskered Bush-tanager

Taxonomy. *Chlorospingus flavigularis parvirostris* Chapman, 1901, Santo Domingo, Marcapata, south-eastern Peru.

Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. This species was originally considered a race of *C. flavigularis*, but subsequently separated on basis of size, plumage and elevational distribution. Three subspecies recognized.

Subspecies and Distribution.

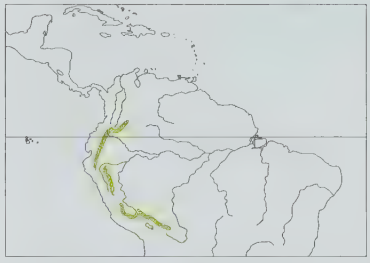
C. p. huallagae Carriker, 1933 – E slope of E Andes from Colombia (Cundinamarca and Meta) S through Ecuador to NW Peru (La Libertad).

C. p. medianus J. T. Zimmer, 1947 – E slope of Andes in C Peru (Junín and Urubamba regions).

C. p. parvirostris Chapman, 1901 – E slope of Andes in SE Peru and adjacent Bolivia.

Descriptive notes. 14 cm; 17·5–28·5 g. Drab bush-tanager with yellow sweeping out on each side of throat. Nominate race has crown, side of head and upperparts, including upperwing-coverts and tail, olive-green, flight-feathers dusky, edged olive, tertials more broadly edged olive; side of throat bright yellow, flaring back and slightly upward onto side of neck ("whiskers") and sometimes raised in slight tuft below ear-coverts; rather uniformly grey below, centre of throat somewhat paler; iris yellowish-white to light grey; bill dusky; legs dark grey. Sexes similar. Juvenile undescribed. Race *huallagae* is slightly duller and browner than nominate, has side of throat mustard-yellow (less bright than nominate), centre of throat, breast and belly mostly smoky brownish-grey, undertail-coverts olive-yellow; *medianus* is intermediate between previous and nominate. Voice. Call in Colombia an incessant "tsip"; in Ecuador "tsrreet"; in Peru a high, vibrating "seeep", sometimes preceded by thin "tsip". Dawn song apparently unrecorded.

Habitat. Humid and wet montane forest and forest borders, especially in mossy, epiphyte-laden forest; in E Ecuador and E Peru shows some affinity for vegetation bordering streams. At c. 1400–2100 m (once to 2500 m) in Colombia, 1100–2250 m in Ecuador, and 1100–2750 m in Peru; throughout range occurs mainly at higher elevations than those at which *C. flavigularis* found.



Food and Feeding. Arthropods, and small fruits and berries. Of nine stomachs examined, one contained only vegetable matter and five only animal matter, and three contained both; contents included beetles (Coleoptera) and other insects, fruit and seeds. Found in pairs and in small groups of up to eight individuals, typically foraging with mixed-species flocks, also sometimes away from them. Actively and restlessly hops along bare or mossy branches and twigs, and peers and pecks food items. Foraging behaviour much like that of congeners.

Breeding. Breeding period apparently starts in dry season, but extends into Jan–Jun (rainiest months); seven nests (six with eggs) found in Sept–Feb on E slope in Ecuador; dependent fledgling seen in May. Large shallow cup-nest 15 cm wide, 4 cm deep, internal diameter 9·5 cm, thickly lined with tree-fern scales, placed 0·4–2·5 m up on mossy rock ledge bordering stream or supported by vegetation resting against cliff face; five active nests were built on top of old nests, suggesting high nest-site fidelity. No definite data on clutch size; eggs pale salmon to buff-white with pale red-brown and lavender flecking and speckling, heaviest at larger end, average dimensions 22·3 × 16·1 mm. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common in Colombia and in SE Peru (Cuzco); possibly less numerous along E slope in Ecuador, where reportedly fairly common mainly in S region (most records in Ecuador are relatively modern). Distribution possibly discontinuous. Should occur in Cueva de los Guácharos National Park (Colombia), possibly Podocarpus National Park (S Ecuador), Manu National Park (Peru), and probably Madidi National Park (Bolivia). Within its range considerable intact forest exists, but habitat under assault in many areas from deforestation and human settlement.

Bibliography. Brumfield & Maillard (2007), Chapman (1917, 1926), Clements & Shany (2001), Greeney (2005), Hellmayr (1936), Hilty & Brown (1986), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Walker (2001), Zimmer (1947b).

249. **Yellow-throated Bush-tanager**

Chlorospingus flavigularis

French: Chlorospin à gorge jaune **Spanish**: Clorospingo Goliamarillo
German: Gelbkehl-Buschtangare
Other common names: Drab-breasted Bush-tanager (*hypophaeus*)

Taxonomy. *Pipilopsis flavigularis* P. L. Sclater, 1852, "Bogotá", Colombia.

Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. Central American race of this species, *hypophaeus*, geographically isolated and differing from others in plumage, may prove to be a separate species; study required. Three subspecies recognized.

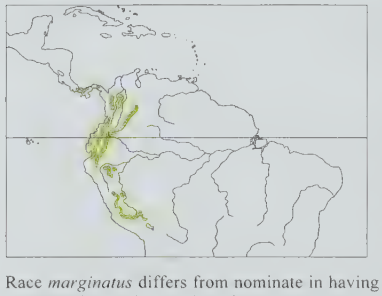
Subspecies and Distribution.

C. f. hypophaeus P. L. Sclater & Salvin, 1868 – W Panama from Volcán Barú (Volcán de Chiriquí) E to C Veraguas.

C. f. marginatus Chapman, 1914 – W slope of W Andes in Colombia (from Valle del Cauca) S to SW Ecuador (El Oro).

C. f. flavigularis (P. L. Sclater, 1852) – Andes of Colombia (N end of W range in Córdoba and Antioquia, both slopes of C range in Antioquia, and E slope of E range S from Boyacá) S on E slope to Ecuador and Peru (S to Puno).

Also, a population of unknown race (either *marginatus* or nominate) on Cerro Tatamá, on Valle del Cauca–Risaralda–Chocó border, in Colombia.



Descriptive notes. 13 cm, 15–20 g (*hypophaeus*); 15 cm, 21·5–31 g (*marginatus* and nominate). Rather plain bush-tanager, dull yellow throat often not particularly conspicuous. Nominate race has lores grey, crown, side of head and upperparts, including upperwing-coverts and tail, yellowish-olive; flight-feathers dusky, edged dull yellow; entire throat yellow, rest of underparts light grey, palest on central belly, with olive tinge on flanks and undertail-coverts; iris hazel; upper mandible mostly dusky, lower mandible paler greyish with dusky tip; legs dark grey. Sexes are similar. Juvenile apparently undescribed. Race *marginatus* differs from nominate in having yellow confined mostly to side of throat (but not sweeping back onto side of neck), and centre of throat and underparts duller brownish-tinged grey, iris grey; *hypophaeus* is overall duller, brownish-olive above, dingier below, but yellow of throat more ochraceous than in nominate, iris dark. Voice. Gives high "chip" notes constantly during foraging; flock-members utter "chip" and "seet" notes. Dawn song in W Colombia a short, weak and high-pitched "chit, twee-twee-twee-twit" in steady series of more or less alternating notes; in Ecuador (*marginatus*) a monotonous series of weak high "tsit" notes at c. 2 per second; dawn song in Peru (nominate) a loud, musical "wheet-chew-wheet-wheet-wheet-chew" or shorter "chip-weet-weet-weet".

Habitat. Inhabits humid to wet mossy forest, borders of forest and various stages of second-growth woodland; occasionally in scattered trees in small pastures surrounded by forest. Mostly in foothills and lower slopes of Andes, and generally below elevational range of other members of its genus, although some local overlap occurs. Race *hypophaeus* recorded at 250–900 m; *marginatus* c. 300–1400 m in W Colombia and W Ecuador; nominate recorded mostly at 700–1800 m (occasionally to 2100 m) in Ecuador and 750–1800 m in Peru.

Food and Feeding. Berries and fruit, also insects. Of 567 observations of feeding in W Colombia (Anchicayá Valley, in Valle del Cauca), 64% involved birds eating fruit, 29% insect-searching, and

7% at flowers (precise food source at flowers undetermined); 28 species of fruit taken, 90% of which were melastomes, especially *Miconia* (which constituted 78% of all fruit records); also ate buds and flower parts from melastomes. Usually in pairs or small groups that join (or are joined by) other species in mixed flocks. Forages from near ground to middle of canopy. In W Colombia median foraging height was c. 6 m, and only c. 25% of observations above 12 m; in Peru mostly at 1–10 m, occasionally ascending to canopy, especially in fruiting trees. Flutters and hops actively and energetically along smaller branches, and perch-gleans insects and fruit; sometimes remarkably unsuspicious. Usually perched upright on twigs or branches to take fruit or flowers (68% of 157 observations), frequently snatched berries in short sallies (27% of records), and occasionally hung downwards to grasp fruit. Swallows small fruits whole; squeezed or pecked at larger ones. Searched for insects by hopping along mossy and bare branches of various sizes, including large (0·3 m diameter) slanting trunks, stopping to cock head to peer at substrate; also foraged in vine tangles and in thickets. Peered and picked prey from branches and leaves about equally, taking insects from both sides of leaves, and reached out to pluck prey off bromeliads, vines, buds and spider webs. Frequently sallied to leaves, branches and air (33% of 76 observations).

Breeding. In Colombia, nest found in Feb, young being fed in Apr, and nest-building in Sept in Anchicayá Valley (in Valle del Cauca), and seven birds in breeding condition in Jun at N end of C Andes and one in Oct in E Boyacá. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common along humid montane slopes of Andes; possibly less common in Panama. Numerous protected sites exist within the long but narrow range of this species, among them La Amistad National Park (Panama), Farallones de Cali and Cueva de los Guácharos National Parks and Tambito Nature Reserve (Colombia), probably Cayambe-Coca Ecological Reserve and Sangay National Park (Ecuador), and Manu National Park (Peru). The lower-elevation slopes where this species occurs, in many areas, face the greatest pressure from human colonization and deforestation, although there appears to be considerable intact habitat that is reasonably secure in at least the short term.

Bibliography. Chapman (1926), Davis (1972), Donegan & Dávalos (1999), Dunning (1982), Echeverry-Galvis & Córdoba-Córdoba (2007), Fjeldså & Krabbe (1990), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Moore *et al.* (1999), Parker & Parker (1982), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Walker (2001), Zimmer (1947b).

250. **Yellow-green Bush-tanager**

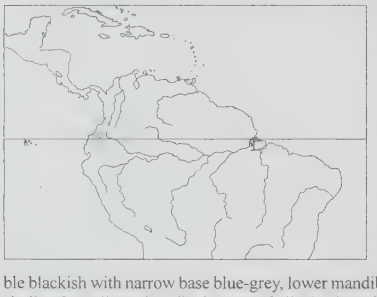
Chlorospingus flavovirens

French: Chlorospin jaune-vert **Spanish**: Clorospingo Verdiamarillo
German: Schwarzstirn-Buschtangare

Taxonomy. *Buarremon flavovirens* Lawrence, 1867, Pichincha, Ecuador.

Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. Monotypic.

Distribution. SW Colombia (W slope of W Andes in upper Anchicayá Valley, in Valle del Cauca; Nariño) and Ecuador (in E Esmeraldas; Pichincha).



Descriptive notes. 14 cm; 22·5–27 g. Very plain, dingy bush-tanager, almost uniformly coloured throughout; strong-billed. Lores and ocular area are dusky (not in strong contrast to rest of head), otherwise head yellowish-olive (or olive-citrine); upperparts olive with faint yellowish tinge; bend of wing pale yellow (usually hidden), median and greater upperwing-coverts and primary coverts dull dark olive, flight-feathers dusky olive, edged dull yellow, tertials and tail dull dark olive; olive-yellow below, slightly paler and yellower, more olive-ochre, on centre of throat, centre of belly and undertail-coverts; iris brown to dark brown; upper mandible blackish with narrow base blue-grey, lower mandible blue-grey with dusky tip; legs dark grey. Sexes similar. Juvenile undescribed. Voice. Call a husky, often repeated "chup!" or "tsup!", coarser and more raspy than notes of other members of genus. Song unknown.

Habitat. Wet mossy forest and along forest borders and nearby tall trees in clearings. Recorded at 500–1050 m in Colombia.

Food and Feeding. Fruits, also small arthropods. Stomach contents of one birds included fig (*Ficus*) fruit and other vegetable matter. Of 91 foraging records in Colombia (Anchicayá Valley, in Valle del Cauca), 45% involved fruit, 34% were insect-searching, and 21% were at flowers (where ate either flower parts or possibly insects). More than 14 species of fruit were taken, mostly melastomes (75% of all fruit), especially *Miconia* berries. Travels in groups of 3–5 individuals, often with mixed-species flocks. Median foraging height c. 12 m, but regularly goes into canopy at 22–30 m, and into thickets or lower vegetation along forest borders, with many foraging-height records c. 7 m up. About 13% of observed fruit-eating events were at parasitic and epiphytic plants, and sometimes noted as flying directly from one mistletoe (Loranthaceae) clump to another. Took most fruit from perched positions, rarely hung from *Cecropia* catkins. Swallowed small fruits whole and mashed larger ones. Searched for insects mainly on all sides of large (more than 13 cm diameter) mossy branches and on tree trunks; also looked at patches of moss, hanging moss clumps, ferns and epiphytes. Perched upright, hung upside-down or clung to substrates to pick at prey. Rarely pursued escaping insects in air or sallied to moss or other surfaces. Once seen to tear apart a termite (Isoptera) nest.

Breeding. Two nests, one in Mar and one in May, in Colombia (Valle): a mossy cup 5 m and 7 m above ground, one in mossy tree fork, the other at base of palm fronds. No other information.

Movements. Resident. During an intensive 16-month observation period in 1972 and 1973 at a site in Anchicayá Valley (at 1050 m), ringed individuals were resident throughout.

Status and Conservation. VULNERABLE. Restricted-range species: present in Chocó EBA. Extremely local. At the few sites where it is known in SW Colombia and NW Ecuador it is rare or uncommon and difficult to find. In Colombia, found at one (possibly two) sites close to each other in Valle del Cauca and at four sites (all close together) in Nariño, and large areas of mostly intact habitat exist between these two areas. In Ecuador, recorded in Esmeraldas at El Placer, Awacachi Corridor, Alto Tambo, Cotacachi-Cayapas Ecological Reserve and Canandé Reserve, and in Pichincha occurs along the Milpe road. The species was relatively numerous along one E ridge of upper Anchicayá Valley, a region afforded protection over the years by privately operated companies because of a small hydropower site. Elsewhere within its tiny known range, pressure from human colonization and deforestation is likely to continue to place this species at serious risk. Logging, deforestation and land-use change are increasing almost throughout the species' range, with no indication of consideration for the environment, and even in reserves protection of the habitat is not efficiently enforced.

Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Butchart & Stattersfield (2004), Collar, Crosby & Stattersfield (1994), Collar, Gonzaga *et al.* (1992), Fjeldså & Krabbe (1990), Griscom (1935), Hilty (1977, 1997), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Stattersfield & Capper (2000).

251. **Ashy-throated Bush-tanager**

Chlorospingus canigularis

French: Chlorospin à gorge grise **Spanish**: Clorospingo Gorjigrís
German: Graukehl-Buschtangare

Taxonomy. *Tachyphonus canigularis* Lafresnaye, 1848, "Bogotá", Colombia.

Recent molecular-genetic studies indicate that this genus and *Nesospingus*, *Spindalis* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. More recent evidence suggests that *Chlorospingus* is closest to genus *Arremonops* in family Emberizidae. It has been suggested that isolated race *olivaceiceps* may represent a separate species; this requires study. Five subspecies recognized.

Subspecies and Distribution.

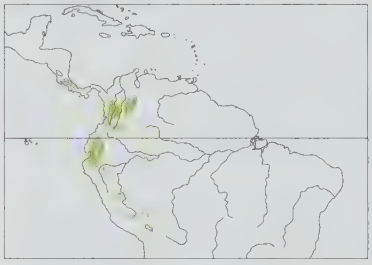
C. c. olivaceiceps Underwood, 1898 – mountains in Costa Rica (mainly E slope in Central Valley and R Reventazón) and W Panama (Bocas del Toro).

C. c. canigularis (Lafresnaye, 1848) – S end of Venezuelan Andes (Táchira) and on W slope of E Andes in Colombia (S to vicinity of Bogotá).

C. c. conspicillatus Todd, 1922 – both slopes of W Andes (from Antioquia S to Cauca) and both slopes of C Andes (from Caldas S to Huila) of Colombia.

C. c. paulus J. T. Zimmer, 1947 – W slope of Andes from Ecuador (Chimborazo) S to NW Peru (Tumbes).

C. c. signatus Taczanowski & Berlepsch, 1885 – E slope from Ecuador (from Napo) S to Peru (Cajamarca, and spottily S to Cuzco).



Descriptive notes. 13–14 cm; 14·5–21 g. Grey-headed bush-tanager with bill more slender than that of congeners. Nominate race has crown and side of head grey, ear-coverts slightly darker; upperparts, including upperwing-coverts and tail, olive-green (back contrasting with grey head); throat clear greyish-white; broad chestband light yellow, this colour continuing down sides and flanks, where tinged olive; centre of breast and belly whitish to greyish-white, undertail-coverts olive-yellow; iris reddish-brown; bill sometimes all dusky, but often most of lower mandible pale steel-grey; legs dark grey. Sexes alike. Juvenile undescribed. Race *conspicillatus* is very similar to nominate, but yellowish breastband broader and slightly darker, and sides and flanks slightly more olive; *paulus* is very similar to previous and nominate, but has uniformly grey head (ear-coverts concolorous with crown) and is slightly smaller; *signatus* has head slightly darker grey, with narrow but conspicuous white postocular stripe continuing to nape; *olivaceiceps* differs from others in having head mainly olive, like upperparts. Voice. Song in Peru (race *signatus*) a high "seet" accelerated into rapid chittery trill, descending and then rising to abrupt end; call a high "chit". Song in Colombia a rather similar "tsuk...tsuk...chit-chit chi't't't't't'a'a'a'a'i'i'it'it-tit", trill rising slightly, then descending, and rising again at end. In Costa Rica, call a high, thin, sharp, penetrating "zeezít" or "dzee dzít", sometimes "zee zee zít"; possible song a sibilant, slightly ascending "tse tse tse tsee". In Venezuela gives thin chipping and rapid chittering notes when foraging.

Habitat. Canopy of tall, wet and mossy forest, vines in upper levels of forest, along edges and in mature second growth, occasionally in scattered trees in clearings by forest. Recorded at 300–1500 m in Central America; 1200–2600 m in W Venezuela and Colombia; in Ecuador, mostly 700–1300 m (locally down to 400 m) along W slope of Andes and mostly 1000–1900 m on E slope; 1000–1800 m in E Peru.

Food and Feeding. Diet not well known. Fruits recorded; in Costa Rica reported as eating berries from melastomes, Rubiaceae, *Hedyosmum*, etc. Forages in small active groups, occasionally up to ten individuals; joins mixed-species flocks and often with other bush-tanagers (especially *C. ophthalmicus*). Explores foliage, bare or mossy limbs, especially slender branches and ends of branches, and searches in vine tangles from near ground to treetops; unlike most other members of genus, more often high or in canopy, and seems particularly fond of vine tangles.

Breeding. Birds in breeding condition in Mar–May and Sept in Colombian Andes. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Uncommon to fairly common; perhaps somewhat local in Andes. Although it is not currently at risk, the middle-Andean elevations favoured by this species are often subject to intensive colonization pressure, which could eventually pose a threat at a local scale.

Bibliography. Álvarez-Rebolledo *et al.* (2007), Coopmans *et al.* (2004), Davis (1972), Dunning (1982), Fjeldså & Krabbe (1990), Garrigues & Dean (2007), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Lysinger *et al.* (2005), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Moore *et al.* (1999), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schulenberg (2000b), Schulenberg *et al.* (2007), Slud (1964), Stiles & Skutch (1989), Yuri & Mindell (2002), Zimmer (1947b).

PLATE 30 ➤


♂
♀
ssp bidentata
252
ssp hepatica
253
ssp albifacies
ssp sanguinolenta
PLATE 30
inches
3
cm
8
ssp flava
ssp faceta
ssp lutea
254
255
ssp macconnelli
ssp haemalea
ssp rubra
256
ssp cooperi
257

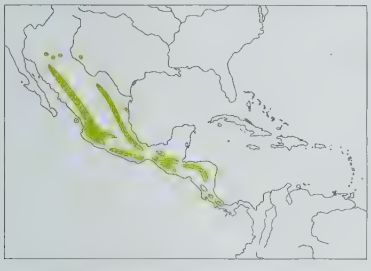
Genus *PIRANGA* Vieillot, 1807

252. Flame-colored Tanager

Piranga bidentata

French: Piranga à dos rayé **German**: Bluttangare **Spanish**: Piranga Estriada
Other common names: Striped/Swainson's Tanager

Taxonomy. *Pyranga bidentata* Swainson, 1827, Temascáltepec, Mexico.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Four subspecies recognized.
Subspecies and Distribution.
P. b. bidentata Swainson, 1827 – extreme SW USA (S Arizona, W Texas), and W Mexico from Sonora and Chihuahua S to Guerrero and E to vicinity of Mexico City.
P. b. flammea Ridgway, 1887 – W Mexico (Nayarit and Tres Marías Is).
P. b. sanguinolenta Lafresnaye, 1839 – E Mexico (from Nuevo León and Tamaulipas) S to Guatemala, NW Honduras and N El Salvador.
P. b. citrea van Rossem, 1934 – mountains of Costa Rica and W Panama.



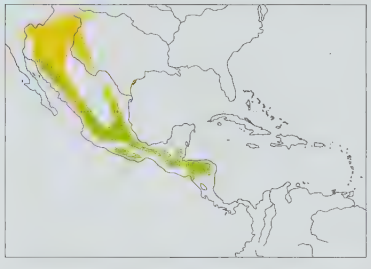
Descriptive notes. 18–19 cm; 33·3–39·4 g (nominate), 32–48·4 g (*flammea*). Distinctive tanager with strong bill. Male nominate race has lores, ocular area and ear-coverts light brown, darker border to rear of ear-coverts; rest of head and entire underparts flame red-orange, becoming paler on lower underparts; mantle and back dusky orange, tinged olive, and boldly streaked black, rump paler and much less streaked (or with almost no streaking); tail dusky, tips of outermost feathers white (forming white tail corners); median and greater upperwing-coverts blackish, broadly tipped white (forming two conspicuous wingbars); primary coverts black, flight-feathers dusky, edged brown, tertials with large white spot on tip of each feather, and often a tiny white tip on several innermost secondaries; iris dark reddish-brown; bill blackish above, grey to dark grey below; legs blackish. Female is patterned like male, but head and underparts yellow, contrasting dusky ear-coverts, crown tinged olive; back olive, streaked black; upperwing and tail brownish, with markings as on male. Juvenile is like female, but pale yellow on head and underparts, and with variable amount of streaking below; immature male much like female, but head and underparts mottled with red or orange-red. Race *flammea* is similar to nominate, but paler red; *sanguinolenta* also is similar, but head and underparts bright red to orange-red, wingbars and tertial spots sometimes tinged red; *citrea* is somewhat paler and more orange below. Voice. Song, from high perch, a long series of phrases of 3–6 notes, rich, musical and reminiscent of a vireo (Vireonidae), but with slight burr, e.g. "chewee-very-vire, chewee-very-vire-very, cheery-chewee a..." and so on, which is much like that of *P. ludoviciana*. Call is a loud, hard "per-dick" or "chi-dick"; also gives a rapid, rolled "chit-t-t-t-tik" or "p-terruk" and a musical "chirrup".
Habitat. Canopy and treetops of moist and humid mountain forest, scattered trees in adjacent shady pastures, coffee plantations, gardens and other settled areas with large trees; in N part of range S to Nicaragua, also in open oak (*Quercus*) and pine–oak (*Pinus–Quercus*) woodland. From c. 800 m to tree-line in Mexico; locally down to near sea-level in Guatemala; in Costa Rica, c. 1850–2850 m on Caribbean slope and regularly down to 1200 m, rarely even to 900 m, on Pacific slope; mostly above 1200 m in Panama.
Food and Feeding. Small arthropods; also variety of berries, including those of Ericaceae, melastomes, *Ficus* and *Satyria*. Not very gregarious, usually seen alone or in pairs, only infrequently in small groups; may join mixed-species flocks, but also often seen independently of them. Forages in high branches of tall trees by peering. Captures arthropods by reaching out or lunging forward, also by frequently making short sallies to foliage or to air. Although usually high up, may occasionally descend low to fruiting shrubs, rarely even to the ground.
Breeding. Breeding reported in Apr and May in Costa Rica and May in Panama. Nest a loose open cup of stiff rootlets, slender twigs and vine tendrils, lined with fine grass stems and inflorescences, placed in dense foliage, often in cypress; four nests were in a variety of locations, mostly outside forest in trees and shrubs in pastures or in coffee plantations, three 1–7·5 m up, the fourth higher in top of medium-size tree; nests reported at 5–11 m in Costa Rica. Clutch 2–3 eggs, pale blue, speckled with reddish-brown and dark lavender, mostly at larger end. No other information.
Movements. Largely resident; in Mexico may move to lower elevations during winter months. Rare pre-breeding and post-breeding wanderer/vagrant in extreme S USA (Santa Rita, Huachuca, and Chiricahua Mts, in S Arizona; Big Bend National Park, in W Texas).
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Rare breeder in extreme S USA (S Arizona and W Texas), where first record (in Apr 1985, in Cave Creek Canyon, in Chiricahua Mts of Arizona) was of a male paired with a female *P. ludoviciana*. Occurs in a number of protected areas from Mexico S to W Panama, including, in Mexico, Cumbres de Majalca (Chihuahua) and Sierra de Manantlán National Parks (Jalisco) and La Michilía Biosphere Reserve (Durango), and also Celaque National Park (Honduras), Chirripó/La Amistad International Park (Costa Rica) and Volcán Barú and La Amistad National Parks (Panama). Range also encompasses large areas of unprotected highland woodland including pine–oak forest. Despite range contractions locally, the species is adapted to utilize disturbed and partially opened areas and park-like highland terrain, and is thus less sensitive to environmental disturbance than are many species.
Bibliography. Benesh (1997), Blake (1956), Binford (1989), Burns (1998a), Chapman (1898), Clark (1984), Davis (1972), Edwards (1972), Garrigues & Dean (2007), Hall (1965), Howell & Webb (1995), Isler & Isler (1999), Land (1970), Le Febvre & Warner (1959), Leck (1972b), Leck & Hilty (1968), Martin *et al.* (1954), McCarthy (2006), Morse & Monson (1985), Ogilvie-Grant (1912), Peterson & Chalif (1973), Ridgely & Gwynne (1989), Rosenberg & Witzman (1999), Sibley (2000, 2003), Skutch (1967a), Slud (1964), Stiles & Skutch (1989), Sutton & Pettingill (1942), Wetmore *et al.* (1984).

253. Northern Hepatic-tanager

Piranga hepatica

French: Piranga à joues grises **German**: Nordzinnobertangare **Spanish**: Piranga Hepática
Other common names: Hepatic Tanager (when combined with *P. lutea* and *P. flava*)

Taxonomy. *Pyranga hepatica* Swainson, 1827, Temascáltepec, Mexico.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species, *P. lutea* and *P. flava* have traditionally been treated as conspecific, but molecular-genetic analyses suggest that they are better regarded as three separate species, sequence divergence (cytochrome *b* gene) between individuals from extremes of range (Mexico and Bolivia) being as high as 6·1%; molecular-genetic data indicate that present species and *P. lutea* are sisters, with *P. flava* sister to them. Present species and *P. lutea* are the most similar in appearance, and *P. flava* and *P. lutea* differ most in areas where their distributions approach one another; analysis of geographical variation, however, complicated by considerable individual, age and seasonal variation. In the case of present species, wing and tail lengths vary somewhat, size decreasing from N to S (to Nicaragua), but bill length does not. Proposed races *zimmeri* (described from S Sonora, in NW Mexico) and *intensa* (from Oaxaca in S Mexico) are both treated as synonymous with nominate. Five subspecies provisionally recognized.
Subspecies and Distribution.
P. h. hepatica Swainson, 1827 – breeds SW USA (E California, Arizona and W New Mexico, casually elsewhere) S through highlands of Mexico (to Guerrero and Oaxaca); those in N migrate to S portion of breeding range or descend to lower elevations in winter.
P. h. dextra Bangs, 1907 – breeds S USA (mountains of New Mexico and W Texas) S through highlands of E Mexico (to C Veracruz, E Oaxaca and Chiapas); those in N migrate mainly to area from C Nuevo León and Tamaulipas S to W Guatemala or descend to lower elevations in winter.
P. h. figlina Salvin & Godman, 1883 – E Guatemala and Belize.
P. h. albifacies J. T. Zimmer, 1929 – highlands of W Guatemala, Honduras, N El Salvador and NC Nicaragua.
P. h. savannarum T. R. Howell, 1965 – extreme E Honduras and NE Nicaragua.



Descriptive notes. 18 cm; 23–47 g. Male nominate race has ear-coverts dusky grey (not in strong contrast); rest of head and upperparts dusky grey-brown, tinged red, brightest on forecrown and uppertail-coverts; lesser and median upperwing-coverts dusky with dull red fringes, greater coverts dusky, outer webs dull red (coverts appear mostly red); flight-feathers and tertials dusky, narrowly edged dull red, tail dull red, brighter on outer fringes; dull red below, brightest on throat; iris brown; strong bill with upper mandible mostly dusky, lower mandible blue-grey with dusky tip; legs grey. Female has ear-coverts dull grey, forehead to mid-crown yellowish, becoming duller towards nape, dullest on mantle and scapulars; lesser and median upperwing-coverts dusky with yellow-olive fringes, greater coverts vaguely edged yellow, flight-feathers dull dusky grey, primaries and most of secondaries edged dull yellow (not in strong contrast), tertials dusky, outer edge paler; tail dusky grey, tinged yellow; throat and undertail-coverts dull yellow to ochraceous yellow, middle of underparts dull grey with hint of yellow, sides and flanks olive. Subadult male acquires adult plumage at end of first year, but may show large patches of yellow in plumage. Races differ mainly in tone of plumage: *dextra* male is slightly smaller and darker than nominate, has both back and underparts slightly deeper red; *albifacies* male is overall much redder, with less contrasting grey on ear-coverts, female more uniformly yellow-olive above and more heavily washed olive below; *figlina* male is intermediate between nominate and previous; *savannarum* is most similar to last, but smaller, and adult male is brighter and with more orange tone, especially below, female brighter yellow ventrally, especially on throat and abdomen. Voice. Song a musical carolling "twee-hee chu-wíte cha-ha" etc., delivered slowly, with distinct pauses, and with a few hoarse notes. In SW USA sings from favourite high perch for half-hour or so at dawn, then moves around, singing from various trees, and eventually falls quiet. Calls include low, abrupt "chup" or "tchuk", less often a series of sharp rising notes, "chu-chit-it" or "chudidit"; flight call a husky, rising "weet".
Habitat. In all highland areas favours open oak or pine–oak (*Pinus–Quercus*) or pure pine woodland; outside breeding season may wander in parks, gardens and other areas with broadleaf trees. Lowland populations, e.g. in Belize (race *figlina*) and in E Honduras and NE Nicaragua (*savannarum*), occur primarily in pine savannas, but may irregularly wander or occur in adjacent broadleaf-woodland edge and coffee plantations. Elevations vary, mostly 1600–2300 m in SW USA, and to 3000 m in Mexico; 600–1800 m in Honduras, above 1100 m in El Salvador; also locally in lowlands.
Food and Feeding. Primarily insectivorous; also eats variety of vegetable matter, including domestic peppers, grapes, cherries and *Miconia* berries, and may take nectar from flowers including agaves, madrones and oaks. Contents of six stomachs were insects, including large ants (Formicidae). In territorial pairs when breeding, occasionally in small loose groups outside breeding period. Forages mostly in foliage, usually well up in trees, occasionally quite low; sometimes visits fruiting trees and shrubs. Forages by hopping rather slowly, peering at foliage and reaching out to peck prey; occasionally takes prey in air by making large looping aerial sallies within trees.
Breeding. Breeds May–Jul in USA and May and Jun in Mexico; Aug in Belize and Apr in Nicaragua. Male may assist female with nest-building; nest a loosely constructed cup of plant fibres and twigs, sometimes lined with pine needles, most often in oak or pine tree and placed 2–15 m up at end of branch. Clutch 3–5 eggs (usually 4), pale blue or greenish-blue with brown markings, these often concentrated in wreath at larger end; incubation by female alone. No other information.
Movements. Migratory in N portion of range in USA and N Mexico, moving S for unknown distance; in some other areas birds descent to lower elevations during winter months, or during rainy season.
Status and Conservation. Not assessed. Probably not globally threatened. Fairly common and relatively widespread. Found in numerous national forests, national parks and biosphere reserves from SW USA S to N Nicaragua. Its range also encompasses much intact foothill and higher-elevation pine–oak, evergreen and semi-evergreen forest, which, although not formally protected,

On following pages: 254. Highland Hepatic-tanager (*Piranga lutea*); 255. Lowland Hepatic-tanager (*Piranga flava*); 256. Summer Tanager (*Piranga rubra*); 257. Rose-throated Tanager (*Piranga roseogularis*).

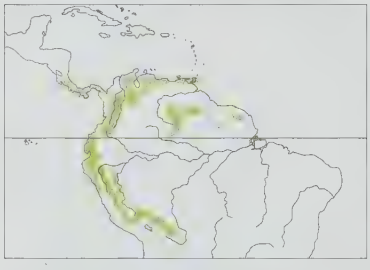
is not immediately threatened with deforestation or development. This species is also adapted to, or tolerates, a variety of disturbed and natural, semi-open wooded habitats.
Bibliography. Bent (1958), Binford (1989), Burns (1998a), Davis (1972), Dickey & van Rossem (1938), Eddleman (2002), Edwards (1972), Garrigues & Dean (2007), Howell, S.N.G. & Webb (1995), Howell, T.R. (1965, 1972), Isler & Isler (1999), Land (1970), Marshall (1957), Martin *et al.* (1954), Nehrkorn (1899), Poole (1938), Pough (1957), Rand & Traylor (1954), Remsen *et al.* (2010), Rowley (1962, 1966, 1984), Russell (1964), Schaldach (1973), Shy (1984b), Sibley (2000), Zimmer (1929).

254. **Highland Hepatic-tanager**

Piranga lutea

French: Piranga bourgogne **German**: Hochland-Zinnobertangare **Spanish**: Piranga Montana
Other common names: Tooth-billed Tanager; Blood-red Tanager (*haemalea*)

Taxonomy. *Pithylus luteus* Lesson, 1834, Callao, Peru.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species, *P. hepatica* and *P. flava* have traditionally been treated as conspecific, but molecular-genetic analyses suggest that they are better regarded as three separate species, sequence divergence (cytochrome *b* gene) between individuals from extremes of range (Mexico and Bolivia) being as high as 6·1%; molecular-genetic data indicate that present species and *P. hepatica* are sisters, with *P. flava* sister to them. Present species and *P. hepatica* are the most similar in appearance, and *P. flava* and present species differ most in areas where their distributions approach one another; analysis of geographical variation, however, complicated by considerable individual, age and seasonal variation. Race *haemalea* of present species sometimes regarded as a separate species, and race *testacea* of lower Central American highlands also may prove to be vocally distinct from populations in Andes; more taxonomic work warranted. Six subspecies currently recognized.
Subspecies and Distribution.
P. l. testacea P. L. Sclater & Salvin, 1868 – highlands from N Costa Rica (Guanacaste) S to E Panama (E Darién).
P. l. desidiosa Bangs & Noble, 1918 – SW Colombia in middle and upper Cauca Valley (S from Antioquia, including isolated records at N end of both W & C Andean ranges) and W slope of W Andes (Dagua Valley S to upper Patía Valley, in Cauca).
P. l. lutea (Lesson, 1834) – Andes of SW Colombia (Nariño) S through W Ecuador and Peru (S to Lima in W, and on E Andean slope from S of Marañón Valley) S to WC Bolivia (Cochabamba).
P. l. faceta Bangs, 1898 – N Colombia (Santa Marta Mts) and Andes and N cordilleras of Venezuela (E to Paria Peninsula); Trinidad.
P. l. toddi Parkes, 1969 – E Andes of Colombia on W slope (at El Cauca, in Magdalena, and Serranía de los Yariguíes, in Santander) and E slope (Chicamocha National Park, in Norte de Santander).
P. l. haemalea Salvin & Godman, 1883 – tepuis of S Venezuela (in Amazonas and Bolívar), and adjacent N Brazil (Sierra Imeri) and the Guianas.



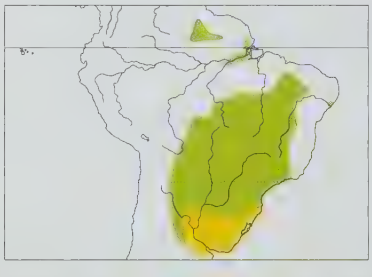
Descriptive notes. 17 cm; 28–40 g. Strong-billed tanager, overall slightly smaller and darker than *P. flava*. Male nominate race is bright red above, with dusky lores, faint pale streaking on ear-coverts and otherwise little contrast anywhere on upperparts; slightly paler below, more rosy on belly; iris brown; bill dusky horn above, paler horn-blue to faintly yellowish-horn below, especially at base; legs grey. Female is intense yellowish olive-green above, with with more golden or ochre tinge on forecrown; olive-yellow below, more olive on sides and flanks, throat and centre of belly usually more yellowish; more yellowish-olive above and on flanks than *P. flava*. Juvenile is dull, female-like in plumage, and with brownish streaking above and below; subadult male like female, but irregular patches of red appear, especially on foreparts, and brighter yellow below. Race *testacea* similar to nominate but more orange-red below; *desidiosa* is darker than nominate, male deeper red, ear-coverts not streaked, female with more strongly olive-tinged back; *haemalea* is notably darker, male maroon-red above, deep carmine-red below, with brighter throat and lower underparts, female also darker above than previous; *faceta* male is light brick-red to orange-red, with dusky grey lores, female paler, close to female of nominate; *toddi* male is much like male of last, but lores blackish, red upperparts faintly grey-tinged, less scarlet, flanks washed grey, and belly close to begonia-rose, female deepest yellow below, almost orange-yellow on throat, with very dark flanks. Voice. Song in Costa Rica a musical carolling of 5–7 rising and falling notes, higher in pitch than song of *P. bidentata* and with slight burry quality, "chew-chewee-cheer-cheeur-chuee"; in coastal cordillera of Venezuela a musical and leisurely, if somewhat choppy, series of throaty phrases, rising and falling, e.g. "wueep, purty, churdik, wudik, purty, wordik, chueet, breep, cheet", or shorter "whip, chew'wip, worry, jury, keép-fit". Song length varies, typically c. 4–8 phrases, and is rather repetitious. Dawn song similar but longer, and with only slight pauses between songs. Songs in S Peru (Cuzco) similar. Call in Costa Rica a quick series of 3–4 sharp rising notes, "chu-chit-it" or "chudidit"; commonest call in Venezuela and elsewhere in Andes a simple "chup", used also in alarm.
Habitat. Typically in rather open woodland, second growth and adjacent tall trees in clearings, coffee plantations, along forest borders, even parks, gardens and occasionally urban areas; occurs, at least sporadically, in dry scrub in foothills of coastal cordillera in Venezuela. In Costa Rica reported as occurring also in canopy of humid mountain forest. Found from c. 900 m to 1850 m, locally down to 600 m, in Costa Rica; in Venezuela, 450–2050 m N of Orinoco, and in S (race *haemalea*) 800–1800 m; mostly 1500–2200 m but locally down to 200 m in Colombia; lowlands to 1900 m on W slope and 1000–1350 m on E slope of Andes in Ecuador; 400–2700 m in Peru (both slopes).
Food and Feeding. Insects, including large beetles (Coleoptera) and caterpillars, and in Trinidad butterflies (Lepidoptera); also buds, berries and fruits, seeds and nectar. Of eight stomachs examined, one contained only vegetable matter and five only animal matter, and two held both; contents included beetles, caterpillars, a bee (Apoidea), an orthopteran, and seeds. Forages singly and in pairs, often slightly away from forest, and only infrequently with mixed-species flocks. Forages at a variety of heights, mostly high in trees, or in tops of low trees in scrubby areas. Hops sluggishly and peers in canopy and middle-level foliage; sallies to air in large looping circles within trees, or executes short rather awkward sallies, or flutters to foliage or to branch or trunk surfaces for variety of often large insect prey. Seen to probe flowers.
Breeding. Breeding reported in Feb, Jul and Oct in Trinidad; in Colombia, birds in breeding condition in Jun–Nov in Santa Marta Mts, in C Andes (in Cauca) and above Cali (in W Valle); nest found in early Mar in SW Ecuador (Tambo Negro, in Loja). In Trinidad, cup-nest of dry grass 6 m up in young vegetation at clearing edge; in Colombia (Santa Marta Mts) a frail flat structure of fine rootlets, two in roots under overhanging bank along road, a third 0·6 m up in small shrub on top of road bank. In Trinidad, clutch 2 eggs, blue or greenish, spotted with grey, violet or brown; chicks fed by both adults. No other information.
Movements. Mostly resident. May wander when not breeding, and some altitudinal migration to lower elevations possible during rainiest months.
Status and Conservation. Not assessed. Probably not globally threatened. Uncommon to locally fairly common. Found in numerous parks, biosphere reserves and refuges across its extensive, mostly Andean range. Occurs also in many areas of unprotected but relatively intact montane habitat. This species also utilizes a variety of lightly wooded and relatively open, second-growth and disturbed habitats, and fairly dry to humid regions, which to some extent protects it against habitat-related risks. Said to be a pest locally in corn fields.
Bibliography. Belcher & Smooker (1937), Best *et al.* (1996), Burns (1998a), Coopmans *et al.* (2004), Davis (1972), Donegan *et al.* (2007), ffrench (1991), Fjeldså & Krabbe (1990), Gilliard (1941), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Isler & Isler (1999), Koepcke (1970), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Miller (1963), Morton (1979a), Nehrkorn (1899), Remsen *et al.* (2010), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Schäfer & Phelps (1954), Schulenberg *et al.* (2007), Slud (1964), Souza (2002), Stiles & Skutch (1989), Strauch (1977), Taczanowski (1884), Todd & Carriker (1922), Tostain *et al.* (1992), Walker (2001), Wetmore *et al.* (1984), Zimmer (1945).

255. **Lowland Hepatic-tanager**

Piranga flava

French: Piranga orangé **German**: Südzinnobertangare **Spanish**: Piranga Bermeja
Other common names: Red Tanager

Taxonomy. *S.*[*altator*] *Flavus* Vieillot, 1822, Paraguay.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species, *P. hepatica* and *P. lutea* have traditionally been treated as conspecific, but molecular-genetic analyses suggest that they are better regarded as three separate species, sequence divergence (cytochrome *b* gene) between individuals from extremes of range (Mexico and Bolivia) being as high as 6·1%; molecular-genetic data indicate that *P. hepatica* and *P. lutea* are sisters, with present species sister to them. Present species and *P. lutea* differ most in areas where their distributions approach one another; analysis of geographical variation, however, complicated by considerable individual, age and seasonal variation. Race *macconnelli* very poorly differentiated from *saira* and may be better subsumed within it; thorough review required. Four subspecies provisionally recognized.
Subspecies and Distribution.
P. f. macconnelli C. Chubb, 1921 – S Guyana and N Brazil (E Roraima) E to S Suriname; possibly also French Guiana.
P. f. saira (Spix, 1825) – E & S Brazil (both banks of R Amazon in Amapá and C Pará; SE Alagoas; and from C Maranhão and C Piauí S to E & S Mato Grosso and Rio Grande do Sul).
P. f. rosacea Todd, 1922 – E Bolivia (E Santa Cruz).
P. f. flava (Vieillot, 1822) – SE Bolivia (from Cochabamba and S Santa Cruz), Paraguay to N & C Argentina (S to Mendoza, Córdoba, N Buenos Aires) and Uruguay.



Descriptive notes. 18 cm; 30–40 g. Strong-billed tanager, overall lighter in colour than *P. lutea*. Male nominate race is mostly red to orange-red, somewhat tinged brownish above, including tail; forecrown, throat and breast brighter, lighter and more contrasting, with decidedly pinkish to peach-red colour; lores dusky; iris dark brown; bill blackish above, paler horn-blue to yellowish-horn below with dusky tip; legs dark grey. Female is yellowish-olive above, strongly tinged sandy-olive, dusky line on lores, weak yellowish eyering, forecrown and underparts fairly bright yellow, sides and flanks pale sandy-buff; weakly indicated yellowish eyering. Juvenile is like female, but somewhat streaked with dull brown above and below; subadult male like female, but with irregular patches of red showing in plumage, especially foreparts. Race *rosacea* male differs from nominate in having less grey edging on upperparts, and underparts more orange-scarlet (not pinkish), although underpart colour quite variable (from salmon-orange to flame-scarlet), female very like female of *saira* but slightly more greyish above; *saira* male is very like nominate, but slightly deeper and richer red above and uniformly bright scarlet-pink below, female darkest olive-grey above; *macconnelli* is exceedingly similar to last, differing perhaps in lighter average coloration of upperparts of male, female differs from nominate female in brighter citrine-olive upperparts, orangy supraloral area, dirty yellowish-white lores, and variable orange tinge on anterior underparts. Voice. Song, in Argentina, described as a repeated "tschip-tschurr", melodious but with little variation; in Brazil a melodious but little-varied stanza, "jip-jewlo, jewlo-jip", and in SE Brazil gives a loud "chip, chap, cherít". Call transcribed variously as a soft "chef" or "chu chu" and a loud "tchip" or "tcherit".
Habitat. Deciduous and gallery forest, borders of *Araucaria* forest, eucalypt (*Eucalyptus*) groves, *cerrado* and other open to semi-open areas with scattered trees. Found mainly in savanna with scattered trees in N portions of range, and in open deciduous woodland in S. Lowlands and foothills throughout most of range; c. 500–1200 m (probably somewhat lower, at least occasionally) in Suriname, and to 2050 m in SE Brazil.
Food and Feeding. Variety of arthropod prey, including caterpillars and spiders (Araneae); also variety of berries and fruit, especially figs (*Ficus*). Of four stomachs examined, one contained only animal matter and three contained both plant and animal matter; contents included termites (Isoptera), beetles (Coleoptera), hymenopterans, hemipterans, feathers, and fruit pulp. Occurs in pairs when breeding; in S of range, many may gather in groups on migration. Like others of genus forages mostly high or in upper branches of trees, sometimes also lower, rarely down to ground. Takes prey from foliage and bark and twig surfaces, and sallies for flying insects, mostly in or close to trees.
Breeding. Breeding reported in Nov SE Brazil (Rio Grande do Sul) and Oct in Paraguay; two males in breeding condition in Aug and Oct in mountains of Suriname. Nest a loosely woven, flat, cup-shaped structure of dry leaves, roots, grass stems and similar, usually placed on high branch,

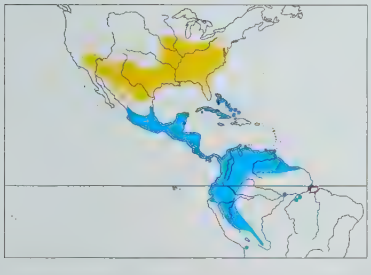
some nests reported as low as 2 m up in bush. Clutch 3–4 eggs, greenish-blue or white, marked reddish-brown or cinnamon. No other information.
Movements. Resident in most of range. S populations (SE Brazil, Uruguay and Argentina) migratory; in Córdoba (W Argentina) moves downslope into valleys during coldest months.
Status and Conservation. Not assessed. Probably not globally threatened. Common to locally common, and widespread. Found in numerous parks and reserves, especially in Brazil. Occurs also in areas that are not formally protected, but do have extensive intact habitat. This species also utilizes a variety of lightly wooded and relatively open, second-growth and disturbed habitats in both dry and humid regions, providing a buffer against habitat-related risks. May be expanding its range following habitat disturbance and the opening-up of forested areas. No significant risks in the near term.
Bibliography. Belton (1985), Bertoni (1898), Burns (1998a), Davis (1980), Descourtilz (1852), Diamond & Lovejoy (1985), Eisenmann (1969), Fjeldså & Krabbe (1990), Fry (1970), Isler & Isler (1999), Klicka *et al.* (2007), Lillo (1889), Moojen *et al.* (1941), Narosky & Yzurieta (1987), de la Peña & Rumboll (1998), Pinto (1944b), Remsen *et al.* (2010), Ridgely & Tudor (1989, 2009), Santos (1948), Schubart *et al.* (1965), Sick (1985, 1993), Souza (2002), Vigil (1973), Wetmore (1926), White & Sclater (1883), Wolff (2006), Zimmer (1929).

256. Summer Tanager

Piranga rubra

French: Piranga vermillon **German**: Sommertangare **Spanish**: Piranga Roja

Taxonomy. *Fringilla rubra* Linnaeus, 1758, South Carolina, USA.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Proposed race *ochracea* (described from Trout Creek, near Cane Springs, in W Arizona) is considered synonymous with *cooperi*. Two subspecies recognized.
Subspecies and Distribution.
P. r. cooperi Ridgway, 1869 – breeds SW USA (from SE California, S Nevada and C Arizona E to W Texas) and N Mexico (S to to NE Baja California, Sonora, N Durango, SW Coahuila and C Nuevo León); winters C & S Mexico (from S Sinaloa S to Michoacán, Morelos and Guerrero).
P. r. rubra (Linnaeus, 1758) – breeds E USA (from SE Nebraska, S Iowa, Ohio and Delaware S to C Texas, Gulf Coast and Florida); winters from S Mexico (Michoacán, Pueblo, Veracruz and Yucatán) S to N South America (S occasionally to N Bolivia, W Brazil and SE Venezuela, occasionally the Guianas.



Descriptive notes. 17–18 cm; 23·9–38·1 g (heaviest prior to migration), in boreal winter 21·6–32 g. Distinctive, with pale-looking bill, and occasionally appearing slightly crested. Male nominate race is red above, with head (including lores), throat and underparts bright rose-red to geranium-red; flight-feathers dusky, edged red; tail feathers red, duskier on inner webs; iris dark brown; bill pale to dusky horn, usually with faint yellowish tinge (typically looks obviously pale); legs dark grey. Female is brownish-yellow with olive tinge, underparts yellow to buff to cinnamon, sometimes with tinges of orange above and below. Subadult male is brownish-yellowish, like female, but by end of first year may show patches of red in irregular pattern, especially on head and foreparts; immature female often has dull orangish wash on belly. Race *cooperi* male is similar to nominate, but larger (on average 15% longer-billed and longer-tailed) and slightly paler, female is pale olive to pale olive-grey above, becoming pale yellowish-olive on lower back and rump, and light yellow on underparts, sometimes dusky loral area and greenish undertail-coverts (occasionally shows orange tinge, but in general paler than nominate). Voice. Song a slow musical carolling of mostly 3-syllable notes, some slightly burry, and with brief but distinct pause between phrases; songs of E birds (nominate race) lower in pitch than those of W populations (*cooperi*). On wintering grounds frequently gives calls but not songs. Call, in all areas, a loud, staccato "pik-tup", or "pik-a-tup" or extended to "pik-a-tuptup".
Habitat. In E portion of breeding range occurs in open hardwood forest; W populations found mainly in riparian woodlands that contain cottonwoods (*Populus*), willows (*Salix*), mesquite (*Prosopis*) and occasionally oak (*Quercus*) woodland, as well as shady parks and patches of trees. Generally overwinters in humid regions, but not inside humid forest; occupies open woodland, tall open second growth, forest borders, shady plantations and parks and gardens, even trees in cities, and occasionally scrub habitats. On non-breeding grounds in South America occurs from lowlands to at least 2700 m, most frequently above c. 500 m.
Food and Feeding. Mostly arthropods, including many bees and wasps and wasp larvae (Hymenoptera), also some fruits. In Arizona study, prey items predominantly flying insects less than 30 mm in length. Of 19 stomachs examined, one contained only vegetable matter, 17 held only animal matter and one contained both; contents mostly wasps. Other reported items include cicadas (Cicadidae), grasshoppers (Caelifera), beetles (Coleoptera, including weevils), ants (Formicidae), spiders (Araneae), caterpillars, dragonflies (Anisoptera) and other arthropods, as well as small fruits, including blackberries (*Rubus*) and whortleberries (*Vaccinium*). On wintering grounds also takes more insect prey than fruit; fruit items include *Miconia*, *Ficus*, *Cecropia*, mistletoe berries (Loranathaceae) and arillate fruits; stomach contents of seven birds contained only animal matter, including hymenopterans and dipterans. Occurs in pairs when breeding, otherwise usually alone. In E of breeding range typically forages in upper foliage of tall trees, where can be difficult to see. Reaches and pecks prey from twigs, foliage, bark, even flowers, and sallies short distances to air for flying insects, mostly within trees. In willow-dominated riparian woodlands in Arizona, breeding birds foraged at all heights from near ground to tops of trees, but rarely went to the ground. Most foraging occurs in outer part of branches, where branch diameter usually less than 7·5 cm. On wintering grounds usually solitary, apparently maintaining individual territories; may join mixed-species flocks, and often with temporary mixed feeding associations in fruiting trees. Foraging behaviour on wintering grounds similar to that when breeding, including frequent rapid swooping sallies to air, and picks fruit while perched or takes it in sallies; has been seen attending army-ant swarms.
Breeding. Season May–Aug in USA. Nest built by female alone, accompanied by male, a shallow cup of dry herbaceous vegetation, lined with fine grass, and placed on horizontal branch 2·5–15 m up in tree. Clutch 3–4 eggs, rarely 5, pale blue or greenish-blue, heavily spotted reddish-brown and faintly marked lilac-grey, sometimes forming a wreath or cap at large end; incubation by female, period 11–12 days; chicks fed by both adults, no information on duration of nestling period.
Movements. Entire breeding population migratory, wintering mainly from C & S Mexico S to W Ecuador, N Bolivia, C Amazonian Brazil and Suriname, once in NW Chile. Uncommon passage migrant and rare winter resident across most of West Indies. Present in Colombia mainly Oct–Apr.
Status and Conservation. Not globally threatened. Widespread and fairly common to common breeder across USA and N Mexico. Found in numerous protected areas. Utilizes a variety of habitats, including forest edges, second growth, partly cleared areas and park-like areas, an adaptability which buffers this species against potential threats. On wintering grounds loss of forested or partly forested habitat, including conversion of shade coffee plantations to sun coffee, is a threat, but overall impact of this remains unknown. Populations wintering in Central America face significantly more degradation and loss of forest and wooded habitat than do those wintering in N South America. In its breeding areas, the species is vulnerable to forest fragmentation which permits intrusion of cowbirds (*Molothrus*) and subsequent increases in nest parasitism.
Bibliography. Álvarez del Toro (1950), Álvarez-Rebolledo & Córdoba-Córdoba (2002), Álvarez-Rebolledo *et al.* (2003), Anon. (2000), Belcher & Smooker (1937), Bent (1958), Binford (1989), Brosset (1964), Burns (1998a), Child & Marshall (1970), Connell *et al.* (1960), Davis (1972), Dickey & van Rossem (1938), Donegan & Dávalos (1999), Eisenmann (1969), Fitch & Fitch (1955), Fjeldså & Krabbe (1990), Garrigues & Dean (2007), Gilliard (1941), Ginés *et al.* (1951), Hallinan (1924), Harrison (1975), Hartman & Brownell (1961), Haverschmidt & Mees (1994), Hilty (1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Jaramillo (2003), Klicka *et al.* (2007), Krabbe *et al.* (2001), Land (1970), Leck (1975), McCarthy (2006), Mee *et al.* (2002), Meyer de Schauensee & Phelps (1978), Miller (1947, 1963), Monroe (1968), Nehrkorn (1899), Ogilvie-Grant (1912), Olivares (1969), de la Peña & Rumboll (1998), Pough (1946), Prescott (1974), Raffaele *et al.* (1998), Ridgely & Gaulin (1980), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Robinson, W.D. (1997), Rogers & Odum (1966), Rosenberg *et al.* (1982), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Shepard & Burns (2007), Shy (1983, 1984b, 1984c), Sick (1985, 1993), Skutch (1980b), Slud (1964), Smithe (1966), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Tashian (1953), Tostain *et al.* (1992), Walker (2001), Yuri & Mindell (2002).

257. Rose-throated Tanager

Piranga roseogularis

French: Piranga à gorge rose **German**: Rosenkehltangare **Spanish**: Piranga Yucateca

Taxonomy. *Pyranga roseo-gularis* S. Cabot, 1846, Yalahau, Quintana Roo, Mexico.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Three subspecies recognized.
Subspecies and Distribution.
P. r. roseogularis S. Cabot, 1846 – drier N portions of Yucatán Peninsula (N Campeche, N Yucatán and N Quintana Roo), in SE Mexico.
P. r. cozumelae Ridgway, 1901 – islands of Mujeres and Cozumel, off NE Quintana Roo.
P. r. tincta Paynter, 1950 – more humid C & S portions of Yucatán Peninsula, N Guatemala and Belize.



Descriptive notes. 16 cm; 21–30 g. Heavy-billed, comparatively dull tanager. Male nominate race has entire crown deep rose, lores dusky, large white eyering; rest of side of head, neck and upperparts grey with brownish tinge, uppertail-coverts reddish; tail dull crimson; upperwing-coverts dusky, broadly edged crimson, flight-feathers dusky, narrowly edged crimson, tertials mostly crimson; throat to upper breast bright rose, rest of underparts grey to buffy grey, tinged rose-pink on undertail-coverts, sometimes also a slight pink tinge on lower breast to central belly; iris dark brown; bill greyish, darker culmen; legs dark grey. Female has crown bright olive-yellow, side of head and upperparts duller yellowish-olive, upperwing and tail slightly darker yellowish-olive; conspicuous white eyering; throat and central foreneck yellow, turning pale grey on breast and whitish on lower underparts; undertail-coverts tinged yellow. Juvenile undescribed; immature male like female, but acquires dull reddish edges of greater wing-coverts in first pre-breeding moult; immature female duller than adult, throat pale lemon. Race *tincta* male is overall paler than nominate; *cozumelae* is somewhat darker than mainland birds. Voice. Song a rich warbled "whee chee cheer-el-chee cheer-el-cheu chee-el-chu..." and so on. Call a raspy, slightly nasal "rreh", and a nasal mewing "myaaa" suggesting a Grey Catbird (*Dumetella carolinensis*).
Habitat. Mainly semi-humid to humid forest edge and scrubby forest with thick undergrowth, infrequently inside tall forest; also occasionally in more open situations with scattered trees and low scrubby vegetation. Sea-level to c. 250 m.
Food and Feeding. Little information. In pairs when breeding. Forages in middle or upper part of medium-sized trees, and often in canopy with mixed-species flocks. Also observed to forage in undergrowth and in saplings, and has been reported as visiting fruiting trees and army-ant (Formicidae) swarms.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to locally common in scrub woodland on Yucatán Peninsula. Race *cozumelae* uncommon on Cozumel I, where appears to have declined since 1980s. Range encompasses several parks and biosphere reserves, including Sian Ka'an and Calakmul Biosphere Reserves, as well as Punta Put and Teacuterminos Lagoon Reserves. There is also extensive unprotected intact habitat within the species' range, and it tolerates some disturbance and scrubby second growth, which provides an additional buffer against near-term threats. Although portions of the area within its range are subject to considerable human-caused environmental pressures, the species does not appear to be at any immediate risk.
Bibliography. Barlow *et al.* (1972), Blake (1953), Chapman (1896), Davis (1972), Edwards (1972), Eisenmann (1955), Howell (2004), Howell & Webb (1995), Klaas (1968), Land (1970), Paynter (1955), Russell (1964), Smithe (1966), Traylor (1941).

PLATE 31

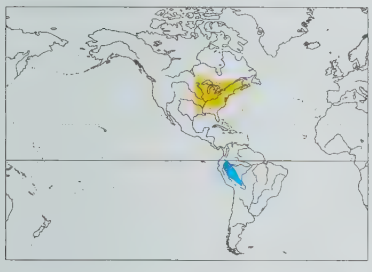

inches 3
cm 8
♂
♀
258
259
yellow morph
grey morph
ssp venezuelae
260
ssp leucoptera
261
ssp benedicti
262
ssp zena
263
ssp pretrei
264
265
266

258. Scarlet Tanager

Piranga olivacea

French: Piranga écarlate **German**: Scharlachtangare **Spanish**: Piranga Escarlata

Taxonomy. *Tanagra olivacea* J. F. Gmelin, 1789, New York, USA.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species has in the past been regarded as most closely related to *P. ludoviciana*, in part because of limited hybridization with that species, but cladistic analysis based on mitochondrial DNA (cytochrome *b* gene) indicates that the two are not each other's closest relative. *P. ludoviciana* appears to be most closely related to *P. bidentata* and the "*P. flava* group", the three forming a phylogenetic clade; depending on analyses used, the present species would be either a sister taxon to this clade, or sister to this clade and *P. rubra*. Monotypic.
Distribution. Breeds SE Canada (SE Manitoba E to S Quebec) S in E USA to N Arkansas, N Alabama, W North Carolina and Virginia and W to C South Dakota and C Kansas. Migrates to NW South America, mainly in W Amazon Basin from SE Colombia, E Ecuador and N Peru E to W Brazil and S to C Bolivia.



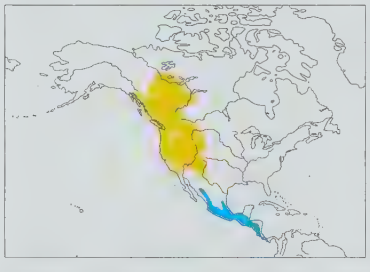
Descriptive notes. 17 cm; 23·5–33 g, prior to migration 32–38 g. Male breeding is bright red, with contrasting jet-black scapulars, upperwing-coverts, flight-feathers, tertials and tail; iris dark brown; bill entirely horn-grey to dull yellowish-horn; legs dusky grey. Non-breeding male is dark olive above, olive-yellow below, brighter on throat and lower underparts, but with scapulars, wing-coverts, flight-feathers, tertials and tail black. Female is plain dark greyish-olive above, paler and more olive-yellow below, palest on throat, and slightly brighter, more yellow, on chest, centre of breast and undertail-coverts; median and greater upperwing-coverts dusky, broadly edged yellow-olive, flight-feathers dusky, narrowly edged yellowish-olive. Subadult male much like female, but usually with some black on shoulder and/or pale yellow edgings on greater coverts and tertials; first-year male in breeding plumage may be dull red to orangish. Voice. Song of male, from very high perches when establishing territory (somewhat lower once nesting underway), a series of musical carolling phrases; easily confused with songs of American Robin (*Turdus migratorius*) and *P. rubra*, but phrases slurred and with distinctly hoarse quality (like American Robin with sore throat). Female also sings when gathering nest material and food, but songs shorter and softer than male's. Commonest call a rough "chik-burrr", with some regional variation; others include a thin "sweeee" in courtship, a nasal whistle when arriving at nest, and high descending screech in distress. Flight call a clear whistled "puwi".
Habitat. Breeds in humid E deciduous hardwood forests and mixed pine–oak (*Pinus–Quercus*) woodland, also parks, orchards and large shade trees in urban areas. On migration occurs in both forest and more open habitats, including woodlots, parks and urban areas with trees. Winters mostly in more heavily forested areas in South America than does *P. rubra*. To at least 1800 m on breeding grounds in USA; on migration up to 3000 m in Colombia; c. 2500 m in Ecuador, and to 1500 m in Peru.
Food and Feeding. Mostly insectivorous during breeding. Principal food hymenopterans, lepidopterans (especially caterpillars and moths) and both adult and larval beetles (Coleoptera); other animal foods recorded include spiders (Araneae), dragonflies (Anisoptera), orthopterans, and flies (Diptera); in early spring (in absence of foliage or during extended wet weather) may forage on ground for grasshoppers (Caelifera), ground beetles (Carabidae), earthworms (Oligochaeta), and other terrestrial invertebrates. Also takes some cultivated fruits such as cherries, and wild fruits and buds. Nestling diet insects and fruit. On migration in W Colombia seen to take insects from *Cecropia* and to eat *Cecropia* catkins. In pairs when breeding. Solitary on wintering grounds, but regularly joins mixed-species flocks in canopy, and feeding aggregations at fruiting trees. In small loose groups when migrating, seldom more than 10–20, rarely groups up to 50 reported in Colombia, where may remain for short periods in vicinity of a fruiting tree. On both breeding and wintering grounds spends most of time high in foliage of tall trees, often not moving much, hence can be difficult to locate. Most foraging done at middle heights, e.g. c. 6–18 m up; in New Hampshire mean foraging height was 12·8 m (in 22-m canopy). Searches for arthropods mostly by peering around and hopping in deliberate, almost slow manner, to examine foliage, twigs and branches. Regularly picks prey from outer leaf clusters, and will sally within trees for flying insects such as hymenopterans; may fly off fairly long distance to another tree.
Breeding. Season May–Jul; single brood. Males arrive before females on breeding grounds and establish territories. Territory boundaries somewhat flexible, and males frequently dispute boundaries when females present. In courtship, male descends to perch only 1–2 m above ground, and droops wings and stretches neck to expose scarlet back to female perched above. Female selects nest-site and builds nest alone; nest a shallow cup of plant stems, rootlets, grass, occasionally twigs, lined with finer material (eggs often visible through thin walls of nest), located on horizontal branch mostly 6–18 m up, infrequently much higher or lower. Clutch 2–5 eggs, mostly 3–4, dull white to greenish-blue, with brown markings concentrated at large end; incubation by female, often fed by male, period 12–14 days; chicks fed by both adults, nestling period 9–15 days.
Movements. Migratory; entire population makes post-breeding movement through Central America and a few through Caribbean region to N Amazonia. On wintering grounds recorded as far E as French Guiana. Uncommon to fairly common transient in Mexico, mostly S from S Veracruz and Yucatán. An uncommon passage migrant (so far as is known) through Andes of Colombia; a small number reported on Sabana de Bogotá during Nov–Mar. Considered a rare migrant across most of Caribbean, mainly Sept–Oct and even less frequent in Mar–May; very rare in Hispaniola, Puerto Rico, Virgin Is and N Lesser Antilles, and only a vagrant in S Lesser Antilles. Vagrant records throughout W USA, and rarely N to Alberta, in Canada.
Status and Conservation. Not globally threatened. Widespread and fairly common to common in breeding area, where found in numerous national forests and other national protected areas. Utilizes variety of habitats, including forest edges, second growth, and partly cleared and park-like areas, which offers some safeguard against potential threats. Not seen on South American wintering grounds in proportional numbers, and even in presumed main wintering area (in N Amazonia) this species is under-reported and seemingly scarce. On breeding grounds vulnerable to forest fragmentation, which permits intrusion by cowbirds (*Molothrus*) and subsequent increase in nest parasitism. Breeding censuses and other data suggest that the population is in decline.
Bibliography. Anon. (2000), Baldwin & Kendeigh (1938), Bent (1958), Brush (1967), Burns (1997a, 1998a), Burns *et al.* (2002, 2003), Connell *et al.* (1960), Cruz (1974), Davis (1972), Dechelle & Ingels (2007), Garrigues & Dean (2007), Graber & Graber (1962), Groskin (1943, 1950), Hales (1896), Harrison (1975), Hilty (1994, 1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Klatt *et al.* (2008), Klicka *et al.* (2007), Land (1970), Landestoy *et al.* (2006), McCarthy (2006), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Mowbray (1999), Ogilvie-Grant (1912), Patterson & Allen (1968), Pearson (1972), Pough (1946), Prescott (1964, 1965), Raffaele *et al.* (1998), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Roberts & Norment (1999), Sabo & Holmes (1983), Salaman *et al.* (2008), Schulenberg *et al.* (2007), Shy (1983, 1984a, 1984b, 1984c), Sibley (2000), Sick (1985, 1993), Skutch (1980b), Souza (2002), Stewart & Skinner (1967), Stiles & Skutch (1989), Terborgh (1989), Vega Rivera *et al.* (2003), Walley (1989), Weidensaul (1999), Yuri & Mindell (2002), Zimmer (1945).

259. Western Tanager

Piranga ludoviciana

French: Piranga à tête rouge **German**: Kieferntangare **Spanish**: Piranga Carirroja

Taxonomy. *Tanagra ludoviciana* A. Wilson, 1811, near Kamiah, Idaho, USA.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species has in the past been regarded as most closely related to *P. olivacea*, in part because of limited hybridization with that species, but cladistic analysis based on mitochondrial DNA (cytochrome *b* gene) indicates that the two are not each other's closest relative. Present species appears to be most closely related to *P. bidentata* and the "*P. flava* group", the three forming a phylogenetic clade; further, vocalizations and several plumage characteristics support close relationship with *P. bidentata*, and the two are known to hybridize. Birds from Texas, described as race *zephyrica*, considered to fall within the range of variation of the population as a whole. Monotypic.
Distribution. Breeds S Alaska, and W Canada (from British Columbia and S Mackenzie, N Alberta and S Saskatchewan) S in W USA (E to Wyoming and C Colorado) to SW California, S Arizona, New Mexico and W Texas, and extreme NW Mexico (N Baja California). Migrates to mountains of W Mexico (from Jalisco and S Tamaulipas) S locally to Costa Rica and, rarely, W Panama.



Descriptive notes. 17 cm; 22·5–36 g, in boreal winter 28–34·5 g. Male breeding has forehead and crown, lores, ocular area, malar area and throat rose-red to bright red fading to bright yellow of neck and breast; mantle and scapulars black, lower back to uppertail-coverts bright yellow; wings black except for bright yellow median coverts, broad pale yellow to white on tips of outer webs of greater coverts, and narrow pale edges to outer webs of secondaries and especially tertials; tail black; most of underparts bright yellow; iris dark brown; bill horn-grey with yellowish tinge, cutting edges paler and more yellowish; legs grey. Non-breeding male is similar but duller, red colour on head faint, variable and confined to face, back somewhat mottled black. Female occurs in two colour morphs: yellow morph similar to male, but no red on head, yellow much duller, back and wings grey, wingbars weaker, and bill tends to be more yellowish-orange and less dusky; grey morph generally greyer, duller and more uniform, with bill more yellowish. Juvenile is similar to female. Voice. Song a series of throaty carolling phrases, much like that of *P. olivacea*. Commonest call a loud "pit-ick" or varied to "pit-er-ick"; also a burry "tu-weep". Flight call a soft whistled "howee" or "weet".
Habitat. Open coniferous forest, also mixed coniferous and deciduous forest and mature aspen (*Populus*) and alder (*Alnus*) groves. On wintering grounds found in pine and pine–oak (*Pinus–Quercus*) woodlands, scrubby forest and shady coffee plantations. During migration occurs also in variety of more open habitats, including desert scrub, parks and gardens. In El Salvador, reported as arriving in highlands, then spreading out into lowlands, but returning to highlands above c. 600 m before N migration. Breeds mainly at 1000–3050 m; as low as 450 m in Washington, and mostly above 2300 m in SW USA.
Food and Feeding. Mostly insects. Contents of 47 stomachs (Apr–Aug) were 82% insects and 18% fruit: hymenopterans, mostly wasps but some ants (Formicidae), accounted for 56% of the insect food, increasing to 75% in Aug; a further 12% were beetles (Coleoptera), including click beetles (Elateridae) and wood-borers; bugs (Hemiptera), including stink-bugs (Pentatomoidea) and a few cicadas (Cicadidae), made up 8%, grasshoppers (Caelifera) 4%, and caterpillars 2%; fruit included some large unidentified items, also elderberry (*Sambucus*) seeds, also raspberry or blackberry (*Rubus*) seeds. Other stomachs contained hemipterans and fruit and plant matter. Noted also as eating berries of juniper (*Juniperus*) and cotoneaster (*Cotoneaster*) and wild cherries (*Prunus*). Nestling diet adult and larval insects. On wintering grounds in El Salvador, consumed fruit and foraged in middle or upper branches of trees. In pairs when breeding, but solitary on wintering grounds. On migration may gather in mostly small loose groups, but flocks of up to 30 individuals reported; occasionally more, once reported in "large" numbers at a fruiting tree with Clay-coloured Thrush (*Turdus grayi*). Forages mostly in canopy or upper levels of coniferous and mature alder trees, mostly for insects. Sallies varying distances to air for flying ants and termites (Isoptera); sometimes remains motionless except for head movements as it watches for flying prey. Examines foliage in slow, methodical manner, hopping or jumping from perch to perch, and taking prey mostly by reaching or pecking from foliage, also from flowers.
Breeding. Season May–Jul. Cup-nest built from twigs, rootlets, grass and pine needles, lined with hair and fine rootlets, and placed 1·8–20 m up on outer horizontal limb, usually of fir (*Abies*) or pine, nest tree often in open area; one nest reported under ledge on ground. Clutch 3–5 eggs, pale blue or greenish-blue with brown or grey-green markings, these concentrated at larger end; incubation by female alone, period c. 13 days; chicks fed by both adults, no information on duration of nestling period.

On following pages: 260. White-winged Tanager (*Piranga leucoptera*); 261. Red-headed Tanager (*Piranga erythrocephala*); 262. Red-hooded Tanager (*Piranga rubriceps*); 263. Western Spindalis (*Spindalis zena*); 264. Jamaican Spindalis (*Spindalis nigricephala*); 265. Hispaniolan Spindalis (*Spindalis dominicensis*); 266. Puerto Rican Spindalis (*Spindalis portoricensis*).

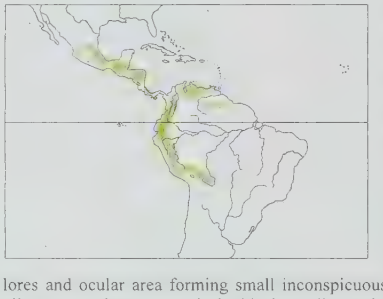
Movements. Migratory; entire population moves S to wintering grounds in mountains and Pacific slope (not Caribbean slope) from C Mexico S to extreme NW Costa Rica, a few S to W Panama. Spring migrants reach S Arizona and New Mexico by c. 20 Apr, coastal migrants advancing more swiftly than those inland; by c. 20 May migrants have reached S British Columbia and begun nesting, while those in Rocky Mts plains region are little farther N than NE Colorado; in Montana (Bozeman), birds set off S from c. 27 Aug to 25 Sept.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common over large breeding range. Breeds in many national forests and other protected areas. Breeding range also encompasses extensive intact habitat that, although not formally protected, is at relatively low risk. Wintering habitat also encompasses a variety of protected areas, including in Mexico Cumbres de Majalca (Chihuahua), La Michilía Biosphere Reserve (Durango) and Sierra de Manantlán (Jalisco); also Celaque National Park, in Honduras, and probably Miraflor Natural Reserve and Bosawás Biosphere Reserve, in Nicaragua. Wintering range, which is mostly in foothills and highlands, also contains intact habitat that is not formally protected, but deforestation and fragmentation are locally extensive and it is difficult to assess the long-term viability of these areas. Nevertheless, the species appears to be at little imminent risk on wintering grounds, as it also is able to exploit a variety of disturbed or altered habitats, including shade (but not sun) coffee plantations and selectively logged pine–oak woodlands.
Bibliography. Anon. (1999), Bent (1958), Binford (1989), Burns (1998a), Butler *et al.* (2002), Davis (1972), Dickey & van Rossem (1938), Edwards (1972), Fischer *et al.* (2002), Garrigues & Dean (2007), Goguen *et al.* (2009), Hayward (1935), Howell, S.N.G. & Webb (1995), Howell, T.R. (1965), Hudon (1999), Isler & Isler (1999), Johnson (1964), Klimkiewicz & Futcher (1987), Land (1970), Lovette & Bermingham (2002), Marshall (1957), McCarthy (2006), Monroe (1968), Nehrkorn (1899), Pough (1946), Rand & Traylor (1954), Ridgely & Gwynne (1989), Salt (1957), Shy (1984b), Sibley, C.G. (1955b), Sibley, D.A. (2000), Skutch (1980b), Stiles, E.W. (1980), Stiles, F.G. & Skutch (1989), Sworth (1904), Tashian (1953), Wells & Wells (2002), Wiggins & Wiggins (1939).

260. White-winged Tanager

Piranga leucoptera

French: Piranga bifascié **German**: Weißbindentangare **Spanish**: Piranga Aliblanca

Taxonomy. *Pyranga leucoptera* Trudeau, 1839, Mexico.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species and *P. erythrocephala* have sometimes been placed in a separate genus, *Spermagra*, but recent DNA work does not support such treatment. Four subspecies recognized.
Subspecies and Distribution.
P. l. leucoptera Trudeau, 1839 – highlands of E Mexico (from Tamaulipas) S to Guatemala, Belize, El Salvador, Honduras and Nicaragua.
P. l. latifasciata Ridgway, 1887 – highlands of Costa Rica and W Panama (E to Veraguas).
P. l. venezuelae J. T. Zimmer, 1947 – Andes of Colombia (except Nariño), and highlands of Venezuela (N & S of R Orinoco) and adjacent Brazil (on Uei-tepui).
P. l. ardens (Tschudi, 1844) – W slope of Andes in SW Colombia (Nariño) S to SW Ecuador; E slope from Ecuador and Peru S to Bolivia (to Cochabamba).



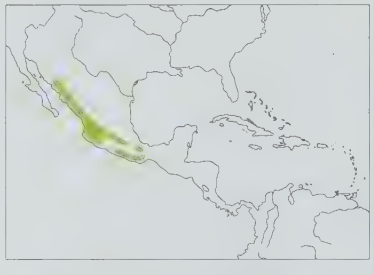
Descriptive notes. 13 cm; 13–20 g. Small stout-billed *Piranga* with conspicuous white wingbars. Male nominate race is mainly bright red, with narrow black line across base of forehead, ocular area and chin (forming small mask); scapulars, upperwing-coverts, flight-feathers, tertials and tail black, tertials sometimes very narrowly tipped white (inconspicuous arcs); median and greater wing-coverts tipped white, forming two bold white wingbars (size of bars varies); often some blackish mottling on back; iris dark brown; bill blackish, basally bluish-grey, especially on lower mandible; legs dark grey. Female has head yellowish-olive, dusky lores and ocular area forming small inconspicuous mask; upperparts slightly darker yellowish-olive, upperwing-coverts dusky black, median and greater coverts broadly tipped white (two conspicuous white wingbars), flight-feathers and tertials dusky, edged dull olive-yellow, tertials usually narrowly tipped white; tail dusky olive-yellow; yellow below, brightest on throat and undertail-coverts, tinged olive on sides and flanks. Juvenile is like female, but duller, juvenile male with blacker flight-feathers; immature male like adult, but underparts duller; subadult male more orangish than red, especially on belly and flanks. Race *latifasciata* male differs from nominate in broader white wingbars and darker red plumage (upperparts close to carmine), female broader white wingbars and more intense yellow and olive; *venezuelae* male differs from nominate primarily in having black of face restricted to lores and orbital ring (no black line over bill); *ardens* is similar to last, but both sexes have lower wingbar (tips of greater coverts) narrower. Voice. Song a thin, wiry "e-seé-se-whéét". In Mexico utters a stream of squeaks and twitters with occasional emphatic squeal. Frequently heard calls often the first indication of this species' presence. In Andes a distinctive "pit-sweet!" or "pit-sweet-sweet!", the "sweet" notes musical and rising; also various sharp "weet" and "chip" notes.
Habitat. In Mexico and N Central America occurs in pine–oak (*Pinus–Quercus*) associations and shady coffee plantations. In lower Central America and in Andes and tepuis occurs in canopy of humid montane forest, cloudforest, tall second-growth woodland, coffee plantations, and drier more seasonal mountain forest, especially drier areas where forest is broken or disturbed. In mature forest found mainly on top of canopy. At c. 100–1800 m in Mexico (mostly above 600 m on Atlantic slope), 1100–1850 m in Costa Rica, and 900–1800 m in Panama; in Venezuela 650–2100 m N of R Orinoco and, S of it, 1000–1800 m; c. 600–2000 m in Colombia, Ecuador and Peru.
Food and Feeding. Fruit, including melastome berries and *Heliocarpus* (Tiliaceae) seeds; probably also some insects. Pairs and groups of 3–6 individuals, calling frequently, usually forage in semi-open on top or outer edge of canopy foliage, either alone or with mixed-species flocks; fairly easy to see. Usually forages somewhat above other species. Peers and flutters in high outer twigs and foliage; looks under small branches in manner of some *Tangara* species.
Breeding. A small cup nest 14 m up on mossy branch, built by female. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to fairly common locally in mature montane forest, and second growth and partly wooded areas. Found in numerous parks, reserves and other protected areas, e.g. Celaque National Park (Honduras), La Amistad International Park (Costa Rica and Panama), Henri Pittier and Canaima National Parks (Venezuela), Farallones de Cali and Munchique National Parks (Colombia), Manu Biosphere Reserve (Peru) and Amboró National Park (Bolivia). Range also encompasses extensive intact habitat not formally protected, but at relatively low risk. Has suffered range contraction and fragmentation to varying degrees owing to deforestation, but the species' long-term viability seems secure so long as protected areas within its range are maintained.
Bibliography. Binford (1989), Blake (1953), Burns (1998a), Collins & Watson (1983), Davis (1972), Dickey & van Rossem (1938), Donegan & Dávalos (1999), Edwards (1972), Garrigues & Dean (2007), Ginés *et al.* (1951), Hartman & Brownell (1961), Haverschmidt & Mees (1994), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Hubbard (1965), Isler & Isler (1999), Klicka *et al.* (2007), Land (1970), Lysinger *et al.* (2005), Mec *et al.* (2002), Meyer de Schauensee (1964, 1966, 1970a), Meyer de Schauensee & Phelps (1978), Moore *et al.* (1999), Phelps & Phelps (1950, 1963), Remsen, Cadena *et al.* (2010), Remsen, Traylor & Parkes (1987), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Russell (1964), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Salaman, Stiles *et al.* (2002), Schäfer & Phelps (1954), Schulenberg (2000a), Schulenberg *et al.* (2007), Slud (1964), Smithe (1966), Souza (2002), Stiles & Skutch (1989), Tashian (1953), Wetmore (1939), Wetmore *et al.* (1984), Zimmer (1947a).

261. Red-headed Tanager

Piranga erythrocephala

French: Piranga érythrocéphale **German**: Rotkopftangare **Spanish**: Piranga Cabecirroja

Taxonomy. *Spermagra erythrocephala* Swainson, 1827, Temascáltepec, Mexico.
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species and *P. leucoptera* have sometimes been placed in a separate genus, *Spermagra*, but recent DNA work does not support such treatment. Two subspecies recognized.
Subspecies and Distribution.
P. e. candida Griscom, 1934 – NW Mexico from S Sonora and S Chihuahua S to Jalisco; outside breeding season recorded S to Michoacán and México.
P. e. erythrocephala (Swainson, 1827) – SC & S Mexico (Jalisco S to E Oaxaca at Isthmus of Tehuantepec).



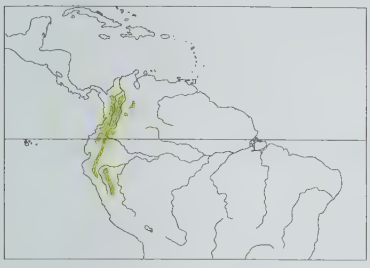
Descriptive notes. 15 cm; 19·9–24·5 g. Male nominate race has black lores and narrow black eyering, rest of head (except rear crown), throat and foreneck geranium-red, ending in short crest at rear, with faint white markings on ear-coverts; rear crown, nape, rear side of neck, and upperparts, including scapulars, bright yellowish-olive; upperwing-coverts and flight-feathers dusky, broadly edged yellowish-olive, tail yellowish-olive; chest and breast to undertail-coverts olive-yellow, brighter and paler than upperparts; iris brown; bill dusky, basal half of lower mandible blue-grey; legs grey. Female has forecrown yellowish, becoming yellow-olive on rest of crown and upperparts; lores and ear-coverts dusky, throat and chest yellow, becoming whitish to buffy white on belly and undertail-coverts; wings and tail as on male. Juvenile male is similar to female, but brighter. Race *candida* is very similar to nominate, but tends to be slightly duller and darker, with white markings on ear-coverts often more prominent. Voice. Song a long, slow, throaty series of single or double notes, e.g. "chur chew che-wier chéé-chur wee chur cheer chéé-chur..." and so on; also described as a high, thin, fairly rapid, tinkling "tsi-tsi tsee-tsee", or similar variation, the first phrase often repeated up to three times. Call a high "chit" and twittering "chit-t-t-t"; also "spik" or "spi."
Habitat. Semi-humid and moist montane forest and pine–oak (*Pinus–Quercus*) associations, semi-deciduous and evergreen forest, and open woodland mixed with scrub; also forest edges and plantations. From 900 m to c. 2600 m.
Food and Feeding. Insects and small fruits, including blackberries (*Rubus*) and berries of a *Solanum*. Forages in pairs and small groups (possibly family parties), from eye level in shrubs up to canopy, more often at middle levels or higher in medium-sized trees. Inconspicuous; tends to remain within foliage, sometimes in view, as it forages out along ends of branches.
Breeding. Nest a cup of fine twigs and other plant material, at middle heights or high in outer canopy of tree. No other information.
Movements. Some southward movements within Mexico during non-breeding season; seasonal elevational movements also likely.
Status and Conservation. Not globally threatened. Locally fairly common along almost entire Pacific slope of Mexico. Occurs in a number of protected sites, including Cumbres de Majalca National Park (Chihuahua), La Michilía Biosphere Reserve (Durango), Sierra de Manantlán Biosphere Reserve (Jalisco), and almost certainly other reserves. Range also encompasses intact habitat that is not formally protected in S Sonora, Sinaloa, Nayarit, Jalisco, Michoacán and elsewhere. Although the long-term viability of habitat in these areas is unknown, it seems certain that the near-term risk to this species is low.
Bibliography. Alden (1969), Binford (1989), Burns (1997a), Burns *et al.* (2002, 2003), Davis (1972), Edwards (1972), Griscom (1934), Hellmayr (1936), Howell & Webb (1995), Hutto (1980), Isler & Isler (1999), Peterson & Chalif (1973), Rowley (1966), Salvin & Godman (1883), Schaldach (1963, 1973), Zimmerman & Harry (1951).

262. Red-hooded Tanager

Piranga rubriceps

French: Piranga à capuchon **German**: Scharlachkopftangare **Spanish**: Piranga Capuchirroja
Other common names: Gray's Tanager

Taxonomy. *P.*[*yranga*] *rubriceps* G. R. Gray, 1844, "Bogotá".
Molecular-genetic evidence indicates that this genus forms a monophyletic group with *Habia* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Monotypic.
Distribution. Locally in all three ranges of Andes in Colombia, and on E slope (from Nariño and Putumayo) S through Ecuador (locally also on W slope S to Pichincha) to N Peru (S to Huánuco).
Descriptive notes. 17 cm; 28–42 g. Colourful stout-billed tanager with red head and yellow underparts. Male has entire head down to upper mantle and to central breast deep red, back and scapulars yellowish-olive, becoming bright yellow on rump and most of uppertail-coverts; longest uppertail-coverts olive, rather like tail, which slightly darker dusky olive with dull yellow edgings; bend of wing and lesser and median upperwing-coverts bright yellow (often partly or



completely hidden), rest of wing and tail black with olive-yellow fringes on greater coverts and outer webs of tertials, secondaries and rectrices; underparts from chest to undertail-coverts bright yellow; iris dark brown; bill blackish; legs dark grey. Female is similar to male but duller, with red more restricted, reaching only as far as upper nape and foreneck. Juvenile undescribed. VOICE. Song a combination of thin trills, e.g., "tititi-titi", interspersed with sweeter, more musical phrases such as "tswe, weéteetseet-see". Also gives sharper, more piercing "tsee-ee-ee-ee" or similar note that rises, e.g. "tuueeet!". Calls include sharp "spink!" and "tink!" notes.

Habitat. Found in humid and wet montane forest, especially mossy epiphyte-laden forests, and forest edges. At 1700–3000 m in Colombia; mostly 2200–3000 m in Ecuador; c. 1800–3000 m in Peru.

Food and Feeding. Forages in pairs and in small groups of 3–6 individuals; with mixed-species flocks or away from them about equally. Hops and peers sluggishly along limbs or in foliage in middle or upper storey; often in open, where fairly conspicuous.

Breeding. Female in breeding condition in Sept at N end of W Andes. No other information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Rare to uncommon and local; almost everywhere throughout limited Andean range occurs at low density. Can be found in a number of protected areas, including Las Orquídeas, Tatamá and Cueva de los Guácharos National Parks (Colombia), the Reserva Hidrográfica de Río Blanco, in Caldas (Colombia), Antisana and Cayambe-Coca Ecological Reserves and Sangay and Podocarpus National Parks (Ecuador), and Cordillera Azul National Park (Peru). Range encompasses intact forest in unprotected areas, although portions of this may be at near-term risk. The long-term viability of this species seems secure so long as the parks and reserves where it occurs are maintained. It has, however, suffered considerable range contraction and fragmentation, and these will probably continue to take place.

Bibliography. Clements & Shany (2001), Echeverry-Galvis & Córdoba-Córdoba (2007), Fjeldså & Krabbe (1990), Graves (1983), Hilty & Brown (1983, 1986), Isler & Isler (1999), Krabbe *et al.* (2001), Meyer de Schauensee (1964, 1966, 1970a), Moynihan (1979), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan & Cuervo (1999), Schulenberg *et al.* (2007), Zimmer (1945, 1947a).

Genus *SPINDALIS* Jardine & Selby, 1837

263. Western Spindalis

Spindalis zena

French: Zéna à tête rayée **German**: Kuba-Streifenkopftangare **Spanish**: Cigua Cubana
Other common names: (Western) Stripe-headed Tanager; Bahaman Spindalis (nominate and *townsendi*); Cuban Spindalis (*pretrei*); Cayman/Salvin's Spindalis (*salvini*); Benedict's/Cozumel Spindalis (*benedicti*)

Taxonomy. *Fringilla Zena* Linnaeus, 1758, New Providence, Bahama Islands.

Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *S. nigricephala*, *S. dominicensis* and *S. portoricensis*; all four were formerly treated as conspecific, but differ in morphology, plumage and vocalizations, and are geographically isolated from one another. Moreover, races of present species originally suggested as representing four distinct species, nominate and *townsendi* forming one species and *pretrei*, *salvini* and *benedicti* a further three. Additional studies may lead to changes in the present taxonomic arrangement. Five subspecies currently recognized.

Subspecies and Distribution.

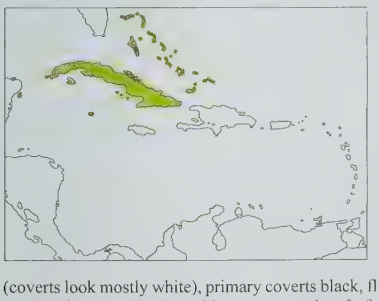
S. z. townsendi Ridgway, 1887 – N Bahamas (including Grand Bahama, Little Abaco, Abaco and offshore cays).

S. z. zena (Linnaeus, 1758) – C & S Bahamas (including Berry Is, Andros, Green Cay, New Providence, Eleuthera, Cat I, Exuma, Long I, Acklin and Mayaguana).

S. z. pretrei (Lesson, 1831) – Cuba and I of Pines.

S. z. salvini Cory, 1886 – Grand Cayman I.

S. z. benedicti Ridgway, 1885 – Cozumel I, off NE Yucatán Peninsula.



Descriptive notes. 15 cm; 17–25·5 g (nominate), 18–25·5 g (*pretrei*), 20·5–31 g (*salvini*), 26·5–35·6 g (*benedicti*). Smallest spindalis, bill short and conical. Male nominate race has head and side of throat black, long white supercilium, broad white submoustachial area, white chin, bright yellow central throat; nuchal collar and chestband chestnut and rich yellow; mantle and upper back black, lower back tawny-yellow, rump and shorter uppertail-coverts darker golden-rufous, longer uppertail-coverts black; tail black with extensive white outer edges; scapulars and upperwing-coverts black, greater coverts with outer webs almost entirely white (coverts look mostly white), primary coverts black, flight-feathers and tertials black, small white patch at base of outer primaries (white on outer webs of a few feathers), otherwise flight-feathers sharply and narrowly edged with white, tertials more broadly edged white; mid-breast yellow, turning white on lower underparts; iris dark brown; bill blackish, basal half to two-thirds of lower mandible and base of upper mandible steel-grey; legs dark grey. Female is greyish-olive above, with obscure whitish submoustachial; rump and uppertail-coverts paler brown than back, greater wing-coverts dusky, broadly edged whitish, flight-feathers dusky, narrowly edged whitish-olive, tertials dusky black, broadly edged whitish-olive, outer primaries with small white spot at base of feathers; tail dull olive-grey; throat and underparts unstreaked dirty greyish to buffy whitish. Juvenile is similar to female but much duller, with minimal pattern on foreparts. Race *townsendi* male differs from nominate in having nuchal collar tawny-rufous (not tawny), back dark olive-green mixed with dusky brown, lower back darker tawny-orange, scapulars duller, more dusky; *pretrei* male differs in bright olive-green back, brighter rump, paler tawny-yellow nuchal collar, paler tawny on chest, chestnut on lesser wing-coverts, median coverts broadly tipped olive-green, female differs in having long dull whitish supercilium, some yellow on underparts, and often a weak greyish malar stripe; *salvini* male is much like previous, but slightly larger, rump slightly darker, nuchal collar and chestband darker (more tawny-orange), and more extensively white on flanks and lower underparts; *benedicti* male most closely resembles nominate, but back deep yellowish-olive, scapulars sometimes partly blackish, lesser upperwing-coverts chestnut, and median coverts black, tipped with yellowish-olive. VOICE. Song high, thin, sibilant and rather variable, e.g. "see-tee" doublets mixed with high "seet" and reedy "deet" notes and sometimes with twittering notes; weak, but stronger during breeding season and usually delivered from top of high tree. A second song type described as a soft warbling series of notes given rapidly. Flight song a high, sibilant "seeet sit-t-t-t-t". A faint whisper song also described. High, thin quality of vocalizations often makes this bird difficult to locate. Calls include high thin "seeip" and soft "tsit-tsit-tsit".

Habitat. Lowlands to highlands, in wide range of fairly dry to humid regions. In Bahamas found in native pines (*Pinus*) and Australian pines (*Casuarina*) when breeding, and at other times can occur in almost all habitats, including scrub and densely vegetated habitats (coppice). On Cuba and I of Pines occurs from coast to mountains in open woodland, brushland, forest edges, second growth and mangroves, but not inside tall dense forest. Most numerous at middle and higher elevations. On Cozumel I mainly in disturbed, degraded and second-growth vegetation.

Food and Feeding. Feeds mainly on fruits and berries, also tips of soft leaves and other plant parts; once seen attempting to eat a snail (Gastropoda). In pairs when breeding; at other times in pairs and small groups, in past apparently also in larger groups. Forages from low in shrubs to high in trees.

Breeding. Season Apr–Aug. In flight display, male flies up on slowly beating wings, circles above treetops while singing, then dives down to same or another perch; spread wing and tail feathers may make a noise during display. Thin, poorly constructed nest of palm fibres, placed low down or quite high up in bush or small to large tree. Clutch 2–3 eggs, white, covered with brownish dots. No other information.

Movements. Resident, with some inter-island wandering. Occasional records at various extralimital localities. Up to c. 50 records (some unverifiable) from S Florida (SE USA), in all months except Jul, with greatest concentration in Apr, May and Dec (which may represent periods when more human observers afield); estimated 65% of Florida records are of males.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Considered common in Bahamas and Cuba, fairly common on Grand Cayman I, and in small numbers on numerous other islands. Utilizes a variety of second-growth, disturbed and scrubby habitats, which buffers it against threats. In past reported to occur in large groups on Cuba, but populations there may have been much depleted as a result of trapping.

Bibliography. Acosta *et al.* (2003), Barbour (1943), Bond (1943, 1956, 1985), Brudenell-Bruce (1975), Buden (1980, 1987), Burns (1997a), Burns *et al.* (2002, 2003), Davis (1972), Downer & Sutton (1990), Edwards (1972), English (1916), Garrido & Montaña (1975), Garrido *et al.* (1997), Griscom (1926), Gundlach (1855), Hellmayr (1936), Howell & Webb (1995), Isler & Isler (1999), Klaas (1968), Oberle (2008), Olson & Angle (1977), Paynter (1955), Pranty & Smith (2001), Raffaele *et al.* (1998), Reynard (1969, 1982), Sibley (2000), Steadman *et al.* (1980).

264. Jamaican Spindalis

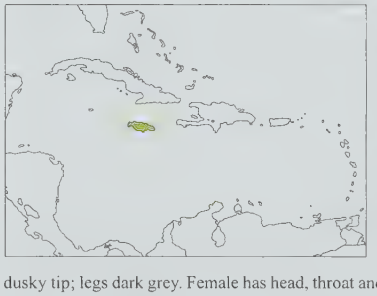
Spindalis nigricephala

French: Zéna de Jamaïque **German**: Jamaika-Streifenkopftangare **Spanish**: Cigua Jamaicana
Other common names: Jamaican (Stripe-headed) Tanager

Taxonomy. *Tanagra nigricephala* Jameson, 1835, Jamaica.

Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *S. zena*, *S. dominicensis* and *S. portoricensis*; all four were formerly treated as conspecific, but differ in morphology, plumage and vocalizations, and are geographically isolated from one another. Further taxonomic evaluation may be warranted. Monotypic.

Distribution. Jamaica.



Descriptive notes. 18 cm; 38–64·8 g. Largest spindalis. Male has black hood with long, broad white supercilium reaching to side of nape, and long, broad white submoustachial stripe, with white also on chin and upper throat; yellowish-olive back, tawny-yellow rump and uppertail-coverts; wing and tail black, with greater upperwing-coverts, flight-feathers and sides of outer tail feathers heavily edged white; central chest bright yellowish-orange becoming yellow below, with greenish-golden tinge on sides and flanks, rearmost belly, thighs and undertail-coverts white; iris dark brown; bill dusky above, lower mandible steel-grey with dusky tip; legs dark grey. Female has head, throat and upperparts greyish-olive (facial stripes obscure or absent); white edging on greater wing-coverts and inner flight-feathers; pale orange-yellow central chest, becoming pale yellow on belly and whitish on undertail-coverts. Juvenile resembles female but much duller, with black markings on head obscure. VOICE. Notably quiet. A long-sustained whisper song consisting of a phrase c. 4 seconds long repeated over and over, e.g. "chu wheet, chee see whee see, chu wheet". Gives soft "seep" notes, often heard in flight, and a high, fast "chi-chi-chi-chi-chi" when foraging in groups. Male gives churrs or rattles when disturbed or in hostile situations; a female gave a harsh "chirring" note when gathering nesting material.

Habitat. Forest, woodlands and brushy areas; mainly fruiting trees and shrubs in forest and forest borders. Lowlands and highlands; much more numerous in hills and mountains. Local on N and SW coasts.

Food and Feeding. Fruit and berries, including many non-native species such as oranges, pimentos, and royal palm (*Roystonea*) fruits; other fruits in diet include *Ficus*, *Cecropia* and *Dunalia*, and has been noted as eating leaves and orange blossoms. Two stomachs contained fruit seeds. Pairs and family groups often at fruiting trees; also gathers in feeding aggregations of 8–10 individuals, which interact with much chattering and scolding. Acrobatic, hanging in various positions from twigs to take berries. Rests in treetops.

Breeding. Season Apr–Jul. Nest a loose cup of grass and rootlets. Clutch 2–3 eggs, greenish-white or pale grey, marked with brown or grey, especially around larger end. No other information.

Movements. Resident.

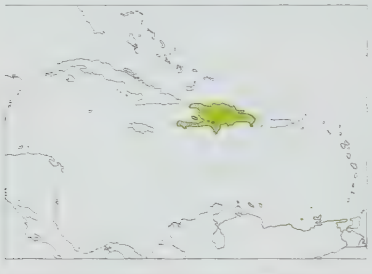
Status and Conservation. Not globally threatened. Restricted-range species: present in Jamaica EBA. Common and widespread, particularly at higher elevations. Utilization of a variety of habitats, including second growth and brushy areas, safeguards this species against near-term threats, despite its tiny global range.
Bibliography. Bond (1943, 1956, 1985), Cruz (1974), Danforth (1928), Downer & Sutton (1990), Garrido *et al.* (1997), Gosse (1847), Hellmayr (1936), Isler & Isler (1999), Jeffrey-Smith (1956), March (1863), Ogilvie-Grant (1912), Raffaele *et al.* (1998), Reynard (1969, 1982), Steadman *et al.* (1980), Taylor (1955).

265. Hispaniolan Spindalis

Spindalis dominicensis

French: Zéna d'Hispaniola **Spanish**: Cigua de la Española
German: Hispaniola-Streifenkopftangare
Other common names: Hispaniolan (Stripe-headed) Tanager

Taxonomy. *Tanagra dominicensis* H. Bryant, 1867, Port-au-Prince, Haiti.
Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *S. zena*, *S. nigricephala* and *S. portoricensis*; all four were formerly treated as conspecific, but differ in morphology, plumage and vocalizations, and are geographically isolated from one another. Present taxonomic arrangement may warrant further evaluation. Monotypic.
Distribution. Hispaniola (Haiti and Dominican Republic) and Gonâve I.



Descriptive notes. 16·5 cm; 25–33·2 g. Male has black head with long, broad white supercilium and submoustachial area, chin white, bright yellow patch on central throat flanked by black triangle on lower part of malar area; rich yellow hindneck, mantle and back rather green citrine-olive, darker on scapulars, rump tawny-yellow becoming chestnut on uppertail-coverts, lower tail-coverts black; marginal and lesser upperwing-coverts deep chestnut, median coverts black with deep olive edges, greater coverts black, prominently edged white (most of outer web of each feather white); flight-feathers and tail black, narrowly edged white, tertials more broadly edged white, white spot at base of outer primaries; central chest broadly deep chestnut, becoming yellower on sides and bright rich yellow on breast, light greyish on flanks, white from central belly to undertail-coverts; iris dark brown; bill dusky, basal half of lower mandible steel-grey; legs dark grey. Differs from similar *S. nigricephala* in smaller size, yellow nuchal collar, and small rufous shoulder patch (marginal and lesser coverts). Female is greyish-olive overall, greyer on rather uniform head and mantle, yellower on rear upperparts, upperwing dusky brown with buffy-olive feather edges, lesser and median coverts mostly dull olive, primary coverts blackish-brown, tail feathers dusky-brown with olive outer edges; malar area and throat whitish with ill-defined dusky spots, a hint of dusky malar stripe in between, rest of underparts whitish with ill-defined dusky streaks, whitest on belly and undertail-coverts. Juvenile similar to female but much duller, with black on head obscure. Voice. Dawn song described as a thin, high-pitched whistle, or a prolonged weak, sibilant "tsee see see see". Male sings from exposed perch or lower and inside dense thickets. Female sings a whisper song of jumble notes recalling that of male. Commonest call a high "thseep"; also gives more drawn-out "seeee", this sometimes followed by ticking notes.
Habitat. Wide range of habitats, but favours humid regions with thickets and low vegetation in or near montane forest, woodland and pine (*Pinus*) forest. Away from forest mainly in orchards and plantations; attracted to fruiting shrubs and trees. Least numerous in overgrown clearings and dry scrub. Lowlands and highlands; most numerous in highlands.
Food and Feeding. Primarily fruits and flower buds, also seeds and tender green leaves, also insects. Fruit comprised 70–93% of foraging records in two studies, and stomach contents have included only fruit. Observed to eat fruits of *Cecropia*, *Miconia*, *Ficus*, *Brunellia*, *Solanum* and *Passiflora*, *Rubus* species (blackberries) and rose apples (*Syzygium jambos*); also pecks or opens oranges and other large fruits. Found in pairs and in small groups of 3–4 individuals; may congregate locally in larger numbers when fruit ripening. Forages from low in bushes to tops of fruiting trees. Takes insects from foliage and on fruit.
Breeding. Season May–Jun; some pairs raise second brood. Small cup-nest, loosely constructed entirely from dry grass, placed 1–4·5 m up in tree or bush. Clutch 3 eggs, whitish with brown spots, mostly on large end. No further information available.
Movements. Resident. Local movements in response to changing fruit supplies.
Status and Conservation. Not globally threatened. Restricted-range species: present in Hispaniola EBA. Common and widespread, particularly at higher elevations; less numerous in lowlands and on coast. Occurs in several parks in Dominican Republic, including Armando Bermúdez and José del Carmen Ramírez National Parks, and in numerous other protected areas, including Sierra de Neiba, Sierra de Bahoruco, La Barbacoa, Montaña de Humeadora and Nalga de Macao. Utilization of a variety of habitats, including second growth and brushy areas, buffers this species against near-term threats, despite its small world range.
Bibliography. Bond (1943, 1956, 1985), Christy (1897), Danforth (1926), Dod (1978), Garrido *et al.* (1997), Hellmayr (1936), Isler & Isler (1999), Raffaele *et al.* (1998), Reynard (1969, 1981), Steadman *et al.* (1980), Verrill & Verrill (1909), Wetmore & Swales (1931).

266. Puerto Rican Spindalis

Spindalis portoricensis

French: Zéna de Porto Rico **Spanish**: Cigua Puertorriqueña
German: Puerto-Rico-Streifenkopftangare
Other common names: Puerto Rican (Stripe-headed) Tanager

Taxonomy. *Tanagra portoricensis* H. Bryant, 1866, Puerto Rico.
Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Phaenicophilus* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *S. zena*, *S. nigricephala* and *S. dominicensis*; all four were formerly treated as conspecific, but differ in morphology, plumage and vocalizations, and are geographically isolated from one another. Present taxonomic arrangement may warrant further evaluation. Monotypic.
Distribution. Puerto Rico.



Descriptive notes. 16·5 cm; male 22·5–37 g, female 28–41·1 g. Male has black head with long, broad white supercilium and submoustachial area, latter with narrow black flecking, chin white, bright yellow to orange patch on central throat flanked by black triangle on lower part of malar area; nape and side of neck yellow-orange to bright orange, mantle and scapulars deep yellowish-olive to olive-green, brighter olive-yellow tinge on rump and shorter uppertail-coverts; tail dusky with narrow yellowish-olive fringes; rufous at bend of wing and on marginal coverts (often hidden), median upperwing-coverts dusky with buff edgings and tips, greater coverts and flight-feathers dusky with narrow yellowish-white edgings; orange of foreneck fades to golden-olive on chest and breast, often greener on sides, most of flanks pale greyish, lower belly to undertail-coverts nearly white, entire abdomen usually with obscure dusky spots or stripes; iris dark brown; bill dusky, basal portion of lower mandible steel-grey; legs dark grey. Differs from similar *S. nigricephala* mainly in smaller size, orangy hindcollar, rufous patch on bend of wing, and less black on lower throat. Female is olive-brown above, tinged greenish-yellow on rump and uppertail-coverts; variable whitish supercilium, submoustachial area dingy whitish; upperwing and tail dusky brown, edged buffy brown to greenish-yellow; chin and central throat whitish, often a yellow to orange spot on central foreneck, rest of underparts pale sandy-buff, with ill-defined dusky streaks mainly on sides and flanks, and often some yellow on central underparts; very like female of *S. dominicensis*, but streaking below clearer, less smudgy, has white head markings, and often some yellowish on central underparts. Juvenile resembles female but much duller, with black pattern on head obscure. Voice. Song a thin, high, squeaky or wiry "zeé-tit-zeé-tittit-´zeé", the "zeé" notes sound like air being inhaled; or a thin high "tswee, tswee, tsweey". Basic call has two variations, a thin trill like a tiny hammer, and a short twittering. Call a soft "teweep", ventriloquial and difficult to locate.
Habitat. Woodland and forest, at all elevations.
Food and Feeding. Feeds mainly on small fruits and flower buds. Occurs in pairs, family parties and locally in larger groups around suitable fruiting trees; may gather in flocks locally when ripe fruit abundant. An arboreal species.
Breeding. Breeds primarily Mar–Jun, sometimes from as early as Dec. Nest a loose cup of vegetation, sometimes with *Usnea* lichen, built low in bush, tree or palm. Clutch 2–4 eggs, pale blue, blotched and scrawled with blackish or dark blue. No other information.
Movements. Resident. Local movements in response to shifting seasonal food supplies, but does not migrate away from the islands.
Status and Conservation. Not globally threatened. Restricted-range species: present in Puerto Rico and the Virgin Islands EBA. Common and widespread. There are 56 nationally recognized protected areas in Puerto Rico, and the species occurs in many of the terrestrial sites, including the well-known Caribbean National Forest/Luquillo Experimental Forest and Guánica State Forest and Biosphere Reserve. Utilization of a variety of habitats, especially second growth and brushy areas, safeguards this species against near-term threats, despite its small world range.
Bibliography. Biaggi (1970), Bond (1943, 1956, 1985), Bowdish (1903), Burns *et al.* (2003), Danforth (1926), Faaborg (1982), Garrido *et al.* (1997), Hellmayr (1936), Isler & Isler (1999), Leck (1972a), Oberle (2008), Olson & Angle (1977), Raffaele (1983, 1989), Raffaele *et al.* (1998), Steadman *et al.* (1980), Terborgh & Faaborg (1973), Wetmore (1927), Wetmore & Swales (1931).

PLATE 32 ➤


ssp rubica
ssp rosea
ssp hesterna
ssp holobrunnea
ssp rubicoides
267
ssp coccinea
ssp fuscicauda
268
ssp discolor
270
271
269
ssp dugandi
274
275
ssp stolzmanni
273
272
PLATE 32
inches
3
cm
8

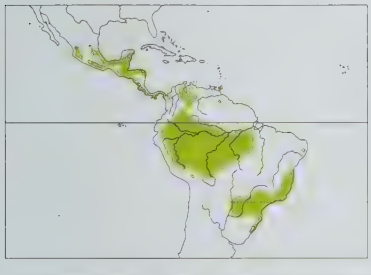
Genus *HABIA* Blyth, 1840

267. Red-crowned Ant-tanager

Habia rubica

French: Habia à couronne rouge **German**: Karminameisentangare **Spanish**: Habia Coronirroja
Other common names: Jungle Ant-tanager

Taxonomy. *Staltator* [sic] *rubicus* Vieillot, 1817, Paraguay.
Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Nominate race and *bahiae* geographically isolated from all other races, in region of SE Brazil; other races are smaller and paler, with more contrasting pattern on head, and might represent a separate species. Several of the numerous races are weakly differentiated and seem barely worth recognizing. Seventeen subspecies currently recognized.
Subspecies and Distribution.
H. r. holobrunnea Griscom, 1930 – E Mexico from S Tamaulipas S to N Oaxaca.
H. r. rosea (Nelson, 1898) – Pacific slope of SW Mexico from Nayarit and Jalisco S to Guerrero.
H. r. affinis (Nelson, 1897) – SW Oaxaca (S Mexico).
H. r. nelsoni (Ridgway, 1902) – SE Mexico (Yucatán Peninsula).
H. r. rubicoides (Lafresnaye, 1844) – S Mexico (from Pueblo, E Oaxaca, Tabasco and Chiapas), Guatemala and Belize S to Honduras, El Salvador and possibly Nicaragua.
H. r. alfaroana (Ridgway, 1905) – NW Costa Rica (Guanacaste).
H. r. vinacea (Lawrence, 1867) – Pacific slope of Costa Rica (S from Nicoya Peninsula) and Panama (E to Darién).
H. r. perijana Phelps, Sr & Phelps, Jr, 1957 – Perijá Mts region of Venezuela–Colombia.
H. r. coccinea (Todd, 1919) – base of Andes in W Venezuela (S from Lara) and adjacent NC Colombia.
H. r. crissalis Parkes, 1969 – NE Venezuela (mountains of Anzoátegui and Sucre).
H. r. rubra (Vieillot, 1819) – Trinidad.
H. r. mesopotamia Parkes, 1969 – E Venezuela (R Yuruán region of E Bolívar).
H. r. rhodinolaema (Salvin & Godman, 1883) – Colombia E of Andes (from Meta S to Caquetá), NW Brazil, E Ecuador and NE Peru.
H. r. peruviana (Taczanowski, 1884) – E Peru, W Brazil and N Bolivia (S to Santa Cruz).
H. r. hesterna Griscom & Greenway, 1937 – C Brazil S of R Amazon (E to R Xingu, S to N Mato Grosso).
H. r. bahiae Hellmayr, 1936 – NE & CE Brazil (Alagoas; SE Bahia).
H. r. rubica (Vieillot, 1817) – E Paraguay, SE Brazil (from S Minas Gerais and Espírito Santo S to Rio Grande do Sul) and NE Argentina (Misiones).



Descriptive notes. 17–19 cm; male 27·7–42·9 g, female 22·5–37 g. Mostly brownish-red ant-tanager with strong bill and no obvious crest. Male nominate race is mainly dull brownish-red above, with partly hidden scarlet crown patch bordered narrowly by inconspicuous black line (crown patch usually shows as narrow medial stripe, and often inconspicuous, but can be raised); upperwing-coverts dull red, primary coverts blackish, narrowed edged red, flight-feathers dusky, inner half of primaries and most of secondaries edged dull red, tertials and tail mostly dull red; paler red below, throat (and sometimes chest) contrastingly brighter red, flanks tinged grey; iris dark brown; bill dusky above, generally paler below; legs dark grey. Female is similar to male but duller, olive-brown above, with brownish-yellow median crown patch; underparts paler than above. Juvenile is generally sooty olive-brown, paler below, and palest on throat; soon acquires immature plumage, which is much like female; adult male plumage gained in about one year. Races differ mainly in brightness of plumage above and below: *bahiae* rather similar to nominate, with red of breast somewhat less extensive; *perijana* is relatively dark, morocco-red above with scarlet crest, throat coral-red, breast dull scarlet, becoming rose-pink on lower underparts and tinged brick-red on flanks; *coccinea* has brightest red (scarlet) throat, blood-red breast and pale jasper-red underparts, generally redder above (although tinged brownish) and with more scarlet crest than other races; *crissalis* resembles previous (has throat deep red), but posterior underparts paler and pinker; *rubra* is duller and with red areas less scarlet than last; *mesopotamia* is paler than nominate, abdominal area greyish, undertail-coverts more salmon-pink (less rose-pink), dark margins of red crown patch less well marked or even absent, and bill paler, upper mandible brown (rather than blackish); *rhodinolaema* has rosy-red throat, and breast and belly washed grey; *rosea* is palest, with upperparts pinkish-red and underparts pale pinkish-red; *affinis* and *nelsoni* resemble last; *holobrunnea* darker above than nominate, slightly paler and redder below; *hesterna* slightly smaller than nominate and generally paler, especially on underparts; *rubicoides* is darker, with upperparts dull dark red, and red throat contrasting slightly with dusky red underparts; *vinacea* and *alfaroana* resemble preceding race. Voice. Has diverse array of vocalizations, some harsh, some exceptionally melodic. In Middle America three main song types: breeding-season dawn song by male, varying individually, may be e.g. "peer peer p"yerk pewk peer", or a series of musical, mostly trisyllabic phrases, e.g. "inter-vene, inter-vene..." and so on; day song, likely to be rough or burry and more repetitive (so far, reported mainly from Mexico to Belize); and whisper song mainly during day, may be given when carrying food, in territorial disputes and at other times. In South America dawn and day songs are quite variable from region to region, and may include only sweet, melodic phrases or, more often, a mixture of harsh and melodic phrases. Call notes in all areas are harsh "chat" or "chak" notes and other grating sounds, sometimes in chattering or rough series.
Habitat. Leafy undergrowth and lower levels of humid *terra firme* forest and tall second growth; also *várzea* and transitional forest in Amazonia. Occurs almost exclusively in forest interior, infrequently along river edges or forest borders. Lowlands to 1500 m in El Salvador; to c. 1200 m in Costa Rica and to 2250 m in Panama; to 1400 m in Venezuela, 500 m in Colombia, 600–700 m in Ecuador and c. 900 m in Peru.
Food and Feeding. Food primarily arthropods; small amount of fruit, including *Miconia* and *Solanum* berries. Of 24 stomachs examined, two contained only vegetable matter and 18 only animal matter and four contained both; contents included weevils (Curculionidae) and other beetles (Coleoptera), ants (Formicidae), caterpillars, millipedes (Diplopoda), mantises (Mantodea), snails (Gastropoda), berries and fruit. Nestling diet larvae and mature insects, some so large that young have difficulty in swallowing them. Lives in pairs and small family groups, and sometimes joined by other species, but typically wary and difficult to see. In N Central America may defend a common territory with Tawny-crowned Greenlet (*Hylophilus ochraceiceps*), the two species forming core of small mixed-species flocks; foraging territory in Belize c. 4–5 ha, and family-members may forage together along territorial boundaries when not breeding. In Amazonia, associates with a few other species in small understorey flocks and travels independently of them about equally. Follows army-ant swarms in Central America and Trinidad, but faithfulness to swarms varies; in Amazonia seldom follows army ants, but regularly reported at swarms in SE Brazil (Espírito Santo). Forages from near ground to c. 10 m up, infrequently higher. Mean foraging height in SE Peru was c. 3·6 m. Forages by hopping in foliage, or occasionally leaping or fluttering and lunging for prey, which it picks off twigs and foliage or captures in chasing manoeuvres. Rarely, captures prey by sallying. May hover or cling momentarily beneath a leaf or other substrate to capture an insect, and regularly searches hanging dead leaves. In Trinidad forages mostly on branches and twigs. May take fruit while perched or in short fluttering sally, and occasionally takes fallen fruit from ground.
Breeding. Breeding reported May and Jun (less often as early as Feb) in Mexico, Apr–Jul in Belize, Mar in Guatemala and Feb–Jun in Costa Rica; Feb–Aug (also Oct) in Trinidad; in Brazil, Feb and Apr in Pará and Sept–Dec in Rio de Janeiro; at least Sept through Jan in Paraguay; occasionally two broods. Pair defends a breeding territory. Nest built almost entirely by female, a shallow cup-shaped structure of rootlets, plant fibres and twigs, usually markedly thin-walled (eggs often visible from outside), but one nest in Paraguay thick-walled, placed 1–4 m (infrequently to 7 m) above ground in fork of sapling, bush or vine inside forest, often near small stream. Clutch 2 or 3 eggs, rarely 1 or 4, white or bluish with cinnamon or yellow-brown spots, especially at large end, where form a wreath; incubation by female, period 13–14 days; chicks fed by both adults, females feeding more than males; adults may engage in distraction displays, feigning injury, to lead intruders away from nest; nestling period c. 10 days; young leave nest before able to fly, and hop about in thick foliage and bushes.
Movements. Resident.
Status and Conservation. Not globally threatened. Widespread, and uncommon to locally fairly common. Occurs in a large number of parks and reserves throughout its large range, and its numerous populations, many of which are geographically isolated, face variety of environmental conditions. Deforestation extensive within the range of populations from Mexico S to NW Colombia and, while unprotected lowland forest remains in Guatemala, Belize and Nicaragua, the species appears to be largely confined to protected areas and parks in much of its area of distribution in Mexico, El Salvador, Costa Rica and Panama. Large Amazonian population widespread and is at little risk. Populations in E & SE Brazil appear to be largely confined to a string of parks and reserves; some in SE Brazil reported as surviving in remnant woodlots as small as 21 ha. Those in Andean foothills of Venezuela and NE Colombia have contracted with deforestation but remain viable in numerous areas, including shade coffee plantations. Status of populations in NE Venezuela uncertain, but deforestation is extensive and ongoing in this area, and likely that few birds persist away from the few protected areas, such as Cueva del Guácharo and Península de Paria National Parks.
Bibliography. Allen (1905), Álvarez del Toro (1952), Beebe (1909), Belcher & Smooker (1937), Belton (1985), Burns (1997a), Burns *et al.* (2002, 2003), Clements & Shany (2001), Diamond & Lovejoy (1985), Dickey & van Rossem (1938), Dunning (1982), Edwards (1972), Euler (1867), ffrench (1991), Foster *et al.* (1989), Garrigues & Dean (2007), Hartman (1955), Herklots (1961), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Klicka *et al.* (2007), Land (1970), de Lima Fávaro & dos Anjos (2005), Meyer de Schauensee (1964, 1966, 1970a), Munn & Terborgh (1979), Narosky & Di Giacomo (1993), Nehrkorn (1899), Ogilvie-Grant (1912), Parker & Goerck (1997), Parkes (1969b), Paynter (1955), de la Peña & Rumboll (1998), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Rowley (1966), Russell (1964), Salaman *et al.* (2008), Schubart *et al.* (1965), Schulenberg (2000c), Schulenberg *et al.* (2007), Sick (1985, 1993), Skutch (1954, 1980b), Slud (1964), Smithe (1966), Snethlage & Schreiner (1929), Souza (2002), Stiles & Skutch (1989), Tashian (1952), Weske (1972), Wetmore *et al.* (1984), Willis (1960a, 1960b, 1960c, 1961, 1972, 1979, 1980), Zimmer (1945).

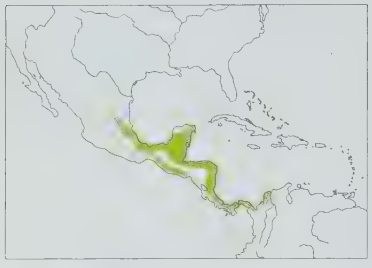
268. Red-throated Ant-tanager

Habia fuscicauda

French: Habia à gorge rouge **German**: Rotkehl-Ameisentangare **Spanish**: Habia Gorjirroja
Other common names: Jungle Ant-tanager; Salvin's Ant-tanager (*salvini*)

Taxonomy. *Phoenicothraupis fuscicauda* Cabanis, 1861, Costa Rica.
Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Race *willisi* appears to intergrade with nominate in NW Panama, from where one specimen is intermediate between the two. Six subspecies recognized.
Subspecies and Distribution.
H. f. salvini (Berlepsch, 1883) – E & SE Mexico (from San Luis Potosí and S Tamaulipas) S to Guatemala (except N), Belize, Honduras and El Salvador.
H. f. insularis (Salvin, 1888) – SE Mexico (N & E Yucatán Peninsula) and N Guatemala.
H. f. discolor (Ridgway, 1901) – Nicaragua.
H. f. fuscicauda (Cabanis, 1861) – extreme S Nicaragua, and both slopes of Costa Rica S to W Panama.
H. f. willisi Parkes, 1969 – C Panama from NE Coclé and Colon E to San Blas (mainly on Caribbean slope).
H. f. erythrolaema (P. L. Sclater, 1862) – Caribbean coast of Colombia (N Atlántico, N Bolívar and Córdoba).
Descriptive notes. 18–20 cm; 29–46·5 g. Dark ant-tanager with strong bill. Male nominate race has head dull dark red, with usually concealed scarlet crown patch and dusky lores; upperparts dusky brown, tinged red; upperwing-coverts dark dull red, flight-feathers dusky, edged dull red, tertials and tail dull red to brownish-red; throat intense rose-scarlet, contrasting with dusky side of head and dusky reddish-brown breast; lower underparts dark greyish-brown with faint reddish tinge;

On following pages: 269. Black-cheeked Ant-tanager (*Habia atrimaxillaris*); 270. Sooty Ant-tanager (*Habia gutturalis*); 271. Crested Ant-tanager (*Habia cristata*); 272. Carmiol's Tanager (*Chlorothraupis carmioli*); 273. Olive Tanager (*Chlorothraupis frenata*); 274. Lemon-spectacled Tanager (*Chlorothraupis olivacea*); 275. Ochre-breasted Tanager (*Chlorothraupis stolzmanni*).



iris dark brown; bill dusky; legs brownish-flesh. Female is dark brown above, paler below, with contrasting ochre-yellow throat. Juvenile is overall dingy and dark, mostly sooty cinnamon-brown, but soon moults into immature plumage; immature much like female, male acquires adult plumage at c. 1 year of age. Races differ mainly in darkness of plumage, nominate darkest: *salvini* is close to nominate, male slightly less dark; *insularis* male is palest, brownish-red above, crown patch scarlet, throat, chest and undertail-coverts pale scarlet, breast and belly duller brownish-grey, tinged red; *discolor* male is slightly darker than previous; *willisi* similar to nominate but with more extensive red above and below; *willisi* and *erythrolaema* females are palest, brownish-olive above, olive-yellow below, with yellowish throat and brownish-tinged flanks. Voice. Often quite vocal. Song, mainly at dawn during breeding season, a rich mellow series of whistles, e.g. "cherry-quick cherry-quick cherry-quick cherry-chewer" or similar phrase, repeated over and over. At least three types of call, including a raspy scold of 2–20 notes, a high rattling "scack ack-ack" like static on a radio (or tearing paper) as birds flee from intruders, and soft "wik" and faint "chak".

Habitat. Found in older second growth and forest borders or shrubby areas near forest. Especially fond of thickets at edge of forest, thick growth along streambanks, and shady overgrowth shrubbery in old plantations; much less often in interior of humid forest. Sea-level to c. 1200 m in Mexico, Costa Rica and Panama; to c. 200 m in Colombia.

Food and Feeding. Arthropods, including ants (Formicidae), caterpillars (including some up to three times length of bird's bill), and long-horned grasshoppers (Tettigoniidae). Of five stomachs examined, two contained animal matter, one had vegetable matter, and two had both; contents included beetles (Coleoptera) and other insects, fruit, grass seeds, berries, and a small snake. In pairs when breeding, but at other times in family parties or noisy groups of up to about eight individuals; may associate with small understorey mixed-species flocks for short periods of time, or more often alone. With other species mainly around army-ant swarms, which it follows regularly. Forages in restless, nervous manner, with much wing-flicking and agitated calling as it hops. Of c. 4000 observations of foraging attempts in Belize, 75% were below 5 m; often foraged on ground around army-ant swarms. Around army ants mostly uses horizontal perches, peers rapidly, frequently turns about-face on branch, hops along branches, then lunges for escaping insects or hops on ground briefly to grab prey. Occasionally flutters upwards to beneath leaf, or hovers or sallies for flying insects. Behaviour similar away from ant swarms, where perches mostly in horizontal position and reaches or pecks prey from foliage and trunks. Frequently inspects curled dead leaves or accumulated leaves and debris in branch forks.

Breeding. Season at least Apr–Jun in Costa Rica. Apparently a co-operative breeder at times. Nest built by female, occasionally helped by other dull-plumaged birds, presumably subadults, a bulky, loose structure of leaves and other coarse material, mostly 1–5 m up in shrub or small spiny palm; in Belize, 33 nests were inside forest at heights of 1·4–7 m, mostly in sapling. Clutch 2–4 eggs, mostly 3, white; incubation by female, period 12–14 days; chicks fed by both adults, sometimes also by helpers if present, nestling period c. 9 days; young leave nest well before able to fly. Many nests fail owing to predation or unknown cause.

Movements. Resident.

Status and Conservation. Not globally threatened. Widespread, and locally fairly common. Occurs in various protected areas, including Tikal National Park (Guatemala), Indio-Maíz Biological Reserve (Nicaragua), La Selva Biological Reserve (Costa Rica), La Amistad International Park (Costa Rica and Panama), and Santa Fé, Soberanía and Chagres National Parks (Panama). Present also in unprotected lowland forest sites in Guatemala, Belize, Honduras, Nicaragua and C Panama. In E Mexico, El Salvador, Costa Rica and much of Panama, deforestation is so extensive that the species may survive primarily in protected sites. Despite a checkered distribution of range contraction and fragmentation, the species' viability should be secure so long as protected sites are maintained. Further, it appears able to persist locally in some second-growth and disturbed areas.

Bibliography. Álvarez del Toro (1952), Davis (1972), Dickey & van Rossem (1938), Edwards (1972), Garrigues & Dean (2007), Hallinan (1924), Hartman (1955), Hartman & Brownell (1961), Hilty (1985, 1994), Hilty & Brown (1986), Howell & Webb (1995), Klaas (1968), Klicka *et al.* (2007), Land (1970), Meyer de Schauensee (1964, 1966, 1970a), Paynter (1955), Peck (1910), Ridgely & Gwynne (1989), Ross & Whitney (1995), Russell (1964), Salaman *et al.* (2008), Slud (1964), Smithe (1966), Stiles & Skutch (1989), Stone (1918), Strauch (1977), Sutton *et al.* (1950), Wetmore *et al.* (1984), Willis (1960a, 1960c, 1961, 1972).

269. **Black-cheeked Ant-tanager**

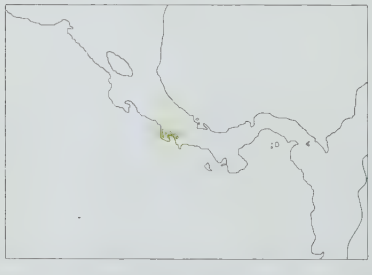
Habia atrimaxillaris

French: Habia à joues noires **Spanish**: Habia Carinegra
German: Schwarzwangen-Ameisentangare

Taxonomy. *Phoenicothraupis atrimaxillaris* Dwight and Griscom, 1924, Puerto Jimenez, Puntarenas, Costa Rica.

Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Monotypic.

Distribution. Vicinity of Osa Peninsula and Golfo Dulce (S Puntarenas), in SW Costa Rica.



Descriptive notes. 19 cm; one male 48·9 g. Relatively dull ant-tanager, strong-billed and with dark head. Male has partly concealed crown patch salmon-orange, the feathers long but normally held flat (crest rarely obvious); rest of crown dark grey, tinged reddish, forehead, lores and side of head dusky to sooty black, forming rather broad, diffuse mask (does not contrast strongly with back); upperparts dark grey, tinged reddish, tail blackish; upperwing-coverts and flight-feathers blackish, edged dark grey; throat bright pinkish-scarlet to salmon, becoming red-tinged grey on breast and darker grey with pink tinge on belly; iris dark red; bill dusky; legs dark horn. Female is similar to male, but central crown patch smaller and duller, head dull dusky, throat duller salmon, and plumage overall much duller. Juvenile is even duller than female, lacks red, is more brownish to sooty above, no crown patch, side of head and chin dark sooty brown, throat duller and greyish, underparts brownish with faint sooty shaft streaks, flanks dusky; immature male much like female. Voice. During foraging, groups continually give low, nasal "chit" and "chet" notes mixed with rough scolding notes similar to those of *H. fuscicauda* but more abrupt, e.g. "rrak" or "rruk". Song, only at dawn and presumably only during breeding season, usually from at least partial concealment, a clear, sweet whistled "tu-see, tu-see, tu-see" or "tu-seeur tu-swee tu-seeur".

Habitat. Dense lowland forest, streamside woodland, older second growth, occasionally selectively logged forest, palm trees and beach-front scrub; mainly inside mature humid forest. Sea-level to c. 200 m.

Food and Feeding. Arthropods; also some fruits, including berries of melastomes and Solanaceae. Found in pairs and in small groups, often with other birds in small mixed-species flocks. Forages mostly c. 1–6 m up in understorey, where it hops, peers and chases arthropod prey. Gleans small insects from leaves and twigs, rummages in dead-leaf clusters, inspects hanging dead leaves, and occasionally follows swarms of army ants (Formicidae). Squeezes the pulp of fruits.

Breeding. Few nests found. Season approximately mid-Jan to May, spanning dry season and early rainy season; nests with eggs in late Jan, nest-building seen Feb–Mar and fledglings seen in May. Nest a bulky cup, outer layer of large dead leaves, vines, twigs and dry grass, middle layer of smaller, thinner dry twigs and vines, lining entirely of black fungal rhizomorphs, internal diameter 65·5 × 71 mm and 64·6 × 70·7 mm, cup depth 20 mm and 31 mm; nest supported by branches and leaf petioles, but not woven or fastened to plant, 0·5–2 m above ground, two nests placed very close to bank of river, two located near top of small shrub, another in top of *Dieffenbachia*, all in tall, older secondary forest. No information on clutch size; eggs immaculate white, slightly transparent when fresh, 26·05 × 18·89 mm and 26·57 × 18·94 mm. No other information. Nest structure and eggs most like those of *H. fuscicauda*.

Movements. Resident.

Status and Conservation. ENDANGERED. Restricted-range species: present in South Central American Pacific Slope EBA. Locally fairly common; declining. Found only on the Osa Peninsula and around the Golfo Dulce, in SW Costa Rica. Its range has been reduced by half since 1960. As recently as 1989 the species was still fairly common in unprotected forest areas in the Osa Peninsula area; since then it has become increasingly scarce and local in fragmented and ever-shrinking forested habitat outside Corcovado National Park and Golfito Faunal Refuge. Population in these protected areas remains stable.

Bibliography. Anon. (2010a), Butchart & Stattersfield (2004), Capper *et al.* (1998), Davis (1972), Garrigues & Dean (2007), Isler & Isler (1999), Roxero-Bixby *et al.* (2002), Sandoval & Gallo (2009), Skutch (1954), Slud (1964), Stattersfield & Capper (2000), Stiles & Skutch (1989), Willis (1972).

270. **Sooty Ant-tanager**

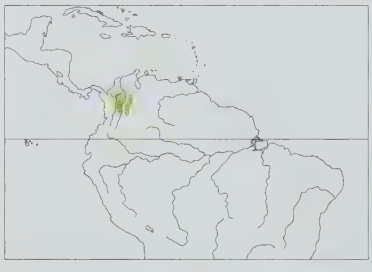
Habia gutturalis

French: Habia fuligineux **German**: Graurücken-Ameisentangare **Spanish**: Habia Sombría

Taxonomy. *Phoenicothraupis gutturalis* P. L. Sclater, 1854, Nova Grenada = Colombia.

Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Monotypic.

Distribution. NW Colombia along N base of Andes from Córdoba (upper R Sinú) E to Santander, and S on both slopes of Magdalena Valley to N Tolima on W side and to W Santander (SW of Bucaramanga and N of San Vicente), W Boyacá (including Reserva El Paujíl, in Serranía La Quinchas) and N Cundinamarca on E side.



Descriptive notes. 20 cm. Long-tailed ant-tanager with strong bill, male with striking pinkish-and-black plumage. Male has head and upperparts, including upperwing-coverts, flight-feathers and tail, mostly slaty to blackish-grey, with pinkish-scarlet crest conspicuous when raised (often held flat, except when alarmed or excited); side of head and side of throat black, central throat and chest bright rose to pinkish; rest of underparts dark grey; iris brown; bill blackish; legs dark grey. Female is similar to male, but duller, with brownish-tinged plumage, crest much shorter and duller, and throat greyish-white, tinged pink. Juvenile resembles female. Voice. Alarm and territorial-defence calls include fast, chattering, grating "chat-cha-cha-cha-cha-cha..." 5–15 notes at up to 5 notes per second, often ending with one or more static-like "chack" notes; notes sometimes doubled and delivered with distinct syncopated beat, e.g. "cha-chick, cha-chack...". Also "chak" notes when foraging, a "wik", rattles and contact note. Dawn song, usually from perch c. 3–8 m up, perhaps the most musical of those of all the ant-tanagers, somewhat variable, given in deliberate fashion, typically 2–4 rich whistles, the middle ones higher in pitch than the preceding one, then the last somewhat lower, "waa, wuu weet, wu", repeated a few times, then pattern changing slightly or interrupted with harsh scolding notes, then the sequence repeated at faster or slow speed, or with some pairs of notes given more quickly. In longer variation may sound like "cheh, wher, whereyeh, whoa, pong", and "where'errr", then may switch to different series of notes. Songs given near nest when female out of sight, and especially at dawn or dusk as male moves through understorey. Apparently no day song.

Habitat. Understorey of tall second growth, wooded streamsides, bushy forest borders and inside tall humid forest and primary forest in middle Magdalena Valley. Also colonizes dense young second growth in landslides, along streambanks, even regenerating young, dense, low growth in former pastures, and may benefit to some extent from limited forest disturbance by humans. Mainly restricted to foothill forest regions; c. 100–1400 m.

Food and Feeding. Small arthropods; infrequently eats or pecks at fruit. Like others of genus lives in pairs or family groups of 3–4 individuals; sometimes associates with mixed-species flocks, but much more often found away from flocks, where it is often wary and fast-moving and difficult to see. Pairs notably territorial, and hostile encounters at borders involve chattering, wing-flicking and tail-flicking, short flights and raising and spreading of crest. Forages mostly 1–5 m up in understorey, or a little higher (4–10 m) in tall forest. Searches for insects on bare horizontal perches or executes short sallies; regularly follows army ants (Formicidae), when it sallies to foliage above the ants or sallies to ground for arthropod prey.

Breeding. Nine birds in breeding condition in Feb–May in S Bolívar and S Córdoba, and juvenile with two adults in early May in E Antioquia. Nest described as a deep loose cup of roots and fibres, lined with ferns, and located in bush near stream in hills; one was a leafy cup in crown of fishtail palm (*Caryota*) 0·6 m above a creek in tall forest. Clutch probably 2 eggs, white or pale grey marked with reddish-brown and lilac, especially at large end; nestlings fed by both adults. No other information.

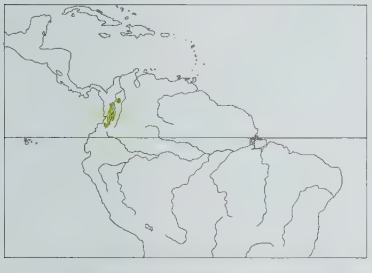
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Nechí Lowlands EBA. Generally rare and local. Occurs in the protected and privately operated Reserva El Paujil (W Boyacá) and in tiny Reserva Bellavista (near La Victoria, in SE Caldas). Present also in scattered patches of unprotected forest and second growth, but much of the unprotected habitat (both primary and regrowth) formerly occupied has now disappeared, and this species has doubtless undergone extensive range contraction and fragmentation. Survives locally in dense and surprisingly young second-growth scrub and palmetto (e.g. N of San Vicente, in Santander), but the long-term viability of this species is of concern as there are few protected sites within its range, and deforestation is widespread, although perhaps slowing. Recent mapping of this species' range, however, suggests that it may be more widespread than was believed.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Anon. (2010a), Butchart & Stattersfield (2004), Donegan & Briceño (2005), Hilty (1985), Hilty & Brown (1986), Isler & Isler (1999), Klicka *et al.* (2007), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ogilvie-Grant (1912), Quevedo *et al.* (2006), Renjifo *et al.* (2002), Ridgely & Tudor (1989, 2009), Salaman, Donegan & Caro (2008), Salaman, Donegan, Cuervo & Ochoa (2001), Sclater & Salvin (1879), Stattersfield & Capper (2000), Stiles *et al.* (1999), Willis (1972).

271. **Crested Ant-tanager**

Habia cristata

French: Habia à crête rouge **Spanish**: Habia Copetona
German: Scharlachhauben-Ameisentangare

Taxonomy. *Phoenicothraupis cristata* Lawrence, 1875, "Bogotá", Colombia. Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Chlorothraupis*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Monotypic.
Distribution. W Colombia on W slope of W Andes from Antioquia S to S Cauca (Cerro Munchique), locally on E slope of W Andes.



Descriptive notes. 19 cm. Strong-billed ant-tanager with "bicoloured" appearance, red and greyish. Male has long, prominent crest scarlet, most often held erect (occasionally held flat in narrow rearward-pointing spike); rest of crown and side of head dusky, tinged red; mantle red, becoming darker crimson to brownish-red on rump and uppertail-coverts; tail dusky, edged red; upperwing-coverts and flight-feathers dusky, tinged red, tertials more broadly edged and tinged dark red; throat and chest bright scarlet, centre of lower underparts grey, stained red, sides and flanks contrastingly grey; iris reddish-brown; bill blackish; legs dusky grey to dusky pink. Female is similar to male, but crest shorter, and overall slightly duller and with less grey on sides and flanks. Immature is mainly russet-brown above, slightly paler cinnamon-brown below, and lacks crest. Voice. Mobs with loud, shrill "chi-veek!", repeated 2–4 times or over and over in long series; contact calls "chip" or a sharp series of "chee" notes. Dawn song 3–4 unmusical, monotonous "che'ik" notes, repeated up to a dozen times per minute.
Habitat. Understorey of humid pre-montane and montane forest, especially dense or bushy regrowth vegetation along rushing streams, around landslides and in steep ravines; occasionally at openings to woodlots or in isolated trees in pastures. At 700–2000 m.
Food and Feeding. Food mostly insects, caterpillars and other arthropods; also some fruit, and regularly eats *Miconia*, palm seeds and other fruits, but usually only few at any time. Occurs in pairs and in small groups of 2–5 individuals (probably family parties). Moves rapidly through undergrowth, foraging mostly 1–10 m up, higher than congeners, and frequently with mixed-species flocks or at feeding associations in small fruiting trees. Typically rather wary, but can at times be inquisitive and may perch partly in open briefly to peer and scold at intruders. Foraging territory c. 5–8 ha, and boundaries disputed by males, which posture with raised and spread crest, fluffed body feathers and spread tail, facing alternately towards and away from each other while nearby families intermingle. Searches by perching on horizontal bare branches and peering at foliage, often methodically, before moving. Like others of genus, reaches out to twigs and leaves for prey, or flutters or hovers briefly, and may sally to snap prey from substrates or to catch falling prey. Also takes arthropods from hanging dead leaves. Up to ten have been observed together at an army-ant (Formicidae) swarm.
Breeding. One bird, accompanied by two others, seen carrying nesting material in deep streamside ravine in N Tolima, in Jun. No other information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Chocó EBA. Fairly common locally. Can be found in a few parks and preserves, including Farallones de Cali National Park, Otún-Quimbaya Sanctuary, Tambito Nature Reserve, and probably Munchique National Park. Also occurs locally in unprotected watersheds, e.g. on E slope of W Andes above Cali (Pichindé), E slope of C Andes in Tolima (areas near Ibagué; above Líbano, etc.) and at N end of C Andes in Antioquia and Caldas. This species' numbers are undoubtedly declining; it has experienced considerable range contraction and fragmentation because of deforestation, and should probably be regarded as being at risk in the near future.
Bibliography. Álvarez-Rebolledo *et al.* (2007), Donegan & Dávalos (1999), Gochfeld & Tudor (1978), Hilty (1985, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Willis (1966b).

Genus *CHLOROTHRAUPIS*

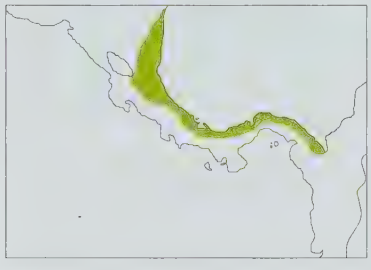
Salvin & Godman, 1883

272. **Carmiol's Tanager**

Chlorothraupis carmioli

French: Habia de Carmiol **German**: Carmioltangare **Spanish**: Tangara de Carmiol

Taxonomy. *Phoenicothraupis carmioli* Lawrence, 1868, Angostura, Costa Rica.
Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Habia*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species often treated as conspecific with *C. frenata*, the two being morphologically very similar; further investigation desirable. Three subspecies provisionally recognized.
Subspecies and Distribution.
C. c. carmioli (Lawrence, 1868) – Caribbean slope and lowlands and very locally on Pacific slope at low passes from E Nicaragua S to extreme NW Panama (vicinity of Almirante Bay).
C. c. magnirostris Griscom, 1927 – W Panama (both slopes in Veraguas).
C. c. lutescens Griscom, 1927 – from C Panama (Coclé and Colon locally E to San Blas and NW Darién, generally N & E of valleys of R Chepo and R Chucunaque, and on Cerro Tacarcuna) and adjacent extreme NW Colombia (slopes of Cerro Tacarcuna, in Chocó).



Descriptive notes. 16 cm; 30·5–44 g. Robust tanager with heavy bill and nearly uniform plumage. Nominate race has head and entire upperparts, including upperwing-coverts and tail, intense olive, lores and ocular area slightly darker than rest of head; flight-feathers dusky, edged yellowish-green; throat and underparts yellowish-green, slightly paler than upperparts, flanks greenish-olive, underwing-coverts greenish-yellow; iris light to dark brown; bill blackish, variably paler grey on most of lower mandible; legs dark grey. Sexes similar. Juvenile is similar to adult, but iris dull grey. Races differ mainly in measurements and in plumage tone, nominate more greenish (less yellow) than others: *magnirostris* is very similar to nominate, but bill longer and heavier, and chin and throat lighter, more yellowish (less olive); *lutescens* is very like nominate, but slightly more yellowish on throat and underparts, and with less olive tinge in plumage. Voice. Dawn song a rapid stream of mostly short notes, some grating or wheezy, some musical, and typically given rapidly in groups of 3–8, then abruptly switching to another type of note, entire sequence often lasting up to several minutes; some song sequences consist of clear whistled notes much like those of Northern Cardinal (*Cardinalis cardinalis*). Can be rather noisy when foraging, uttering variety of mostly short, high, thin notes, including "chay", a squeaky "eep", a churring "wrsst", and abrupt "chut", squeezed "chee" and metallic "whit"; also a slightly buzzy "seeet" or "seee-seeee" and staccato "tik" in bursts when about to fly; in alarm a scratchy "nyaaah" or "cheeyah".
Habitat. Undergrowth of humid and wet lowland and foothill forest and adjacent tall second-growth woodland, less often along forest borders; in Panama reported as favouring vicinity of wetter areas near rivers. In Panama mostly c. 300 m to 1000 m, locally to 1450 m.
Food and Feeding. Arthropods, including beetles (Coleoptera), cockroaches (Blattodea), crickets (Gryllidae), katydids (Tettigoniidae); also some berries and fruit. In Panama seen to eat arillate fruits of *Lindackeria*; in Costa Rica reported as eating many berries, especially of melastomes, and taking pieces from large *Coussarea* (Rubiaceae). Usually encountered in rather noisy, single-species flocks of 5–15 individuals, also in pairs when breeding. Groups may follow regular routes and defend a common flock territory, and sometimes join or are joined by other species of flocking birds, especially *Tachyphonus delatrii*. Forages mostly c. 2–6 m up in understorey, occasionally higher, where it hops rather heavily in vegetation, rummaging and peering for arthropods, lunging forward or hanging downward for fast or fleeing prey. From a sample of 59 insect-searching records, 63% were on foliage, and 65% of these were from underside of leaves.
Breeding. Breeding reported in Apr in Nicaragua, Mar–May in Costa Rica and Mar in Panama. Nest a neat cup of mosses and long plant fibres, with some leaves at base, lined with fine rootlets and black fungal rhizomorphs, placed 1·5–2·5 m up in fork of understorey shrub or tree. Clutch 2 eggs, creamy white, speckled brown and lavender, especially around larger end. No other information.
Movements. Resident.
Status and Conservation. Not assessed. Believed not globally threatened. Fairly common to common, especially in humid and wet hilly terrain and foothills. Occurs in several protected areas, including Indio-Maíz Biological Reserve (Nicaragua), La Selva Biological Reserve and Braulio Carrillo National Park (Costa Rica), and Soberanía and Darién National Parks and Comarca Kuna Yala Indigenous Reserve and Atlantic Forest (Panama). The species occurs primarily inside primary forest and tall, older second growth, making it sensitive to human disturbance. Much hill-country forest within its range has been lost to deforestation as human settlement and agriculture increase. Most unprotected habitat within its range has now disappeared, creating range contractions and distributional gaps. Populations now fragmented and declining, but the long-term viability of this species will likely continue so long as there is adequate protection of existing parks and reserves.
Bibliography. Burns (1997a), Burns *et al.* (2002, 2003), Davis (1972), Garrigues & Dean (2007), Greenberg (1981a, 1984), Greenberg & Gradwohl (1980), Huber (1932), Isler & Isler (1999), Klicka *et al.* (2007), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Ross & Whitney (1995), Salaman *et al.* (2008), Slud (1960, 1964), Stiles & Skutch (1989), Wetmore *et al.* (1984).

273. **Olive Tanager**

Chlorothraupis frenata

French: Habia bridé **German**: Streifenkehltangare **Spanish**: Tangara Embridada
Other common names: Yellow-lored Tanager

Taxonomy. *Chlorothraupis frenata* Berlepsch, 1907, Marcapata, Peru.
Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Habia*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. This species often treated as conspecific with *C. carmioli*, the two being morphologically very similar; further investigation desirable. Monotypic.
Distribution. S Colombia at E base of Andes (Caquetá and Nariño), Ecuador (along E base of Andes N of Lumbaquí, in Sucumbíos; Loja–Zamora Road in extreme SE), and E base of Andes in Peru (C Huánuco S to C Pasco, and from C Cuzco) S to WC Bolivia (Cochabamba).
Descriptive notes. 16 cm. Robust, heavy-billed tanager with nearly uniform plumage (especially male). Male is almost entirely dingy olive-green above, slightly paler below; lores and, especially, throat somewhat yellowish, vaguely olive-streaked; iris light to dark brown; bill blackish, variably paler grey on most of lower mandible; legs dark grey. Differs from very similar *C. carmioli* in having lores and facial area paler, more yellowish. Female is very similar to male (and to either sex of *C. carmioli*), but loral area and face distinctively yellowish (not olive) and throat lighter, more clear yellow, and without streaking. Juvenile undescribed. Voice. Song in SE Peru an excited, rapid



rolling "ki'r'r'rup-ki'r'r'rup-ki'r'r'rup-ki'r'r'rup-ki'r'r'rup...", sometimes up to c. 8 notes in the series with squealing, frantic quality, and often repeated over and over at short intervals. At times song more varied, with other high or squeaky notes inserted into the long series, e.g. "ki'r'r'rup-ki'r'r'rup-ki'r'r'rup-éé-kir'r'r'r-éé-kir'r'r'r, squik-Skeek-Skeek-Skeek-kir'r'r-kir'r'r..." and so on for up to 30 seconds or more; also transcribed as a grating "kettup" or "keetup". A somewhat more melodic song (context uncertain) is a series of several similar notes, then a series of different notes, and so on, e.g. "chow-chow-chow-chow-chi-chi-chi-chow, chow, chow, whi-chow, whi-chow, wheeup, wheeup, wheeup, wheeup, tic-chow tic-chow, tic-chow, tic-chow, tic-chow, tic-tic-tic-tic-ch-ch-ch-ch...", for 10–25 seconds. Songs and other vocalizations rather unlike those of *C. carmioli*.

Habitat. Humid foothill and pre-montane forest along E base of Andes and also, at least in Peru, on outlying ridges. At c. 300–1000 m; to c. 800 m in Colombia, c. 600–1100 m in Ecuador and 400–1350 m in Peru.

Food and Feeding. Arthropods, also fruit; has been seen to eat *Cecropia* catkins. Of 13 stomachs examined, two contained only vegetable matter, nine only animal matter and two both; contents included fruit, seeds, beetles (Coleoptera) and other insects. Occurs singly and in pairs, sometimes in small groups of 3–4 individuals that join, or are joined by, other small understorey passerines. Stays mainly in undergrowth c. 1–6 m up, occasionally higher, and can be difficult to see. Foraging movements and behaviour reminiscent of those of larger members of genus, but seems more restless and faster-moving, often constantly flicking wings and tail in agitated manner as it hops along branches and in tangles and foliage or flies short distances through understorey.

Breeding. No information.

Movements. No information; almost certainly resident.

Status and Conservation. Not assessed. Believed not globally threatened. Locally fairly common; distribution in Colombia and Ecuador particularly spotty and poorly known. Has recently been reported as numerous in the Bermejo oil-field area N of Lumbaquí (Sucumbíos), in N Ecuador. Found in a narrow elevational band along E base of Andes that is subject to extensive deforestation and human settlement. Occurs in a few protected areas, most notably the Manu Biosphere Reserve (SE Peru) and Madidi National Park (Bolivia). Deforestation in unprotected areas is extensive, especially in Colombia and locally in Ecuador, and has almost surely contributed to range contractions and distributional gaps. Despite local population declines, the species' long-term viability seems secure so long as existing protected areas are maintained.

Bibliography. Hilty (2009a, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Mee *et al.* (2002), Meyer de Schauensee (1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (1999), Schulenberg (2000a), Schulenberg *et al.* (2007), Zimmer (1947a).

274. Lemon-spectacled Tanager

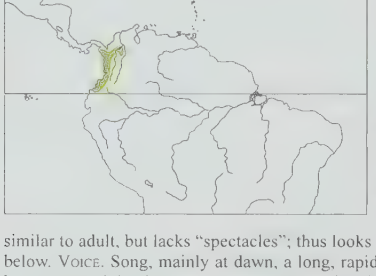
Chlorothraupis olivacea

French: Habia à lunettes **German**: Gelbbrauentangare **Spanish**: Tangara Olivácea
Other common names: Lemon-browed Tanager, Spectacled Tanager

Taxonomy. *Orthogonys olivaceus* Cassin, 1860, River Truandó, north-west Colombia.

Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Habia*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Monotypic.

Distribution. Pacific slope in extreme E Panama (SE Darién S & E of R Chepo and R Chucunaque) and W Colombia (E along N base of Andes to Magdalena Valley in Antioquia, and in Pacific lowlands) S to NW Ecuador (N Esmeraldas).



Descriptive notes. 17 cm; 36–41 g. Robust species with conspicuous "spectacles" and strong, heavy bill, but dingy plumage. Male is uniformly dark olive above, including head, upperwing and tail; lores and prominent, contrasting eyering bright yellow; chin and throat dull yellow, vaguely streaked along lower border; underparts dark olive, becoming yellowish on belly and undertail-coverts; iris reddish-brown; upper mandible blackish with pale line along cutting edge, lower mandible light blue-grey; legs grey. Female is essentially similar to male, but slightly paler and more yellowish on lower underparts. Juvenile is similar to adult, but lacks "spectacles"; thus looks much like *C. stolzmanni*, but not so ochraceous below. Voice. Song, mainly at dawn, a long, rapid series of notes that begins softly, then rapidly becomes much louder, e.g. "wu-wu-wu-wu-chu-chu-chu-chéé-chéé-chéé-chéé". Often noisy when foraging, uttering rapid, excited "treu-treu-treu-treu..." of 4–8 notes; also "turee" and "jee-ut", and "eep", and other notes and more nasal "nyaah-nyaah-nyaah-nyaah-nyaah".

Habitat. Lower levels of wet lowland and foothill forest and adjacent second growth, especially along streams. Sea-level to c. 400 m in Ecuador; to 1500 m (although rarely above c. 400 m) in Colombia.

Food and Feeding. Two stomachs contained animal matter, another had both animal and plant material; contents included parts of ants (Formicidae), coleopterans including weevils (Curculionidae) and scarab beetles (Scarabaeidae), caterpillars, wasps (Vespidae), and seeds of *Solanum*. Occurs in pairs and in small groups of three or four individuals, often joining or joined by mixed-species flocks. Groups stay mainly in undergrowth, mostly out of sight, and, except for chattering calls, are easily overlooked.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Uncommon to locally fairly common in Colombia; decidedly less numerous at S end of range in extreme NW Ecuador. Occurs in a few protected areas, including Darién National Park (Panama) and Los Katíos, Ensenada de Utría and possibly Sanquianga National Parks (Colombia), but most of range lies outside protected areas. Extensive and ongoing deforestation in much of its range is a longer-term risk, and habitat loss is fragmenting its range, resulting in overall decline in numbers. On the positive side, the species utilizes a variety of shrubby forest-edge and second-growth habitats and does not appear to be at any immediate risk in Colombia. Relatively little suitable habitat remains within its range in W Ecuador.

Bibliography. Burton (1975), Chapman (1917, 1926), Davis (1972), Dunning (1982), Haffer (1975), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Klicka *et al.* (2007), Meyer de Schauensee (1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008).

275. Ochre-breasted Tanager

Chlorothraupis stolzmanni

French: Habia de Stolzmann **German**: Ockerbrusttangare **Spanish**: Tangara Pechiocre

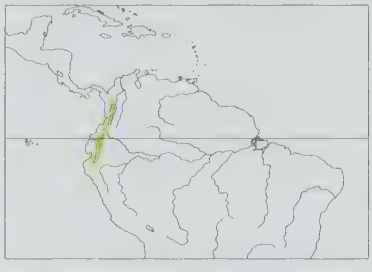
Taxonomy. *Phoenicothraupis stolzmanni* Berlepsch and Taczanowski, 1884, Chimbo, Ecuador.

Molecular-genetic evidence indicates that this genus may form a monophyletic group with *Piranga* and *Habia*, and that all three are more closely related to cardinals (Cardinalidae) than to true tanagers. Races weakly differentiated. Two subspecies recognized.

Subspecies and Distribution.

C. s. dugandi Meyer de Schauensee, 1948 – Pacific slope of Andes in Colombia (Risaralda S to Nariño); extreme NW Ecuador (El Placer, in Esmeraldas).

C. s. stolzmanni (Berlepsch & Taczanowski, 1884) – W slope of Andes in Ecuador from Pichincha S to El Oro.



Descriptive notes. 17 cm; 36·6–43 g. Large and robust, with stout bill and few obvious field marks. Nominate race has head and upperparts, including upperwing and tail, dull dark olive-green with brownish tinge; throat and centre of lower underparts dull ochraceous, rest of underparts dull clay-coloured, breast, sides and flanks tinged olive; iris brownish-grey; bill dusky, basal portion of lower mandible pale blue-grey, sometimes pinkish at corner of gape; legs dusky horn. Sexes similar. Juvenile is darker than adult, dingy brownish, with no pattern or contrasts in plumage. Race *dugandi* is very like nominate, but has greyish tone on crown and is slightly paler below. Voice. Rather vocal, like many congeners. Dawn song, given all year, from high exposed canopy perch, a fast, energetic series of variable and mostly unmusical phrases, e.g. "geegeegee wit'er wit'er tututu, weep, twéér- twéér-twéér, eep'eep k'eep eep eep twéér- twéér-twéér jeep-jeep twéér..." and so on in loud uninterrupted stream for half an hour or more; thin "eep" notes extremely high-pitched. Each individual has distinctive repertoire. When foraging, chatters incessantly with rough "jeep-jeep-jeep-jeep"; mobs with loud "jee'ut" and other notes.

Habitat. Mostly in lower storey of wet foothill and pre-montane forest and along adjacent borders; recorded at 200–2100 m in Colombia, and mostly 400–1500 m in Ecuador. Confined mostly to a rather narrow elevational band along W base of Andes, corresponding closely to belt of highest rainfall in Western Hemisphere.

Food and Feeding. Fruits and insects, also flowers. Of 232 feeding records in study in upper R Anchicayá watershed (W Valle del Cauca), in Colombia, fruit-eating comprised 71% of observations, insect-hunting c. 27% and searching at flowers c. 2%. Recorded as eating at least 24 species of fruit, primarily melastomes (87% of all fruit-eating observations), of which 57% were of genus *Miconia*. Frequently captured large insects, including katydids (Tettigoniidae), skippers (Hesperioidea) and moths (Lepidoptera). Forages in groups of 5–15 individuals throughout year; often joined by other small passerines. In upper R Anchicayá watershed, foraged in a rather plodding manner with heavy hopping in understorey vegetation. Most observed foraging was 1·5–9 m up, more rarely ascended to 15 m or higher, and generally foraged lower for insects than for fruit; median foraging height c. 5·5 m. Perched or occasionally hung downwards awkwardly to take fruit, and snatched berries in short sallies or lunges. Searched for insects by hopping on small live or dead and bare or mossy branches (less than 2·5 cm in diameter) and peering. Used wide range of foraging motions, many of them involving rather clumsy acrobatics, including hanging downwards, stretching upwards, reaching around or under leaves and branches, lunging, and diving to pursue fleeing or perched prey, but seldom took prey in the air.

Breeding. In Colombia (R Anchicayá), four nests found mid-Jan to mid-Feb, stub-tailed fledgling early Apr, and one female with brood patch in mid-Jun. Rough cup-nest placed 2–5 m up in fork of sapling inside forest; clutch 1–2 eggs, white with dense ring of reddish-brown spots, mostly at large end. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common locally in Colombia and extreme NW Ecuador (El Placer); decidedly less numerous and more local S in W Ecuador. Occurs in only a few protected sites, including Farallones de Cali National Park (Colombia) and Cotocachi-Cayapas Ecological Reserve and Reserva de Milpe (Ecuador). Deforestation within this species' range, especially in Ecuador, is extensive and its habitat is fragmented. Viability of this species, however, at least in short term, is probably secure so long as existing protected areas are maintained.

Bibliography. Donegan & Dávalos (1999), Hilty (1997, 2009b), Hilty & Brown (1986), Isler & Isler (1999), Klicka *et al.* (2007), Lysinger *et al.* (2005), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Moore *et al.* (1999), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008).

PLATE 33 ➤



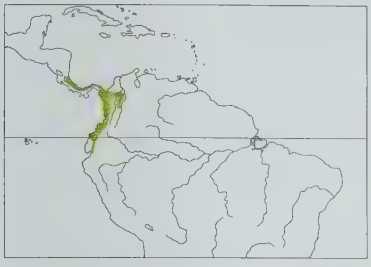
Genus *MITROSPINGUS* Ridgway, 1898

276. **Dusky-faced Tanager**

Mitrospingus cassinii

French: Mitrospin obscur **German**: Rußgesichttangare **Spanish**: Tangara Carinegruzca

Taxonomy. *Tachyphonus Cassinii* Lawrence, 1861, Lion Hill, Panama.
Recent molecular-genetic data indicate that this genus may be unrelated (or, at least, not closely related) to any other in present family; affiliations uncertain, and no closely related family or sister-taxon yet identified. Two subspecies recognized.
Subspecies and Distribution.
M. c. costaricensis Todd, 1922 – Caribbean lowlands of Costa Rica (from Heredia) S to extreme NW Panama (vicinity of Almirante Bay).
M. c. cassinii (Lawrence, 1861) – Caribbean lowlands of W Panama (from Veraguas and Chiriquí Lagoon E to E Darién, also locally on Pacific slope in Veraguas); and Colombia at N end of W Andes (R Nechí) E to Serranía de San Lucas, S on E slope of C range in Caldas (to Tasajos; La Victoria), and entire Pacific lowlands (from Chocó) S to W Ecuador (S to Guayas).
Descriptive notes. 18 cm; 32–41 g. Relatively dull species with rather long, slender and conical bill, and feathers of face rather short and stiff. Nominate race has centre of crown mustard-yellow; forehead, lores, entire side of head, including area above eye, black, forming large dark mask, shading to dark grey on throat; rear and lower half of ear-coverts slightly paler; upperparts, including upperwing and tail, plumbeous grey, uppertail-coverts faintly tinged olive; chin narrowly blackish, throat light grey, becoming olive-yellow on breast and sides and flanks, with belly and undertail-coverts dusky grey mixed olive-yellow; underwing-coverts grey; iris pale grey to greyish-white; upper mandible blackish with blue-grey at base, lower mandible blue-grey; legs dark grey. Sexes similar. Juvenile is duller than adult, with mustard-yellow on crown only faintly indicated, underparts tinged buff. Race *costaricensis* differs from nominate in having upperparts slightly darker, more blackish, tinged dark olive, throat slightly darker, and undertail-coverts duller and tinged rufescent. Voice. Song, repeated persistently at dawn, a sharp, high-pitched, emphatic "zeep zeep zeep zeep-it zeepity zeep", described also as "seety, seety, seety, seety, seety". Foraging groups



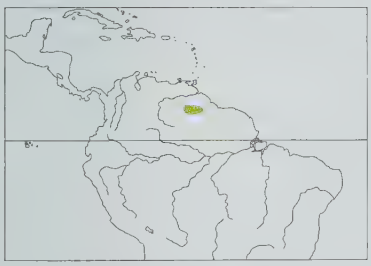
noisy, uttering incessant clattering, low, gravelly "chet" and "chet-ut" with chattering and metallic quality; other short notes include a high "wss" or "sszeet?" and thin "zeet".
Habitat. Thickets and dense shrubbery along forest borders, light gaps, second growth of various ages, and especially along bushy stream borders and watercourses. Sea-level to 600 m in Costa Rica, up to 1200 m in Panama, and to 1100 m in Colombia and 800 m in Ecuador. In all areas most numerous in lowland and foothill areas, and local at highest elevations.
Food and Feeding. Small arthropods and fruits. In Costa Rica recorded as eating fruits especially of melastomes, Rubiaceae and Solanaceae, also grass seeds (*Lasiacis*) and hard seeds of arillate fruits of *Alchornea*; arthropods taken in W Colombia include orthopterans and spiders (Araneae). Four stomachs contained fruit, including *Carludovica palmate* (Cyclanthaceae); stomach contents of two birds in Panama (at Cana), contained both insects and small fruits, one with c. 15% (by weight) insect parts, and the other c. 65% (by weight) insect parts and much of remainder seeds of various fruits. Nestling diet arthropods, including spiders, grasshoppers (Caelifera), caterpillars. A social species that lives in family groups or single-species groups of up to c. 15 individuals; seldom follows or is joined by other birds. Noisy, excitable groups forage mostly rather low in shrubbery, move rapidly with much agitated wing-flicking and tail-flicking and chattering; generally rather wary and keep out of sight, but may ascend higher to visit fruiting trees and occasionally perch up briefly in semi-open tree or tall bush. In W Colombia took berries from perched position, and hopped along branches and on large leaves to search for prey. Picked insects mostly off foliage, especially from large leaves of *Heliconia* and palm fronds. Sometimes hung upside down from leaves, inspected palm fronds with head down between leaflets, and probed curled arboreal dead leaves. Has been found near ant (Formicidae) swarms.
Breeding. Breeding reported in Mar–Apr in Costa Rica; in Colombia, twelve birds in breeding condition in Feb–May in NW and a stub-tailed juvenile with two adults seen in Sept in W (Anchicayá Valley). Co-operative breeding recorded in Costa Rica, where one nest with two nestlings was attended by at least three and possibly all seven adults in flock. Nest can be thin or bulky, composed of thread-like flower stems and black fungal filaments, placed 1·5–3 m up and slung between two to several upright stems of small tree near stream. Clutch 1–2 eggs, white and spotted with brown and reddish-brown, heavily at large end. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to locally common throughout most of range. Occurs in a number of protected areas, including, among others, La Selva and Braulio Carrillo National Parks and Hitoy Cerere Biological Reserve (Costa Rica), La Amistad, Soberanía, Chagres and Darién National Parks and Pipeline road near L Gatun (Panama), and Los Katíos, Ensenada de Utría and Farallones de Cali National Parks and Tambito Nature Reserve (Colombia). Utilizes bushy second growth, but extensive conversion of lowland areas for cattle grazing, banana plantations and other activities is fragmenting its once continuous range. Nevertheless, appears not to be facing any serious near-term threats.
Bibliography. Burns (1997a), Burns *et al.* (2002, 2003), Burton (1975), Carriker (1910), Davis (1972), Donegan & Dávalos (1999), Garrigues & Dean (2007), Haffer (1975), Hilty (1997), Hilty & Brown (1986), Isler & Isler (1999), Jahn *et al.* (2002), Klicka *et al.* (2007), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Skutch (1972, 1980a), Slud (1960, 1964), Stiles & Skutch (1989), Stiles *et al.* (1999), Wetmore *et al.* (1984), Yuri & Mindell (2002).

277. **Olive-backed Tanager**

Mitrospingus oleagineus

French: Mitrospin à dos olive **German**: Olivmanteltangare **Spanish**: Tangara Dorsioliva

Taxonomy. *Eucometis oleaginea* Salvin, 1886, Mount Twek-quay, Guyana.
Recent molecular-genetic data indicate that this genus may be unrelated (or, at least, not closely related) to any other in present family; affiliations uncertain, and no closely related family or sister-taxon yet identified. Races very weakly differentiated; species may be better treated as monotypic. Two subspecies provisionally recognized.
Subspecies and Distribution.
M. o. obscuripectus J. T. Zimmer & Phelps, Sr, 1945 – Sierra de Lema and cerros of the Gran Sabana (except Roraima area), in SE Bolívar region of SE Venezuela, S to N Brazil (on Uei-tepui).
M. o. oleagineus (Salvin, 1886) – extreme SE Venezuela (vicinity of Mt Roraima) and adjacent Guyana (on Mt Twek-quay); probably also tepui slopes in adjacent Brazil.



Descriptive notes. 19 cm; 35·5–46 g. Rather large, drab and undistinguished in appearance; wings fairly short and rounded, tail longish and rounded, and bill relatively slender. Nominate race has forehead and side of head dark grey, throat and foreneck slightly paler grey, rest of head and mantle to uppertail-coverts deep olive; upperwing-coverts, secondaries and tertials dusky olive (slightly darker than back), primaries and tail mainly dusky; breast and lower underparts olive-yellow, brighter and yellower on belly; iris grey; upper mandible dusky, lower mandible pale blue-grey; legs dark grey. Sexes similar. Juvenile is much duller and plainer than adult, with no grey mask, and iris brownish-grey. Race *obscuripectus* is very similar to nominate, but marginally darker and more olive above. Voice. Easily overlooked song a short "zweee-eet?" or "zwee-er-eet?", often repeated over and over at intervals of 1–3 seconds. Two or three individuals may sing at same time. Calls frequently when foraging, but vocalizations thin, weak, high-pitched and audible only at fairly close range (hence species seems rather quiet), include a very high, thin "seeep", a thin, drawn-out and rising "seeeeeek", a buzzy "pzzzzz, pzzzzz...", also thin ticking "tic'tic'tic" contact notes.
Habitat. Humid and wet forest and forest borders on slopes of tepuis. On Sierra de Lema found in mature forest and in dense, stunted, melastome-dominated second growth on white sandy soil. Much more often inside shady forest (mature or older second growth) than at borders. At 900–1800 m.
Food and Feeding. Mostly insects; also some fruit, especially melastome berries. Moves about in single-species groups of 5–20 individuals, occasionally more; often follows mixed-species flocks, or joined by other species. Appears to be a keystone species in formation and maintenance of some understorey flocks in tepui mountains. Rather sluggish, typically foraging quietly through understorey or lower middle storey of forest, occasionally to c. 15 m up. Searches methodically, mostly by hopping, then peering at foliage, reaching up to snap insect prey, or occasionally lunging in heavy, semi-acrobatic manner to grasp mostly insect prey. Also snatches items from foliage during short clumsy sallies. Reported as searching twigs, bark, moss and dead leaves.
Breeding. No information.
Movements. Resident. Possibly some altitudinal movement to lower elevations during rainiest months; verification required.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tepuis EBA. Fairly common to locally common. Canaima National Park, in Venezuela, protects a large proportion of the range of this species, although the park itself is poorly protected and has remained intact largely because of an extremely low human population in the area. Unlikely to face near-term threats as most of its range is centred on forested lower slopes of tepuis, which are subject to relatively little human impact except for sporadic and localized diamond-mining and gold-mining.
Bibliography. Ascanio (2009), Braun *et al.* (2000), Hilty (2003), Isler & Isler (1999), Klicka *et al.* (2007), Meyer de Schauensee (1966, 1970a), Meyer de Schauensee & Phelps (1978), Phelps & Phelps (1950, 1963), Snyder (1966), Souza (2002), Yuri & Mindell (2002).

Genus *PHAENICOPHILUS* Strickland, 1851

278. **Black-crowned Palm-tanager**

Phaenicophilus palmarum

French: Katje à couronne noire **Spanish**: Cuatro-ojos Coroninegro
German: Schwarzscheitel-Palmtangare
Other common names: Hispaniolan Palm-tanager (when treated as conspecific with *P. poliocephalus*)

Taxonomy. *Turdus palmarum* Linnaeus, 1766, Cayenne; error = Santo Domingo, Dominican Republic.
Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Spindalis* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *P. poliocephalus*; sometimes treated as conspecific, and hybridization between them occurs. Monotypic.
Distribution. Haiti (E from Morne d'Enfer, on W edge of Massif de la Selle) and Dominican Republic (including Saona I).



Descriptive notes. 17–18 cm; 24–32 g. Bill rather long, strong and sharply pointed. Has crown and side of head black, small white supraloral spot, larger trapezoidal-shaped white patch above eye that projects rearwards a short distance, and small inverted white arc below eye; nape grey; upperparts, including upperwing-coverts, bright yellowish-olive; flight-feathers dusky, edged yellowish-olive, tertials and tail yellowish-olive; throat white, white extending narrowly down central underparts and blending gradually into light neutral grey of side of breast, flanks, belly and undertail-coverts; grey on side of chest extends up to meet grey of nape; iris dark red-brown; upper mandible black, lower mandible blue-grey with variable black tip; legs horn-grey. Sexes similar. Immature has black areas replaced by dusky grey, and whitish areas of foreparts tinged buff. Voice. Song varies among populations, but typically consists of jumbled squeaky notes that grow louder, then diminish and slow to short "chit" notes at end; in some areas, song contains more raspy and buzzy phrases. Vocal when foraging, frequently giving nasal, buzzy "pe-u", and higher, more penetrating "tseep", often doubled; also a low "chep".
Habitat. Thrives in variety of habitats; found in dry to humid zones in both urban and rural situations, especially in thickets, gardens, isolated trees, woodland and forest of all types, including mangroves, pines (*Pinus*), even cloudforest. Common in lowlands, less so in highlands. Sea-level to c. 1800 m.
Food and Feeding. Arthropods, also fruits; reported as eating nectar. Takes wide variety of fruits, including species in Rosaceae, Ulmaceae (probably *Celtis trinervia*), Solanaceae, Lauraceae, and Papaveraceae (*Bocconia*). Of five stomachs examined, three contained only vegetable matter and two contained vegetable and animal matter, and included fruit seeds, a large tree-cricket (Gryllidae), a small katydid (Tettigoniidae), a March fly (Bibionidae), leaf-footed bug (Coreidae) and a wasp (Vespidae). From sample of 739 observations, insect-searching comprises c. 68% of feeding records, fruit-eating 30%, and visits to flowers 2%. Occurs in pairs, post-breeding pairs often accompanied by one or more immatures moving in family groups, and sometimes associate with mixed-species flocks in wooded areas. Forages at almost all levels, from ground to treetop, often for extended period of time in one area before moving. Moves in rather deliberate fashion, often flicking tail. Searches for insects mostly on leaves, but c. 12% of attempts were on bark, where it clambers over trunks and large limbs, using strong feet to cling to rough bark, examining twigs and bark, pecking and pulling at loose bark and Spanish moss (*Usnea*), and flying out in short sallies to capture insects.

On following pages: 279. Grey-crowned Palm-tanager (*Phaenicophilus poliocephalus*); 280. Eastern Chat-tanager (*Calyptophilus frugivorus*); 281. Western Chat-tanager (*Calyptophilus tertius*); 282. Rosy Thrush-tanager (*Rhodinocichla rosea*).

Breeding. Breeding reported in Apr in Haiti and May–Jun in Dominican Republic. Deep cup-shaped, loosely formed nest, unlined, placed 1–2 m up (probably also higher) in bush or tree, often near human habitation. Clutch 2–3 eggs, greenish to whitish, spotted, and variable in size; incubation period c. 10 days; nestling period c. 10 days.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Hispaniola EBA. Common. Has successfully adapted to human-altered environments. Occurs in most, if not all, of the 16 national parks, nine natural monuments and six scientific reserves, as well as most other protected areas and ecological corridors, in Dominican Republic, where common throughout also in unprotected rural and urban areas. Common in heavily damaged habitats in Haiti, although rarely found W of Port-au-Prince. There seems to be little near-term risk associated with this species.
Bibliography. Bond (1928a, 1934, 1943, 1948, 1961), Burns (1997a), Burns *et al.* (2002, 2003), Cherrie (1896), Danforth (1929), Dod (1978), Isler & Isler (1999), Keith *et al.* (2003), Latta (2005), Latta *et al.* (2006), Maurrasse & Rigaud (1982), McCarthy (2006), McDonald (1988), McDonald & Smith (1990, 1994), Raffaele *et al.* (1998), Reynard (1981), Rimmer *et al.* (2005), Steadman *et al.* (1980), Townsend (2007), Wetmore (1932), Wetmore & Swales (1931).

279. **Grey-crowned Palm-tanager**

Phaenicophilus poliocephalus

French: Katje à couronne grise **Spanish**: Cuatro-ojos Coronigris
German: Grauscheitel-Palmtangare
Other common names: Hispaniolan Palm-tanager (when treated as conspecific with *P. palmarum*)

Taxonomy. *Dulus poliocephalus* Bonaparte, 1851, Haiti.
Recent molecular-genetic studies suggest that this genus and *Nesospingus*, *Chlorospingus* and *Spindalis* form a monophyletic clade that is sister to several New World warbler (Parulidae) genera (including *Dendroica*, *Basileuterus* and *Vermivora*), and are not closely related to other genera of present family. This species forms a superspecies with *P. palmarum*; sometimes treated as conspecific, and hybridization between them occurs. Three subspecies recognized.
Subspecies and Distribution.
P. p. coryi Richmond & Swales, 1924 – Gonâve I (off WC Hispaniola).
P. p. poliocephalus (Bonaparte, 1851) – S peninsula of Haiti and immediately adjacent SW Dominican Republic; also island of Grande Cayemite.
P. p. tetraopes Wetmore & Lincoln, 1932 – I à Vache (off SW Hispaniola).



Descriptive notes. 17–18 cm; mean c. 31 g. Bill rather long, strong and sharply pointed. Has black forecrown, ocular area and ear-coverts forming large black mask, this highlighted by prominent white supraloral spot, a second white spot over eye and a small inverted arc of white immediately beneath eye (the three spots imparting a "broken-spectacled" appearance); black mask contrasts sharply with grey middle and rear crown, and conspicuous white chin and upper throat, which extends rearwards to submoustachial area and side of neck; upperparts, including upperwing-coverts, yellowish-olive, flight-feathers and tail dusky, edged yellowish-olive; lower throat and underparts uniformly neutral grey; iris dark brown; upper mandible black, lower mandible blue-grey with small black tip; legs horn-grey. Sexes similar. Immature is like adult, but duller. Race *tetraopes* is slightly paler than nominate, especially in grey of hindcrown, nape and underparts, with back paler green, belly whiter, also bill slightly longer; *coryi* is slightly larger than nominate, also paler, with centre of breast and belly white, undertail-coverts white, and some (but not all) males with a small white spot in centre of crown. Voice. Call a brief "peee-u", often doubled. During breeding season male gives an extended, musical song; apparently also gives a canary-like whisper song, reportedly while approaching female.
Habitat. Forested areas, forest borders, thickets, semi-open areas, mangroves, gardens in dry to humid zones, including cloudforest. Sea-level to mountain summits (to c. 1800 m).
Food and Feeding. Arthropods, some fruits. Insect-seeking comprises more than 90% of foraging records, the rest fruit eating. Of five stomachs examined, three contained only animal matter and two contained both animal and vegetable matter, including seeds (5%), a large cockroach (*Blattaria*), caterpillars, nymphs of hemipterans and homopterans, coleopterans comprising darkling beetles (Tenebrionidae), weevils (Curculionidae), click beetles (Elateridae) and ground beetles (Carabidae), and snails (Gastropoda). Found in pairs and, following breeding, in small family parties or groups of up to about six individuals. At times active, at other times rather slow and deliberate. Forages from ground to treetops, using a variety of foraging methods, including gleaning from leaves and bark, and sallying to air, sometimes up to 15 m or more.
Breeding. Breeding reported in May–Jun on Gonâve and Jul in Haiti. Deep cup-nest thin-walled and frail (eggs visible from below) placed 1–9 m up in bush or tree. Clutch 2–4 eggs, greenish-white or bluish-white, with buff, brown or violet-grey marks forming wreath at larger end. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Hispaniola EBA. Locally common in Haiti; rare in Dominican Republic. In Haiti, occurs mainly W of Jacmel Depression, a small strip of low-elevation land forming E boundary of Tiburon Peninsula, an area still partly forested; reported as particularly numerous in the karst limestone forest of Macaya Biosphere Reserve, a rather poorly maintained national park in the Massif de la Hotte, and, while still numerous locally, it has doubtless declined greatly because no more than an estimated 1·5% of Haiti's original forest remains. Even these tiny remnants are under pressure as a source of firewood and for charcoal production. In Dominican Republic, found only on slopes of Sierra de Baoruco, in extreme SW, and in S part of Loma de Toro and Hoyo de Pelempito. Various predators, mostly introduced, are potential threats to the species; they include black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), Indian mongoose (*Herpestes javanicus*) and feral cats (*Felis catus*), as well as small native raptors such as the Sharp-shinned Hawk (*Accipiter striatus*) and American Kestrel (*Falco sparverius*).
Bibliography. Anon. (2010a), Bond (1928a, 1948, 1961), Butchart & Stattersfield (2004), Danforth (1929), Dod (1978), Isler & Isler (1999), Keith *et al.* (2003), Latta (2005), Latta *et al.* (2006), Maurrasse & Rigaud (1982), McCarthy (2006), McDonald (1988), McDonald & Smith (1990, 1994), Raffaele *et al.* (1998), Richmond & Swales (1924), Rimmer *et al.* (2005), Stattersfield & Capper (2000), Townsend (2007, 2009), Wetmore & Lincoln (1933), Wetmore (1932), Wetmore & Lincoln (1932, 1933), Wetmore & Swales (1931).

Genus *CALYPTOPHILUS* Cory, 1884

280. **Eastern Chat-tanager**

Calyptophilus frugivorus

French: Konichon dominicain **German**: Ostschmätzertangare **Spanish**: Tangara Dominicana
Other common names: Lowland Chat-tanager

Taxonomy. *Phoenicophilus frugivorus* Cory, 1883, Villa Rivas, Dominican Republic.
Molecular data suggest that genus does not belong with this family. This species was originally described in genus *Phoenicophilus*, and subsequently placed in newly erected present genus. Often treated as conspecific with *C. tertius*, the enlarged species then consisting of four races, these sharing some characters, which makes clear separation into an E species and a W species difficult; treatment as two distinct species provisional, and further study required. Two subspecies recognized.
Subspecies and Distribution.
C. f. frugivorus (Cory, 1883) – Samaná Peninsula, on N coast of Dominican Republic.
C. f. neibae J. Bond & Dod, 1977 – C mountains of Dominican Republic (E to Reserva Científica de Ebano Verde).



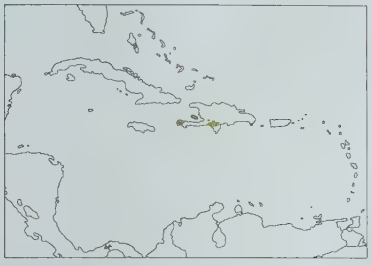
Descriptive notes. c. 18–19 cm; 26·3–38·6 g. Dull species with rather long and pointed bill and large, strong legs and feet; long tail, slightly rounded at tip, imparts a general shape not unlike that of a mockingbird (*Mimus*). Nominate race has crown dusky brown, becoming dark greyish-brown on side of head, with narrow broken yellow eyering (not very conspicuous) and narrow but more prominent yellowish loral mark (or line); otherwise mainly dark olive-brown above, including upperwing and tail; throat and underparts white, sides, flanks and lower underparts heavily washed greyish-brown; yellowish underwing-coverts often visible along bend of wing; iris dark brown; upper mandible black, lower mandible pale blue-grey with dusky tip; legs horn-grey. Differs from *C. tertius* in smaller size, paler plumage, yellow eyering, lack of rufescent colour on wing and tail. Sexes similar. Juvenile undescribed. Race *neibae* is smaller and darker than nominate, and has rufescent tail. Voice. Song, heard mostly at dawn, given by both sexes. Songs of the two races differ somewhat; both are excellent songsters, regarded as among the finest on Hispaniola (as is *C. tertius*). Nominate race sings a low slurred or whistled "swerp, swerp, chip, chip, chip...", sometimes accelerating into a chatter; *neibae* song similar but more varied, "weet-weet-werp chip-cheep-sweet...", sometimes ending in short trill.
Habitat. Thick undergrowth of mountain forest and dense vegetation along streams and ravines; reported as occurring especially in areas of dense undergrowth dominated by an invasive fern, *Dicranoteris pectinada*, with native bushes and trees typical of Hispaniolan cloudforest. At various elevations from lowlands to mountains, but primarily above 1000 m. Nominate race in areas below 600 m.
Food and Feeding. Feeds primarily on insects and other invertebrates; takes only very small amount of fruit (despite scientific name). One stomach contained animal matter, another held vegetable matter, including seeds, a moth (Lepidoptera), an ant (Formicidae), two hairy spiders (Araneae), a thrips (Thysanoptera) and a cockroach (Blattaria) ootheca. Found in pairs; secretive and tending to remain hidden in dense vegetation. Strongly territorial and mainly a ground-dweller, foraging on or near ground by searching leaf litter.
Breeding. Season probably May–Jul. One nest, believed to be of this species, was cup-shaped, placed 0·6 m above ground in a fern at edge of a blackberry (*Rubus*) patch; contained 1 spotted egg. No other information.
Movements. Resident.
Status and Conservation. Not assessed. Probably Vulnerable. Restricted-range species: present in Hispaniola EBA. Rare to locally common. Nominate race has not been reported in recent years, and may be extinct. Race *neibae* has reportedly declined dramatically, with recent records mainly from Sierra de Neiba, where it is still locally common, and at Ebano Verde Scientific Reserve, where it may be relatively numerous, at least in upper zone (800–1565 m). It appears that relatively little of the species' habitat lies within protected areas, and priority should be given to sites where it is known to occur. Primary threats appear to be logging and the clearing of forest or wooded areas for agricultural purposes. Considering its extremely small distribution and rapid decline, the species may be better listed as Endangered.
Bibliography. Almonte & Fernández (2002), Anon. (1998, 2010a), Bond (1928a, 1943, 1961), Bond & Dod (1977), Butchart & Stattersfield (2004), Cherrie (1896), Cory (1886), Danforth (1929), Dod (1978), Isler & Isler (1999), Keith *et al.* (2003), Latta (2005), Latta *et al.* (2006), Pregill & Olson (1981), Raffaele *et al.* (1998), Reynard (1981), Stattersfield & Capper (2000), Townsend *et al.* (2007), Wetmore & Swales (1931).

281. **Western Chat-tanager**

Calyptophilus tertius

French: Konichon d'Haïti **German**: Westschmätzertangare **Spanish**: Tangara Haitiana
Other common names: Highland Chat-tanager

Taxonomy. *Calyptophilus frugivorus tertius* Wetmore, 1929, higher slopes of Morne La Hotte, Haiti.
Molecular data suggest that genus does not belong with this family. This species was originally described in genus *Phoenicophilus*, and subsequently placed in newly erected present genus. Often treated as conspecific with *C. frugivorus*, the enlarged species then consisting of four races, these sharing some characters, which makes clear separation into an E species and a W species difficult; treatment as two distinct species provisional, and further study required. Proposed race *selleanus* (described from Massif de la Selle, in Haiti) is considered synonymous with nominate. Two subspecies recognized.
Subspecies and Distribution.
C. t. abbotti Richmond & Swales, 1924 – Gonâve I (off WC Hispaniola).
C. t. tertius Wetmore, 1929 – SW Haiti (Massif de la Hotte and Massif de la Selle) and adjacent SW Dominican Republic.
Descriptive notes. 20–21 cm; 40·2–55·3 g. Dull species with rather long and pointed bill and large, strong legs and feet; long tail, slightly rounded at tip, imparts a general shape not unlike



that of a mockingbird (*Mimus*). Nominate race has small, inconspicuous rusty loral spot, rest of head mainly rich dark olive-brown, becoming blackish on crown; upperparts, including upperwing and tail, deep rufescent brown; throat and underparts white, side of chest and side of breast to flanks and lower underparts heavily washed greyish brown; yellowish underwing-coverts often visible along bend of wing; iris dark brown; upper mandible black, lower mandible pale greyish; legs horn-grey. Differs from *C. frugivorus* in larger size, darker plumage, more rufescent upperparts, lack of yellow eyering. Sexes similar. Juvenile undescribed. Race *abbotti* is slightly smaller and more greyish-brown in colour than nominate. VOICE. Song, by both sexes, mostly at dawn, "wee-chee-chee-chee", quite similar to that of *C. frugivorus*, but weaker and buzzier. Makes "chip-chip" while foraging; "tick, tick, tick, tick..." when approaching nest.

Habitat. Broadleaf forest and dense thickets, especially in ravines and near water, much as for *C. frugivorus*. In semi-arid scrub on Gonâve I (race *abbotti*). From sea-level up into mountains; locally numerous at a few high-elevation sites.

Food and Feeding. Few data. Diet probably primarily small invertebrates, with small amount of fruit. In pairs; secretive. Details apparently similar to those for *C. frugivorus*.

Breeding. Two nests found, in mid-May and early Jun; season probably May–Jul. Nest is coarsely built, partially domed, bulky structure, placed 1–1·5 m above ground; one nest was in dense thicket, the other in a forest clearing; exterior made of small woody stems and coarse herbaceous stems, vine tendrils, moss, and foliose lichens, partially overlain by whole leaves of broadleaf species; inner cup lined mainly with fine herbaceous stems and leaf fragments; external diameter 11–13 cm, depth 5 cm. One nest contained two eggs (other nest empty, already predated); eggs pale blue with irregular brown spotting. Both adults fed chicks, male sporadically, female every 15–20 minutes when not brooding; female removed faecal pellets; male sang regularly, within 10 m of nest. Both nests ultimately predated.

Movements. Resident.

Status and Conservation. Not assessed. Probably Vulnerable. Restricted-range species: present in Hispaniola EBA. Rare to locally fairly common. Race *abbotti*, confined to Gonâve I, has not been reported for many years, and may already be extinct. Nominate race is fairly numerous locally in S Haiti and also in in SW Dominican Republic (Sierra de Bahoruco). Several reserves existed in Haiti, but unstable governments and chronic poverty have made it almost impossible to protect these sites; in addition, recent earthquake damage has caused further deterioration and environmental damage. Dominican Republic has an extensive series of protected areas, including the Sierra de Bahoruco, which offers some security for the species.

Bibliography. Almonte & Fernández (2002), Anon. (1998, 2010a), Bond (1928a, 1929a, 1943, 1961), Bond & Dod (1977), Cherrie (1896), Cory (1886), Danforth (1929), Dod (1978), Isler & Isler (1999), Keith *et al.* (2003), Latta (2005), Latta *et al.* (2006), Pregill & Olson (1981), Raffaele *et al.* (1998), Reynard (1981), Rimmer *et al.* (2008), Stattersfield & Capper (2000), Townsend *et al.* (2007), Wetmore & Swales (1931).

Genus *RHODINOCICHLA* Hartlaub, 1853

282. Rosy Thrush-tanager

Rhodinocichla rosea

French: Quéo rosalbin **German**: Rosenbrusttangare **Spanish**: Tangara Rosada
Other common names: Rose-breasted Thrush-tanager

Taxonomy. *Furnarius roseus* Lesson, 1832, Brazil; error = Caracas, Venezuela.

Relationships uncertain. Traditionally placed in present family, and such treatment partly supported by recent genetic and morphological data, but further evidence required; sometimes thought to be closest to mockingbirds and thrashers (Mimidae). Races represent at least three geographically isolated populations; furthermore, it is possible that the three races in South America (typically represented as a single geographical unit) are isolated from each other. Five subspecies currently recognized.

Subspecies and Distribution.

R. r. schistacea Ridgway, 1878 – W Mexico from S Sinaloa S to W Michoacán, also isolated population in vicinity of Laguna Tres Palos (near Acapulco, in Guerrero).

R. r. eximia Ridgway, 1902 – W Costa Rica (E San José) S to C Panama (Panamá on Pacific slope; locally on Caribbean slope in Coclé and Colon).

R. r. harterti Hellmayr, 1918 – Colombia (N & W base of Santa Marta Mts and W Guajira; E slope of C Andes in N Tolima; and W slope of E range from Norte de Santander S to Cundinamarca).

R. r. beebei Phelps, Sr & Phelps, Jr, 1949 – both slopes of Perijá Mts, on Venezuela–Colombia border.

R. r. rosea (Lesson, 1832) – N Venezuela in Sierra de San Luis, S Lara, and coastal cordillera (from Yaracuy E to Distrito Federal and Miranda, S to extreme N Guárico at San Francisco de Macaira).



Descriptive notes. 19–20 cm; 43–52 g. Distinctive species, with fairly long sharp bill and large and strong legs and feet. Male nominate race has crown and side of head slate-grey, broad carmine-rose supercilium (broad in supraloral area) narrowing and becoming white over and behind eye; upperparts and tail slate-grey, flight-feathers tinged brownish; bend of wing, and throat and underparts to undertail-coverts bright begonia-rose, sides and flanks broadly brownish-grey; iris reddish-brown; bill generally black above and mostly pale horn-grey below, considerable variation, a few have mostly yellowish bill; legs greyish-horn. Female similar to male, but with rose-red colour replaced by orange-cinnamon. Subadult male is like female, but may show patches of rose colour. Races differ mainly in coloration and in tone of red, which show "leap-frog" pattern in geographical variation, with grey-backed populations in Mexico and in South America, and intervening black-backed population in lower Central America: *beebei* is similar to nominate, but male has only a prominent supraloral spot carmine-rose, rest of supercilium white but reduced or essentially absent behind eye, female little or no white supercilium behind eye (same as on male) and with warmer, more yellowish-orange, tinge on underparts; *harterti* differs from nominate in having entire supercilium carmine-rose, but becoming very narrow behind eye; *eximia* differs rather markedly from nominate in having upperparts black (not dark grey), and supercilium pronounced, and both front of supercilium and underparts much brighter and redder, female differs in having black (not dark grey) upperparts and colder, browner underparts; *schistacea* is much like nominate, but male breast and underparts brighter and pinker, perhaps also slightly paler grey above, also wing and tail on average longer and tarsus shorter, female differs from nominate in warmer, slightly more yellowish-orange tinge below. VOICE. Songs vary somewhat geographically, but in all areas they retain distinctive quality and pattern. In Venezuela, songs, given by both male and female separately and antiphonally, include a loud, clear, very musical series of choppy but forceful phrases, "cholo, cheela, cholo, cheela, cheela..." and so on, heard especially during first half of year; may also alternate phrases, e.g. "tor-chíl-o, wachéer, tor-chíl-o..." etc. During foraging, occasionally utters a ringing "eeoo" and a short, dry "tur-ta'tup", the latter closely resembling a call of the Tawny-crowned Pygmy-tyrant (*Euscarthmus melacoryphus*).

Habitat. Thickets and tangled undergrowth on scrubby semi-arid slopes, undergrowth in thorn-forest, cane brakes along rivers, undergrowth in dry and moist woodland, and locally into humid pre-montane forest borders and dense bushy second growth. Mainly foothills and lower slopes. Sea-level to 1000 m in Mexico, 250–900 m in Costa Rica and sea-level to 1200 m in Panama; c. 100–1700 m in Colombia and 100–1450 m in Venezuela.

Food and Feeding. Takes a rather wide variety of food items. Of six stomachs examined, three contained only vegetable matter and three contained both animal and vegetable matter; contents included seeds of fruit, grass and sedges (Cyperaceae), beetles (Coleoptera, of four species), ants (Formicidae), bugs (Hemiptera), a frog-bone fragment, and grains of sand. Alone and in pairs; usually wary, remaining close to the ground and skulking in dense vegetation, where notably difficult to see well. When approached, apt to move away in a series of hops and short flights, and only rarely ascends well up in trees. Forages on ground and within dense cover, flicking aside leaves with the bill, often spending considerable periods of time in one area.

Breeding. Jul in Mexico, and reported in Jan–Sept in Costa Rica. Nest built by both sexes, a shallow, well-made cup of acacia-like rachises on a twig foundation, sometimes lined with hair-like fibres of black fungal rhizomorphs, placed c. 1 m up in dense thicket. Clutch 2–3 eggs, white or pale blue with black markings, sometimes in wreath around large end; both sexes incubate eggs and attend young; no information on duration of incubation and nestling periods.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common very locally. Occurs in a series of small, isolated populations from W Mexico S to N Venezuela. Decidedly local and with apparently narrow micro-habitat tolerance, but sometimes surprisingly common, e.g. in dry W foothills of Santa Marta Mts, in Colombia, and in wooded areas within city limits of Caracas (e.g. Urbanización San José; Hotel Tamanaco), in Venezuela; fairly common in E foothills of Sierra de San Luis and locally elsewhere in Venezuela. Throughout its range generally restricted to dry to moist wooded sites, where often tolerates a surprising amount of habitat disturbance. Relatively little of its habitat lies within protected areas or parks, and in numerous areas dry and moist forest and scrub vegetation is rapidly being cut and converted to grassland for grazing, or being damaged or destroyed through fire and other human activities. Found in a few small protected areas, including Metropolitan Park (near Panama City), Laguna del Tabacal Municipal Park, near La Vega (Colombia), Henri Pittier and Guatopo National Parks and patches of dry to moist scrub and woodland within the metropolitan area of Caracas (Venezuela).

Bibliography. Alden (1969), Carriker (1910), Clark, G.A. (1974), Clark, H.L. (1913a), Davis (1972), Eisenmann (1952, 1962), Garrigues & Dean (2007), Gilliard (1958), Hallinan (1924), Hartert (1916), Hartman & Brownell (1961), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Isler & Isler (1999), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Peterson *et al.* (2004), Phelps (1943), Phelps & Phelps (1950, 1963), Raikow (1978), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Schäfer & Phelps (1954), Seutin & Bermingham (1997), Skutch (1962a), Slud (1964), Stiles & Skutch (1989), Strewe & Navarro (2004), Thomas (1982), Wetmore *et al.* (1984).



Genus *COEREBA* Vieillot, 1809

283. **Bananaquit**

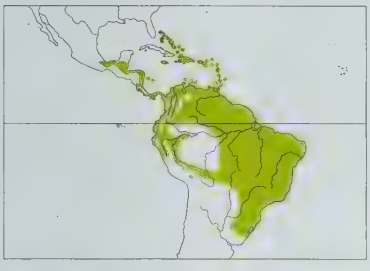
Coereba flaveola

French: Sucrier à ventre jaune **German**: Zuckervogel **Spanish**: Platanero
Other common names: Common Bananaquit; Bahama Bananaquit/Honeycreeper ("*bahamensis* group")

Taxonomy. *Certhia flaveola* Linnaeus, 1758, Jamaica.
Taxonomic placement long disputed. Has often been placed in its own family, Coerebidae, and sometimes with New World warblers (Parulidae) or with buntings and New World sparrows (Emberizidae), sometimes as a subfamily. Recent molecular-genetic data do not support historically recognized family Coerebidae, but do show strong support for a monophyletic grouping that includes present genus, *Tiaris*, the Galapagos finches, and several Caribbean genera (especially *Euneornis*), all usually placed in Emberizidae but now thought to belong clearly within the thraupine lineage; genetic variation between species in this clade comparable to that within most avian genera, despite marked differences in bill morphology and feeding behaviour. Within present species, molecular-phylogenetic studies reveal three clades, "*bahamensis* group" (Quintana Roo region of SE Mexico, and Bahamas), "*flaveola* group" (Cayman Is, Jamaica and Hispaniola), and "*bartholemica* group" (Puerto Rico, Lesser Antilles, Mexico except Quintana Roo, and Central and South America), and these may be better treated as three separate species; several taxa not yet sampled, but should fall within with one of above groups on basis of distribution; placement of SW Caribbean island races *oblita* (San Andrés) and *tricolor* (Providencia) remains uncertain. Recent molecular-genetic studies point to an origin in Greater Antilles, this followed by multiple expansion phases resulting in island to mainland colonization as the species extended its range. Remarkable geographical variation, especially in Caribbean islands. Number of races likely subject to revision, some races (or groups of races) perhaps worthy of species status and others poorly separated genetically; for example, *roraimae* could be subsumed in *guianensis* and *alleni* in *chloropyga*. Forty-one subspecies currently recognized.

Subspecies and Distribution.
C. f. caboti (S. F. Baird, 1873) – SE Mexico (Quintana Roo) and islands off NE Yucatán Peninsula (Holbox, Cancún, Cozumel, and Cayo Culebra).
C. f. bahamensis (Reichenbach, 1853) – Bahamas (from Grand Bahama and Little Abaco SE to Great Inagua and Grand Turk).
C. f. sharpei (Cory, 1886) – Grand Cayman I, Little Cayman I, and Cayman Brac.
C. f. flaveola (Linnaeus, 1758) – Jamaica.
C. f. bananivora (J. F. Gmelin, 1789) – Hispaniola, Gonâve I, Petite Cayemite I and I à Vache.
C. f. nectarea Wetmore, 1929 – Tortue I, off Haiti.
C. f. tricolor (Ridgway, 1884) – Providencia I, off E Nicaragua.
C. f. oblita Griscom, 1923 – San Andrés I, off E Nicaragua.
C. f. mexicana (P. L. Sclater, 1857) – SE Mexico (from C Veracruz and Oaxaca) S on Caribbean slope (and Pacific slope in Costa Rica) to W Panama (Veraguas, including Coiba I).
C. f. cerinoclunis Bangs, 1901 – Pearl Is, in Bay of Panama.
C. f. columbiana (Cabanis, 1865) – Panama (from Canal Zone) E through C & SW Colombia (Andes from Antioquia to Huila) to S Venezuela (extreme NW Amazonas).
C. f. portoricensis (H. Bryant, 1866) – Puerto Rico.
C. f. sanctithomae (Sundevall, 1870) – Vieques I and Culebra I (off E Puerto Rico) and Virgin Is.
C. f. newtoni (S. F. Baird, 1873) – St Croix (S Virgin Is).
C. f. bartholemica (Sparrman, 1788) – N & C Lesser Antilles (Anguilla, St Martin, Saba, St Bartholomew S to Guadeloupe, Marie Galante and Dominica).
C. f. martinicana (Reichenbach, 1853) – Martinique and St Lucia (SC Lesser Antilles).
C. f. barbadensis (S. F. Baird, 1873) – Barbados.
C. f. atrata (Lawrence, 1878) – St Vincent, in S Lesser Antilles.
C. f. aterrima (Lesson, 1830) – Grenada I and the Grenadines.
C. f. uropygialis Berlepsch, 1892 – Aruba and Curaçao, in Netherlands Antilles.
C. f. bonairensis Voous, 1955 – Bonaire I, in Netherlands Antilles.
C. f. melanornis Phelps, Sr & Phelps, Jr, 1954 – Cayo Sal, off N Venezuela.
C. f. lowii Cory, 1909 – Los Roques Is, off N Venezuela.
C. f. ferryi Cory, 1909 – La Tortuga I, off N Venezuela.
C. f. frailensis Phelps, Sr & Phelps, Jr, 1946 – Los Frailes (Puerto Real) and Los Hermanos, off N Venezuela.
C. f. laurae P. R. Lowe, 1908 – Los Testigos Is, off N Venezuela.

C. f. luteola (Cabanis, 1851) – Colombia (Caribbean coast of Bolívar and Magdalena) and N Venezuela (Zulia E to Monagas, S to Apure and N Bolívar); Trinidad and Tobago.
C. f. bolivari J. T. Zimmer & Phelps, Sr, 1946 – E Venezuela (lower Orinoco Valley of Delta Amacuro, and N & E Bolívar from R Cuchivero S to lower R Paragua).
C. f. guianensis (Cabanis, 1851) – C Venezuela (lower Caura Valley) S & E across Guyana.
C. f. roraimae Chapman, 1929 – S Venezuela (N & E Amazonas, S Bolívar) and region of Cerros Roraima and Uei-tepui in Guyana and SE Venezuela.
C. f. minima (Bonaparte, 1854) – E Colombia (R Guainía) and S Venezuela (S half of Amazonas) E to French Guiana and NC Brazil (to Pará, N of R Amazon).
C. f. obscura Cory, 1913 – W Venezuela (E side of L Maracaibo, SE Zulia and below 1200 m in Andean foothills of Mérida and Táchira) and adjacent Colombia (Norte de Santander).
C. f. montana P. R. Lowe, 1912 – Venezuelan Andes (above 1200 m in Mérida and Táchira).
C. f. caucae Chapman, 1914 – Colombia in upper Cauca Valley and on slopes of C & W Andes (from Caldas S to Cauca).
C. f. intermedia (Salvadori & Festa, 1899) – SW Colombia (Nariño), W Ecuador and N Peru (from San Martín, and Loreto) E to W Brazil and S Venezuela (SW Amazonas).
C. f. gorgonae Thayer & Bangs, 1905 – Gorgona I, off W Colombia.
C. f. magnirostris (Taczanowski, 1880) – Peru in upper Marañón Valley (in Piura, Cajamarca and E Libertad).
C. f. pacifica P. R. Lowe, 1912 – W Peru (NW Lambayeque, W Libertad and Ancash).
C. f. dispar J. T. Zimmer, 1942 – C & SE Peru (from S San Martín) S to Bolivia (La Paz).
C. f. chloropyga (Cabanis, 1851) – C Peru (from Huánuco and Junín) S to C Bolivia (to Santa Cruz), then E across SC & E Brazil (to Ceará and Pernambuco, then S to Rio Grande do Sul) and S to E Paraguay, NE Argentina (Misiones) and extreme N Uruguay.
C. f. alleni P. R. Lowe, 1912 – E Bolivia (Santa Cruz) E to C Brazil (Mato Grosso).



Descriptive notes. 10·5–11 cm; 6·4–14·2 g. Distinctive for its bill shape, which is short, sharply pointed and decurved. Generally dark grey to dusky olive above, much brighter on rump, with prominent pale supercilium, white patch at base of flight feathers; throat greyish, underparts bright yellow. Sexes more or less alike. Immature is similar to adult, but paler and dingier, with supercilium dull, often yellowish, or with anterior portion yellow and posterior portion white; immatures of sooty races are similar to adults, but duller and browner. Remarkable range of geographical variation; details presented below for each of the three major clades. *Clade 1* (Bahamas, Cozumel Is: "*bahamensis* group"). Race *bahamensis* has crown dark grey, rest of upperparts plain grey, long white supercilium and small white spot at base of primaries, bill black with red gape, entire side of head, throat, and chest white, broad yellow band across mid-breast, with lower breast to undertail-coverts white; *caboti* is similar to previous, but slightly larger, blacker above, with bill broader at base and slightly less curved. *Clade 2* (Jamaica, Hispaniola, Grand Cayman Is: "*flaveola* group"). Nominate race has deep black upperparts with white supercilium, large and prominent white spot at base of primaries, small dull yellow rump patch, slaty-black throat, and dark wax-yellow underparts; *bananivora* differs from nominate in being slightly lighter in colour overall, with back blackish-slate (not deep black), throat dark grey (less slaty), underparts not so deep yellow, and white wing spot smaller; *nectarea* reported as very similar to previous, but throat and foreneck slightly darker grey; *sharpei* most closely resembles *caboti* (of clade 1, above), from which it differs in having larger bill, smaller and duller yellow rump, smoke-grey (not pale grey) throat and chest, larger white tail tips, and lores and ear-coverts with black more restricted. Two subspecies, *tricolor* and *oblita* are perhaps most similar in appearance to *sharpei*, but both have pale grey of throat spreading well down onto chest (as in *caboti* and *bahamensis*) and their true taxonomic placement remains uncertain; *tricolor* has throat and chest (not just throat) smoke-grey, and also differs from *sharpei* in shorter bill and brighter yellow rump; *oblita* is extremely similar to *tricolor*, but with grey area of throat and chest slightly darker and even more extensive, spreading to upper breast, also yellow of breast paler, more greenish-yellow, flanks slightly more greyish-olive, and bill shorter. *Clade 3* (Central America [except Cozumel], rest of Caribbean, and South America: "*bartholemica* group"). Race *columbiana* has crown and side of head black with long white supercilium, back and wings olive-tinged slate-grey, bright yellow rump, small white spot at base of primaries, white tail tips, throat grey, underparts yellow, white undertail-coverts lightly tinged cream; *mexicana* differs from previous in having rump patch duller, more greenish-yellow and smaller, and back not so dark grey; *cerinoclunis* differs little from *columbiana*, but upperparts black (little contrast with head), instead of deep mouse-grey to dark greyish-olive, also paler grey throat, darker yellow below, smaller white wing spot, and smaller white tail tips; *luteola* is nearest *guianensis*, but blackish above with conspicuous wing spot, differs from *columbiana* in entire upperparts blackish (no olive tinge), rump brighter, and lower underparts white; *montana* is nearest *columbiana*, but upperparts darker, fuscous black (instead of deep mouse-grey to dark greyish-olive), yellow of rump brighter, throat darker grey (more like *luteola*) and bill longer and stronger (*montana* is intermediate between *luteola* and *columbiana*); *obscura* differs in having lower underparts creamy, back, wing-coverts and flight-feathers paler, more dusky; *bolivari* differs in having back and wings distinctly greyish and rump whitish; *minima* is nearest *chloropyga*, but slightly darker above, rump brighter (differs from *columbiana* in slightly smaller size, back slate-grey); *guianensis* differs in having back and wings paler, more brownish-black (not olive), wing spot vestigial or absent, and no white tail tips; *roraimae* is extremely similar to last, but slightly larger, back a little darker and contrasting less with crown, and throat perhaps darker; *caucae* is much like *columbiana*, but supercilium much narrower and somewhat variegated with dusky edges. Several more S races are much paler, mainly greyish, including *intermedia*, which is exceedingly similar to *columbiana*, but underparts brighter yellow (near wax-yellow), upperparts on average slightly darker, rump generally richer yellow; *intermedia* differs from *chloropyga* mainly in conspicuous white wing spot, darker back and darker throat; *pacifica* is very like previous, but has shorter bill, back less sooty, throat paler grey (in colour nearly identical to *magnirostris*, but with much shorter bill and smaller size); *magnirostris* differs in large size, notably long tail and unusually long bill; *dispar* and *chloropyga* resemble *pacifical intermedia*, but slighter larger and essentially lack white wing spot (*chloropyga* quite greyish above and pale yellow below, with pale sandy-buff tinge on flanks); *gorgonae* is nearest *intermedia*, but side of throat and malar area finely barred dusky, back sooty, and white wing spot and tail tips very small; *alleni* is doubtfully ly indistinguishable from *chloropyga*, although may average slightly paler. More different still are several Caribbean races somewhat like *columbiana*: *portoricensis*, which differs in darker grey throat and red gape (additionally, is generally similar to *bananivora*, but differs in black upperparts, clearer slate-grey throat, and much larger, longer, white tail tips); *bonairensis* has red gape, wider white supercilium rearwards, white (not yellow) throat, back olive-brown, wing-coverts with two white wingbars, flight-feathers extensively edged white, rump pale yellow (not bright yellow); *ferryi* is nearest *luteola*, but has forehead with varying amount of white, pale greyish edging on flight-feathers, sometimes extreme base of gape red; *uropygialis* is close to preceding race (and has pale grey wing edgings), but differs in black chin and side of throat, rest of throat white (not grey), also no white wing spot, upperparts less sooty, rump patch reduced and more greenish-yellow, and well-developed red gape; *frailensis* has large white wing spot, and grey flanks and thighs; *martinicana* differs in having long bill with red gape, broad white supercilium, black side of head, side of throat and chin, with central throat whitish, little or no white wing spot and no white tail tips (in general closest to *uropygialis*, and throat similar, but differs in blacker upperparts, much shorter supercilium, and duller yellow underparts with olive-tinged sides); *barbadensis* is much like *martinicana*, differing mainly in having smaller amount of white on throat; *bartholemica* is much like previous two races (including no white wing spot), but differs most obviously in having uniformly slate-coloured throat; *newtoni* resembles *portoricensis* and *sanctithomae*, but has much darker slaty throat, and duller, more olive-yellow, rump; *sanctithomae* is very similar to *portoricensis*, but underparts brighter, cleaner yellow and flanks paler. A few S Caribbean races found on small islands are mainly black or dark olive, and utterly unlike any of the above races: *laurae* is similar in size and colour to *atrata*, but differs in lacking red gape and also in decidedly stronger, longer and less decurved bill; *melanornis* is all black like *laurae*, but smaller and with much shorter bill; *lowii* is similar in size to *melanornis*, but with red gape and olive-tinged lower underparts; *aterrima* is nearest *lowii*, mainly sooty black but with slight greenish-yellow wash on uppertail-coverts and breast and lower underparts (it also has a light morph, similar to *luteola* but with blacker upperparts and duller underparts, dark morph predominates in Grenada, light morph in Grenadines); *atrata* is exceedingly close to *aterrima*, but differs in larger size and longer, heavier bill. VOICE. Gives weak little "tsit" notes when foraging. A persistent singer, songs typically short, high-pitched series of unmusical buzzes, "chip" notes and insect-like hisses. There are hundreds of regional dialects and much individual variation within regions, which can make recognition of this species' songs difficult. Because of this extreme regional variation, songs are easily confused with those of hummingbirds (Trochilidae), *Conirostrum* species, dacnises and others, and even with insect sounds.

Habitat. Occurs in almost any shrubby or semi-open area or forest border in fairly dry to humid regions; in general most numerous in gardens, disturbed or shrubby areas, light woodland and mangroves, least numerous or absent locally in arid scrub, and generally scarce or absent in areas of extensive humid forest. Abundant in gardens and areas with flowers on many Caribbean islands and locally inside humid forest on Caribbean islands, also in dry (but not arid) to moderately humid areas across Caribbean region of N South America; fairly common in arid upper Marañón Valley in Peru, but largely or entirely absent from W Amazonia, including S Colombia, E Ecuador, NE Peru and much of W Brazil. Generally more common and widespread in lowlands, but also found locally in Andes to c. 2000 m; regularly to 2600 m near Bogotá, in Colombia (*columbiana*), 1200–1900 m or higher in Mérida and Táchira, in Venezuela (*montana*), at 1000–2400 m in upper Marañón Valley, in N Peru (*magnirostris*), and up to 2400 m farther S in Andes of Peru and Bolivia (*chloropyga*).

Food and Feeding. Feeds primarily on nectar; also takes some small fruits and berries and a few insects. Feeds many insects to young. Forages alone or in loosely associated pairs; may join mixed-species flocks, but much more often alone. Takes nectar at almost any height, from below eye level up to canopy of tall trees, by probing into flowers or by piercing, from the outside, the base of tubular flower corollas. Notably active, restless, and nervous-acting when foraging; hops rapidly, probes with high-speed movements for nectar, then quickly moves on. Much attracted to hummingbird feeders or bowls of sugar, and in many parts of Caribbean and N South America it may become very bold and tame, entering porches and open dining areas to take sugar from tables even while guests are seated.

Breeding. In Caribbean region breeding cyclical, closely correlated with onset of rains, mainly Mar–Jun, occasionally in other months; in Costa Rica reported throughout year, with peak in Jul–Sept (may vary with flowering in Caribbean lowlands); breeding records scattered throughout year in Colombia, and reported Sept–Oct in Bolivia (La Paz); may regularly produce two or more broods in some areas, e.g. on Barro Colorado (Panama) one pair attempted three broods (two successful) between Jan and Jun. Globular nest, circular entrance hole on lower side and facing slightly downward, made from grass and a wide variety of plant fibre, placed mostly 1·5–4 m up, less often to 15 m; nests sometimes reused. In all areas also builds dormitory nests (resemble sleeping nests), and breeding nests also used as dormitories when female not breeding. Clutch 2–4 eggs, dull white with brown flecks and dots; incubation by female alone, period 12–13 days; chicks fed by male and female, nestling period 17–19 days; fledged juveniles do not return to nest to sleep, but may build own dormitory nest (or use abandoned nest of other species) before acquiring adult plumage.

Movements. Generally resident. In most areas sedentary and territorial throughout year, but in dry areas local population shifts in response to flower abundance. Bahamas race (*bahamensis*) recorded as a vagrant in Cuba, mainly on offshore islets. Rare visitor to S Florida (USA).

Status and Conservation. Not globally threatened. Varies from being uncommon, as in heavily forested areas, to being abundant, as on many Caribbean islands and also locally in gardens and parks in Venezuela and Colombia. Occurs in many protected areas, but generally more numerous in settled areas where there are gardens or hedgerows with flowers. Has profited greatly from human disturbance, primarily because of its ability to use a wide variety of nectar resources, including those of many non-native species. Also, on some Caribbean islands, e.g. Trinidad and Tobago, and locally in N South America, is attracted to fruit and hummingbird feeders and readily comes to sugar bowls, where it can become extremely numerous.

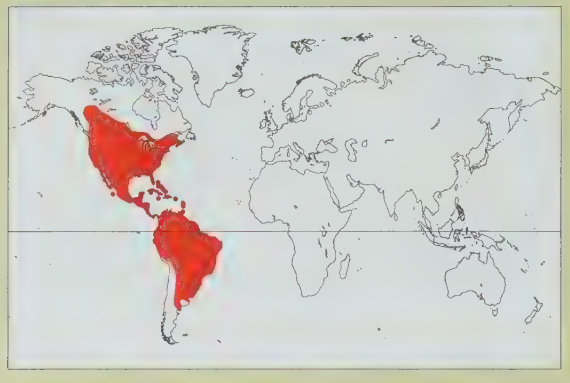
Bibliography. Allen (1961), Bangs & Noble (1918), Beecher (1951a), Bellemain *et al.* (2008), Binford (1989), Blake (1953), Bledsoe (1988), Boal *et al.* (2006), Burns & Naoki (2004), Burns *et al.* (2002, 2003), de Carvalho (1958a), Chesser *et al.* (2010), Davis (1972), Donegan & Dávalos (1999), Dunning (2001), ffrench (1991), Fjeldså & Krabbe (1990), Garrigues & Dean (2007), Harris (1972), Hayes *et al.* (2004), Hellmayr (1938), Hilty (1997, 2003), Hilty & Brown (1986), Howell & Webb (1995), Jahn *et al.* (2002), Klicka *et al.* (2007), Lovette & Bermingham (2002), Meyer de Schauensee (1951, 1952b, 1964, 1966, 1970a), Naumburg (1930), Oberle (2008), Phelps & Phelps (1950, 1963), Raffaele *et al.* (1998), Remsen *et al.* (2010), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989, 2009), Salaman *et al.* (1999), Sato, O'hUigin *et al.* (1999), Sato, Tichy *et al.* (2001), Sazima, I. (2008), Sazima, I. & Marques (2007), Sazima, I. *et al.* (1993), Sazima, M. & Sazima (1999), Schuchmann (1986), Schulenberg *et al.* (2007), Seutin *et al.* (1994), Sick (1985, 1993), Snyder (1966), Souza (2002), Stiles & Skutch (1989), Tostain *et al.* (1992), Vieillot (1809), Wunderle (1980, 1981a, 1981b, 1981c, 1982, 1984), Zimmer (1942a).

Class AVES

Order PASSERIFORMES

Suborder OSCINES

Family CARDINALIDAE (CARDINALS)



- Small to medium-sized passerines with conical to very thick finch-like bill; male plumage coloration often brilliant, with pigmented reds and structural blues, females usually duller.
- 11–24 cm.



- America.
- Temperate and tropical forest, mixed woodland, savanna, arid scrub, suburban gardens; one species in grassland.
- 11 genera, 42 species, 135 taxa.
- No species threatened; none extinct since 1600.

Systematics

Cardinalidae includes some of the most beautiful and best-loved birds of the Americas. The taxa traditionally placed in this family are, with the exception of the anomalous *Parkerthraustes* and *Saltator*, a fairly homogeneous group of small to medium-sized finch-like birds ranging throughout much of North and South America. "Traditional" cardinalids have a more or less heavy, conical bill and, frequently, brilliant colours ranging from rich reds to glittering blues. They are almost entirely inhabitants of forest, forest edge and brushland, the chief exception being the grassland-specialized, sparrow-like Dickcissel (*Spiza americana*).

The distribution of the family is centred on Middle America, its area of highest diversity ranging from the south-western USA southwards to South America north and west of the Andes. Other than *Parkerthraustes* and *Saltator*, which are probably not true cardinalids, only five of the twenty-five "traditional" species breed entirely outside these limits, although the Dickcissel and the Indigo Bunting (*Passerina cyanea*) are only marginal breeders within them. Three of these five, the Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Vermilion Cardinal (*Cardinalis phoeniceus*) and Yellow-green Grosbeak (*Caryothraustes canadensis*) have close relatives within the region. Only the Red-and-black (*Periporphyrus erythromelas*) and Glaucous-blue Grosbeaks (*Cyanoloxia glaucocaerulea*) represent genera absent from this core distribution, although both species have close, and possibly congeneric, relatives within it, the former being closely affiliated with *Rhodothraupis* and *Caryothraustes* and the latter being close to *Cyanocompsa*.

True cardinalids are entirely absent as breeding birds from the West Indies north of Trinidad and Tobago. The Rose-breasted Grosbeak winters sparingly in the western West Indies, and the Blue Grosbeak (*Passerina caerulea*), the Indigo Bunting and, rarely, the Painted Bunting (*Passerina ciris*) likewise spend the winter in that region. The Lesser Antillean Saltator (*Saltator albicollis*), however, is endemic to the islands of Martinique, Guadeloupe, St Vincent and Dominica.

Cardinalidae is one of the few nine-primaried oscine families with a fossil record predating human settlement. The Black-headed Grosbeak (*Pheucticus melanocephalus*) is known from the Pleistocene of Rancho La Brea, in California. D. W. Steadman and M. C. McKitrick assigned the proximal and distal ends of a right humerus and the distal end of a left humerus, collected in 1971 from a Pliocene (late Hemphillian) site in Chihuahua, in northern Mexico, to the genus *Passerina*, although they did note that the specimens were "not adequate for a definitive generic assignment".

Since the late nineteenth century, cardinals have been considered to constitute a subfamily, variously named Richmondeninae, Pyrrhuloxiinae and Cardinalinae, or a tribe, Cardinalini, of a wider Emberizidae or Fringillidae, or they have, as in the present treatment, been regarded as a family in their own right. More crucial than debates about taxonomic rank, however, are the questions of how Cardinalidae is related to the other New



Resembling an emberizid sparrow and inhabiting grasslands rather than forest and forest edge, the ***Dickcissel*** *looks out of place in the Cardinalidae. Some authors have proposed removing it, and one placed it among the New World Blackbirds (Icteridae), but its palatal structure is typically cardinalid and recent molecular-genetic studies support its placement in the present family. Its "aberrant" features may simply be adaptations to its grassland habitat. The female is smaller and duller than the male, with a much less prominent supercilium, and the black throat patch reduced to two narrow streaks.*

[*Spiza americana*, Chambers County, Texas, USA. Photo: Brian E. Small]



Pheucticus *species are large and robust, with a very heavy bill. Five species are recognized here. The plumage of the males of four species, including the* ***Black-backed Grosbeak****, is predominantly black and yellow. There have been various treatments of this "Yellow Grosbeak complex". The Yellow Grosbeak* (Pheucticus chrysopeplus) *of Mexico, Black-thighed Grosbeak* (P. tibialis) *of Middle America and Golden-bellied Grosbeak* (P. chrysogaster) *of north-western South America have been treated as conspecific, or as forming a superspecies with the Black-backed Grosbeak.*

[*Pheucticus aureoventris aureoventris*, Buenos Aires, Argentina. Photo: Matías Romano]

World nine-primaried oscines, and of which species actually belong within the family. The two questions are interlinked, as studies comparing cardinalids with other nine-primaried groups have at times used, as examples of Cardinalidae, genera that probably do not belong within its ranks. For example, a 1995 molecular study of the Emberizidae (*sensu lato*) by M. Watada and colleagues, following C. E. Hellmayr, included two "cardinals" in the genus *Paroaria* as examples of the Cardinalinae, notwithstanding the fact that in 1954 H. B. Tordoff had concluded, on the basis of skeletal morphology, that the genus was not cardinaline. Recent molecular analyses, including a 2002 study by T. Yuri and D. P. Mindell, support the placing of *Paroaria* among the tanagers (Thraupidae), although it is currently included within Emberizidae.

The species traditionally placed in Cardinalidae were generally put there because they were large-billed, often brightly coloured fruit-eaters and seed-eaters. Species having another bill morphology and different feeding habits were usually placed with other nine-primaried groups, tanagers in particular. Bill shape, however, has proven not to be a reliable phylogenetic character.

Hellmayr, in 1938, treated the group as the subfamily Richmondeninae of Fringillidae. He included within its ranks the genera *Saltator*, *Rhodothraupis*, *Caryothraustes*, *Periporphyrus*, *Pitylus*, *Gubernatrix*, *Paroaria*, *Richmondena*, *Pyrrhuloxia*, *Pheucticus*, *Hedymeles*, *Guiraca*, *Cyanocompsa*, *Cyanoloxia*, *Passerina*, *Porphyrospiza*, *Tiaris* and *Spiza*, *Hedymeles* being used for the Rose-breasted and Black-headed Grosbeaks, now included in *Pheucticus*. Tordoff removed *Gubernatrix*, *Paroaria*, *Tiaris* and *Porphyrospiza* on the basis of their palatomaxillary structure, a decision supported by later molecular studies.

Some three decades later, in his subfamily Cardinalinae for J. L. Peters's *Check-list of Birds of the World*, R. A. Paynter included the following genera: *Spiza*, *Pheucticus*, *Cardinalis*, *Caryothraustes*, *Rhodothraupis*, *Periporphyrus*, *Pitylus*, *Saltator* and *Passerina*. His expanded genus *Passerina* incorporated five genera which had been treated separately by Hellmayr, namely *Passerina*, *Cyanocompsa*, *Cyanoloxia*, *Porphyrospiza* and *Guiraca*. This treatment paralleled that used in 1888 by R. B. Sharpe, who included *Cyanocompsa* and *Cyanoloxia* in *Guiraca*. It should be noted that, in the present arrangement, *Pitylus* is subsumed in *Saltator*, and *Porphyrospiza*, no longer considered cardinaline, is included within Emberizidae.

Twenty years after Paynter's classification, in 1990, C. G. Sibley and B. L. Monroe included *Spiza*, *Pheucticus*, *Cardinalis*, *Caryothraustes*, *Rhodothraupis*, *Periporphyrus*, *Pitylus*, *Saltator*, *Cyanoloxia*, *Cyanocompsa*, *Passerina* and *Porphyrospiza* in a tribe Cardinalini within an expanded family Fringillidae.

In 2007, J. Klicka and colleagues performed the first molecular analysis in which all of the cardinalid genera recognized by Sibley and Monroe were sampled. They examined 34 of the 42 species involved, and concluded that, although there is a valid, monophyletic cardinalid clade at the core of the Cardinalidae, the family as traditionally recognized was both polyphyletic, including genera and species that belonged elsewhere, and paraphyletic, excluding taxa that seemed properly to belong within its ranks. The results of this analysis expanded the membership of Cardinalidae to include not only the warbler-like "chats" of the genus *Granatellus*, an assignment first proposed in 2002 by I. J. Lovette and E. Bermingham, but also the *Amaurospiza* seedeaters and three genera of supposed tanagers, *Piranga*, *Habia* and *Chlorothraupis*. *Granatellus* is currently placed with the New World warblers in the family Parulidae, while *Amaurospiza* is usually included within Emberizidae. Klicka and colleagues found that both *Cyanoloxia* and *Amaurospiza* were nested within *Cyanocompsa*. In contrast, *Parkerthraustes*, formerly included within the genus *Caryothraustes*, and *Saltator*, the most speciose genus in the Cardinalidae as currently constituted, appeared not to be cardinalids at all. An additional genus, *Porphyrospiza*, often included in Cardinalidae, was associated instead with *Phrygilus alaudinus*, the Band-tailed Sierra-finch, a species usually placed in Emberizidae but probably a thraupid.

Klicka and colleagues identified five subclades within the newly reconstituted family. Two, the *Habia–Chlorothraupis* and the *Granatellus* subclades, contain only genera newly assigned to Cardinalidae and currently treated within, respectively, Thraupidae and Parulidae. The "traditional" cardinalids retained in the family fall into three subclades:

1) a "masked" subclade consisting of *Piranga*, *Cardinalis* and *Caryothraustes* (including *Rhodothraupis* and *Periporphyrus*, but excluding *Parkerthraustes*);
2) a "blue" subclade consisting of *Passerina* (including *Guiraca*), *Cyanoloxia* (including *Cyanocompsa* and *Amaurospiza*) and *Spiza*; and
3) a grosbeak subclade containing the *Pheucticus* species.

It should be noted that, in the present arrangement, *Granatellus* is still treated under Parulidae, *Piranga*, *Habia* and *Chlorothraupis* under Thraupidae, and *Amaurospiza* under Emberizidae.



The upper mandible of the ***Pyrrhuloxia*** *is remarkably like that of a parrot (Psittacidae), being short, thick and deep, with a strongly curved culmen. Mainly because of this unique bill, the species was formerly placed in the monotypic genus* Pyrrhuloxia. *The mandibles of the Northern Cardinal* (Cardinalis cardinalis) *are quite different, but the bill of the Vermilion Cardinal* (C. phoeniceus) *is intermediate between the two, and the Pyrrhuloxia was returned to* Cardinalis *because of this and other arguments, including similarities in song and nest-building behaviour.*

[*Cardinalis sinuatus fulvescens*, Arizona, USA. Photo: John Cancalosi/ DRK]

Many of these conclusions, and those of earlier molecular studies, have already been accepted by the American Ornithologists' Union (AOU) and the South American Checklist Committee (SACC), although these bodies have not followed the study's proposed generic lumpings. Both have transferred *Chlorothraupis*, *Habia*, *Piranga*, *Granatellus* and *Amaurospiza* to the family Cardinalidae and removed *Saltator* to "incertae sedis" [of uncertain taxonomic position] near Thraupidae. The SACC has also transferred *Parkerthraustes*, which does not occur in North America, from Cardinalidae to a position "incertae sedis".

This radical shift in classification, if correct—and the evidence supporting it appears to be strong—means that the present text, confined to species traditionally placed in the family, can give only a partial picture of the range of morphological and ecological variation within the cardinalid clade. To avoid confusion, the genera *Parkerthraustes* and *Saltator* will generally be discussed only at the end of each introductory section.

Klicka and colleagues' 2007 study was not the first to question the traditional make-up of the Cardinalidae. An earlier molecular study by Klicka, K. P. Johnson and others, published in 2000, pointed to the misplacement of *Piranga* outside the group and of *Saltator* within it, and suggested that Cardinalini, as the authors classified it, was sister to the other four emberizid groups, namely Icterini, Emberizini, Parulini and Thraupini.

A. Grapputo and his colleagues, in a 2001 molecular study of relationships within the Emberizidae, found that the Cardinalidae, represented by the Northern Cardinal (*Cardinalis cardinalis*) and the Rose-breasted Grosbeak, clustered with the *Calcarius* longspurs and the snow buntings (*Plectrophenax*) as basal to other emberizids. These authors, however, did not examine other nine-primaried groups and used the cardinalids essentially as an outgroup, and the support for this positioning was only moderate.

Placement of the genera *Piranga*, *Habia* and *Chlorothraupis* within Cardinalidae was supported in 2002 by Yuri and Mindell, who found molecular evidence that cardinals and tanagers were sister-groups. J. Cracraft and F. K. Barker proposed that Cardinalidae and Thraupidae diverged 13·6–11·6 million years ago, during the Miocene. The cardinalid–thraupid clade, in turn, diverged from the emberizid lineage 16·3–14·1 million years ago.

With its aberrant plumage and behaviour, the Dickcissel has for a long time seemed to be out of place within the Cardinalidae. W. J. Beecher removed it from the family altogether, placing it among the Icteridae, and R. J. Raikow, on the basis of appendicular myology, considered the species to be intermediate between the emberizids and the icterids. Tordoff, however, found the palatal structure of *Spiza*, with its unfused palatomaxillaries, to be typically "richmondenine" (cardinalid). Electrophoretic data obtained by J. W. Tamplin, J. W. Demastes and J. V. Remsen placed *Spiza* as the outgroup to all other cardinalids with the exception of *Parkerthraustes*, which is probably not a cardinalid, and Demastes and Remsen suggested that *Spiza* might be closer to *Saltator*. The 2007 study by Klicka and colleagues, however, allied *Spiza* with typical members of the "blue" subclade, such as *Passerina*, suggesting that its peculiar features may simply be adaptations to its grassland habitat.

The Yellow-shouldered Grosbeak (*Parkerthraustes humeralis*) was formerly included in the genuinely cardinalid genus *Caryothraustes*, although F. M. Chapman placed it in *Saltator*. It has long been recognized, however, that this species differs from its supposed congeners in morphology, plumage and behaviour. Tamplin and his colleagues, using data from starch-gel electrophoresis, suggested that *humeralis* was not a cardinalid, and pointed out that its foraging behaviour, in which it is quiet, inconspicuous, and solitary or in pairs in mixed-species flocks, differed from the noisy, single-species flocking behaviour of *Caryothraustes*. The 2007 Klicka-led study placed it among the tanagers, although both the AOU and the SACC retain it as "incertae sedis".

W. J. Bock, in 1964, supported the submerging of *Richmondena* into *Pyrrhuloxia*, later to be renamed *Cardinalis*, on the grounds that the morphological gap, manifested by a difference in bill shape, between the Pyrrhuloxia (*Cardinalis sinuatus*) and the Northern Cardinal is bridged by the third member of the genus, the Vermilion Cardinal of northern South America (see Morphological Aspects). Bock suggested that the difference in bill shape between the two North American species might have evolved during a time when the two overlapped in habitat to a much greater degree than they do today.

Treatment of the generic boundaries within the *Passerina–Guiraca–Cyanoloxia–Cyanocompsa* complex has varied, some authorities lumping the genera in various combinations (see above) and others keeping them separate. L. L. Short considered the geographically widely separated Blue Bunting (*Cyanocompsa parellina*) and Ultramarine Grosbeak (*Cyanocompsa brissonii*) to be members of a superspecies, but Klicka and colleagues' 2007 study placed *parellina* either as a sister-species to the other members of their expanded *Cyanocompsa*, which included the Glaucous-blue Grosbeak and the "emberizid" Blue Seedeater (*Amaurospiza concolor*), or as one of the branches of a four-way polytomy including *Cyanocompsa*, *Passerina* and *Spiza*. The Ultramarine Grosbeak appeared to be most closely allied not to the Blue Bunting, but to the Glaucous-blue Grosbeak.

The status and affinities of the Blue Grosbeak, in particular, have been a point of disagreement for some time. Placed in the genus *Guiraca* by earlier authorities, such as Hellmayr, it has more recently been included in *Passerina* following Paynter's 1970 treatment. In a 1977 study of skeletal and morphological characters, J. J. Hellack and G. D. Schnell supported the maintaining of *Guiraca* and allied it more closely to *Pheucticus*, but this placement has not been supported by later studies. Klicka's molecular data suggest that the genus *Passerina* contains two lineages, a "blue" lineage consisting of the Indigo Bunting and Lazuli Bunting (*Passerina amoena*), and a "painted" lineage containing the Rose-bellied Bunting (*Passerina rositae*), Orange-breasted Bunting (*Passerina leclancherii*), Varied Bunting (*Passerina versicolor*) and Painted Bunting, and that the Blue Grosbeak fits within the "blue" lineage.

There have been varying treatments of the members of the "Yellow Grosbeak complex", some recognizing them as separate species, the Yellow Grosbeak (*Pheucticus chrysopeplus*) of Mexico, the Black-thighed Grosbeak (*Pheucticus tibialis*) of Middle America and the Golden-bellied Grosbeak (*Pheucticus chrysogaster*) of north-western South America, and others treating them as conspecific. Short considered all three to form a superspecies with the South American Black-backed Grosbeak (*Pheucticus aureoventris*), noting areas of sympatry between the latter and the Golden-bellied Grosbeak and differences in the degree of sexual plumage dimorphism among members of the complex (see Morphological Aspects).

Paynter considered the Black-faced Grosbeak (*Caryothraustes poliogaster*) and the Yellow-green Grosbeak to be conspecific but this idea has not been widely accepted. However, the 2007 study by Klicka and others indicates that the two are sister-taxa. C. W. Thompson, in 1991, suggested that the eastern and western subspecies of the Painted Bunting should be regarded as separate phylogenetic species, on the grounds that there appeared to be little gene flow between them, but the suggestion has not been taken up.

The question of species limits among cardinalids has been particularly vexing for two species pairs, the Rose-breasted and Black-headed Grosbeaks and the Indigo and Lazuli Buntings, each with one representative in eastern and one in western North America. In each case, the members of the species pair hybridize in a narrow zone of overlap at or near the western edge of the Great Plains. Presumably, eastern and western populations became isolated during the Pleistocene, but came into secondary contact at some point following the retreat of the glaciers. For the grosbeaks, especially, this situation has raised questions as to whether one or two species should be recognized, and has also, more productively, led to a number of studies on the nature and effect of evolutionary isolating mechanisms and the viability of hybrids.

The two grosbeaks have generally been maintained as separate species, although D. A. West and, later, A. R. Phillips favoured combining them. In the USA, R. L. Kroodsma found few hybrids in North Dakota, where there is little suitable habitat in what might otherwise be an area of range overlap. He demonstrated that male grosbeaks in areas of allopatry in North Dakota were more likely to attack mounted specimens of their own type than they were those of the other member of the species pair, suggesting that males, at least, discriminate between the two species on the basis of plumage. In South Dakota, B. W. Anderson and R. J. Daugherty found that Black-headed and Rose-breasted Grosbeaks hybridized within a zone some 84 km in width

Excluding the genera Parkerthraustes *and* Saltator, *which are now thought to belong outside Cardinalidae, almost all cardinalids are sexually dichromatic in plumage. The two* Caryothraustes *species are the only exceptions. The* ***Yellow-green Grosbeak*** *and the Black-faced Grosbeak* (Caryothraustes poliogaster) *have been treated as conspecific, and the race* simulans *of the Black-faced has sometimes been included in the Yellow-green. They may form a superspecies. Along with the Red-and-black Grosbeak* (Periporphyrus erythromelas), *they differ from other cardinalids also in being primarily forest-dwellers.*



[*Caryothraustes canadensis canadensis*, Les Nourages Nature Reserve, Régina, French Guiana. Photo: Olivier Tostain]



Formerly placed in the genus Caryothraustes, *the* ***Yellow-shouldered Grosbeak*** *differs significantly in its bill shape and sexually dimorphic plumage, and its quiet, inconspicuous behaviour. It is usually seen alone, in pairs or in mixed-species flocks, in contrast to* Caryothraustes, *which forms noisy single-species flocks. It now occupies the monotypic genus* Parkerthraustes. *It is no longer thought to belong with the cardinals, but its true relationships are uncertain. It has been suggested that it belongs in the tanager family (Thraupidae), but for now it is "*incertae sedis*" (of uncertain taxonomic position).*

[*Parkerthraustes humeralis*,
Cristalino Jungle Lodge,
Alta Floresta,
Mato Grosso, Brazil.
Photo: Edson Endrigo]

along the Missouri River. Even within this range, where hybrids might be expected to predominate, parental phenotypes occur in numbers too high to be explained by genetic recombination or immigration. Anderson and Daugherty found evidence that female Black-headed Grosbeaks, at least, prefer to mate with males of their own morphotype. In addition, the clutch size of hybrid pairs was lower than that of "pure" Rose-breasted or Black-headed pairs, suggesting that hybrids have reduced viability. On the basis of this evidence, the authors concluded that the two forms should be regarded as separate "semi-species". A 2009 molecular study by R. D. Mettler and G. M. Spellman re-evaluated Anderson and Daugherty's work and suggested that hybridization was less frequent than had been estimated on the basis of phenotype alone. These authors concluded that the hybrid zone between the two species was stable, and supported the conclusion that hybrids within it were less fit than their parents.

The question of the relationship between the Indigo and Lazuli Buntings has been confused by Klicka's cytochrome *b* analysis of *Passerina*, which suggested that the two were not, in fact, sister-species, the Lazuli Bunting being more closely related to the Blue Grosbeak. A later study by M. D. Carling and R. T. Brumfield, using ten nuclear loci, did, however, support the traditional sister relationship between Lazuli and Indigo Buntings. Carling, I. J. Lovette and Brumfield have recently estimated that the two species diverged about 1·04 million years ago, during the Pleistocene.

Calculations based on the presumed dates for the expansion of oak (*Quercus*) savannas in central North America suggest that Indigo and Lazuli Buntings may have been in secondary contact for at least 3500 years, and they have certainly been so for the past 120 years. Their ranges overlap within a contact zone that may be as little as 40 km wide, although Sibley and Short estimated that Indigo and Lazuli Buntings overlapped in Nebraska, in a zone more than 640 km across containing both hybrid and "pure" forms. This difference may partly reflect the way in which introgression has been measured in different studies: phenotypically, for example, as opposed to the findings of molecular-genetic analyses.

Studies of bunting hybridization have produced conflicting results, morphological analyses suggesting a high degree of interbreeding, but field studies finding that the real frequency of hybridization was much lower. Because different alleles may introgress at different rates, the presence of hybrid gene combinations may occur over a narrower or broader geographical distance, depending on which alleles are involved. Mixed pairs, especially those in which the female parent is herself a hybrid, show lower reproductive success than single-species matings, suggesting that there is selective pressure against hybridization. This pressure may be the reason why the zone of overlap is so narrow. Female mate selection appears to strengthen the isolating mechanisms between the two species. Within their zone of overlap, male Indigo and Lazuli Buntings act in some ways like members of the same



Closely affiliated with the Red-and-black Grosbeak (Periporphyrus erythromelas), *the* ***Crimson-collared Grosbeak*** *also occupies a monotypic genus,* Rhodothraupis. *This bird is a male. In the female, all the crimson areas are replaced by olive on the upperparts, and olive-yellow on the underparts. Only* Cardinalis *species possess a true crest, but a male Crimson-collared Grosbeak observed in Texas raised its crown feathers when singing, lending it a crested appearance and a cardinal-like silhouette. This species frequently wanders into south Texas from its main distribution along the Atlantic slope of north-eastern Mexico.*

[*Rhodothraupis celaeno*,
Texas, USA.
Photo: George M. Jett]



The largest genus in the Cardinalidae, as currently constituted, appears not to belong there at all but to be closer to the tanagers (Thraupidae). The genus's name, Saltator, *means "jumper" or "dancer", and refers to the birds' long powerful legs. Unlike most true cardinalids, they are subtly rather than brightly coloured. Some, including the* ***Black-headed Saltator****, have a strikingly patterned head and throat. The Black-headed Saltator's white throat patch is bordered with black, including a broad black breastband in all but one race* (lacertosus)*; in another race,* suffuscus, *the throat patch is not white, but cinnamon.*

[*Saltator atriceps atriceps*, Arenal, Guanacaste, Costa Rica. Photo: Mike Danzenbaker/ AGAMI]

species; they defend territories against each other, and they respond aggressively to each other's songs. Females, on the other hand, show a preference for mating with their "own" plumage types, or with males whose song phrases match those of their own plumage type. Interestingly, hybrid females mate randomly on the basis of plumage, but prefer Lazuli song types.

M. C. Baker and J. T. Boylan concluded, after a four-year study of colour-ringed individuals, that Indigo and Lazuli Buntings should continue to be regarded as separate species. Males of each species, however, can learn one another's song traits, and this learnt behaviour can contribute to interspecific mating and introgression, despite the genetic differences between the two species.

Recent work suggests that the measuring of mitochondrial genetic distances between closely related species pairs ("DNA barcoding") can provide a means by which to assign specimens to species, pairs with hybridizing species tending to have smaller distances than pairs with non-hybridizing species. Distance data for Indigo and Lazuli Buntings (taken outside the hybrid zone) are higher than average, but this may not be a measure of overall genetic distinctiveness.

Kroodsma speculated in 1975 that introgression in North Dakota and eastern Montana, in the north USA, was relatively high, but S. T. Emlen, J. D. Rising and W. L. Thompson, who studied populations farther south, in Nebraska, suggested that it was minimal in either direction. Carling and Brumfield's later studies, which benefited from technology that allowed detailed studies of individual loci, found that the degree and direction of introgression varied for different alleles. Mitochondrial haplotypes (mtDNA) showed greater introgression from *cyanea* (Indigo Bunting) into *amoena* (Lazuli Bunting), but alleles from two loci located on the Z chromosome showed much greater introgression in the opposite direction. In general, there was greater introgression among alleles of z-linked loci from *amoena* into *cyanea* than the reverse, suggesting that z-linked *amoena* alleles may be selected against more strongly when present in a *cyanea*-type hybrid than are z-linked *cyanea* alleles when present in an *amoena*-type hybrid.

Carling and Brumfield also found that both mitochondrial haplotypes and z-linked alleles introgressed less than autosomal alleles. Because mitochondrial haplotypes are passed on only by females, and because females are the heterogamic sex in birds, this finding supports Haldane's Rule, which predicts that, in hybrid populations, if one sex is absent, rare or sterile, it will be the heterogamic sex. In this case, female hybrid buntings should be, and apparently are, less fit than males.

By determining which alleles show the least degree of introgression—in other words, the ones most resistant to being taken up in the genomes of the other species—it may be possible to identify the specific genes involved in reproductive isolation. Carling and Brumfield found that a single locus on the Z chromosome, VLDR9, showed introgression across a band only 2·8 km wide. Mutations of the VLDR gene, which is involved in yolk-precursor formation, have been found to lower the egg-laying ability of some chickens, and it is possible that a similar effect may be involved in both the initial generation and the current maintenance of reproductive isolation between Indigo and Lazuli Buntings, despite the probability that some level of gene flow between the two has been going on for some time, even while they were in the process of speciation.

The systematics of the large genus *Saltator*, and its position within the thraupid complex to which it probably belongs, remain unclear. The genus may be polyphyletic. Hellack and Schnell, in their 1977 study, concluded that the Rufous-bellied (*Saltator rufiventris*), Streaked (*Saltator striatipectus*), Masked (*Saltator cinctus*), Black-throated (*Saltator atricollis*), Golden-billed (*Saltator aurantiirostris*) and Orinocan Saltators (*Saltator orenocensis*) bore little similarity to the other species, and recommended that the last three be removed from the genus. Further, J. P. O'Neill and T. S Schulenberg have emphasized that the Masked Saltator, with its unique colour pattern and particularly deep bill, has no obvious close relatives. One should note, incidentally, that Hellack and Schnell treated the Streaked Saltator as conspecific with the Lesser Antillean Saltator, referring to it under the latter's scientific name of *S. albicollis*; it has since become evident, from mitochondrial-DNA studies of Antillean birds and specimens from Peru and Panama, that the two are separate species (see below).

Some 30 years later, in 2007, Klicka and co-workers examined ten *Saltator* species, namely *grossus*, *coerulescens*, *striatipectus*, *atripennis*, *atriceps*, *maximus*, *nigriceps*, *aurantiirostris*, *atricollis* and *rufiventris*, and concluded that all except the last-named were properly placed in *Saltator*. They found that *rufiventris*

was nested instead with the thraupid genera *Delothraupis* and *Dubusia*. A new generic name may have to be found for this species. The Slate-colored (*Saltator grossus*) and Black-throated Grosbeaks (*Saltator fuliginosus*), allopatric species sometimes treated as conspecific, were formerly placed in a separate genus, *Pitylus*, on the basis of their bill and tarsal morphology; they differ also from all except the Thick-billed Saltator (*Saltator maxillosus*) in being sexually dimorphic. Molecular data, however, reveal that these species are nested within *Saltator*, and the 2007 Klicka-led study found *Saltator nigriceps*, the Black-cowled Saltator, to be basal to both *aurantiirostris* and *grossus*, although *fuliginosus* was not examined.

G. Seutin and colleagues, in 1993, separated the Lesser Antillean Saltator of the West Indies from the continental Streaked Saltator on the basis of data indicating that the island populations differ genetically from those of Peru and Panama to an extent greater than that found between many other congeneric passerine species. Even within the Streaked Saltator itself, however, genetic differences are considerable, populations in Peru also differing from Panamanian individuals at levels consistent with congeneric species differentiation. This suggests that *S. striatipectus* may have to be split further.

The question of species limits in *Saltator* has been vexed by lack of information, including an absence of data on zones of overlap and/or intergradation between closely related forms. The Golden-billed Saltator, for example, has been considered conspecific with both the Black-cowled Saltator (but see above) and the Thick-billed Saltator; Short treated all three as members of a superspecies, but noted that the Golden-billed and Thick-billed Saltators interbred extensively in Corrientes Province, in north-east Argentina. The Black-cowled differs, however, from the Golden-billed Saltator in vocalizations, and there seems to be little or no intergradation between the Thick-billed Saltator and the subspecies *parkesi* of the Golden-billed Saltator in Rio Grande do Sul, in south-east Brazil, where the ranges of the two meet. Short considered that the Green-winged Saltator (*Saltator similis*) and the Greyish Saltator (*Saltator coerulescens*) formed a superspecies, although they are sympatric in some areas.

Finally, the major 2007 study undertaken by Klicka and colleagues found that the Many-colored Chaco Finch (*Saltatricula multicolor*), usually treated as a member of the family Emberizidae, was nested within *Saltator*, in a position close to the Black-throated Saltator. Although the SACC has declined to include the Many-colored Chaco Finch within *Saltator*, it may consider the possibility of transferring the Black-throated Saltator to *Saltatricula* in the future.

The mysterious "Townsend's Bunting", known from a single specimen received by J. J. Audubon in 1833, and described as *Emberiza townsendi*, probably represents a Dickcissel lacking carotenoid pigments in its plumage.

Morphological Aspects

Typical cardinalids are rather stocky, medium-sized to small finch-like birds with a heavy bill and a relatively short tail, *Cardinalis*, the only crested genus in the family, being somewhat longer-tailed. Males tend to be slightly larger than females. Dickcissel males are significantly heavier than females for most of the year, the difference being due to increased amounts of protein and water. Females retain their stores of vernal fat for longer than males, reducing the difference between the sexes in summer.

Northern Cardinals are non-migratory (see Movements), but are capable of adjusting their metabolism to deal with the stresses of harsh north-temperate winters. Thermal regulation in winter appears to be more energetically costly than breeding for cardinals at the northern end of their range. Wintering cardinals studied by C. E. Sgueo in southern Ohio increased their daily energy expenditure, raised their metabolic rate and took on extra fat, increasing their average body mass from 41·5 g in summer to 47·2 g in winter. Pectoral-muscle mass did not increase.

Bill shape varies considerably even within genera of Cardinalidae. Within *Cardinalis*, the maxilla, or upper mandible, of the Pyrrhuloxia is remarkably like that of a parrot (Psittacidae), being short, thick and deep, with a strongly curved culmen and a strongly notched tomium; the species' former generic name of



The bills of saltators vary considerably in length and relative thickness, and that of the ***Green-winged Saltator*** *is shorter and less heavy than many of its congeners. In a genus consisting largely of frugivores, this species is primarily an insect-eater. It has been suggested that the Green-winged Saltator forms a superspecies with the Greyish Saltator* (Saltator coerulescens), *although the two occur together in some areas. In* chaco *vegetation, the Green-winged Saltator is found mainly in heavy brush bordering rivers, whereas Greyish Saltators occupy dense brushy areas in woodland, forest, savanna and grassland.*

[*Saltator similis similis*, Itatiaia National Park, Rio de Janeiro, Brazil. Photo: Roland Seitre]



Until 1993, the continental ***Streaked Saltator*** *and the Lesser Antillean Saltator* (Saltator albicollis) *of the West Indian islands were treated as the same species,* S. albicollis. *They were then separated on the basis of data indicating that genetic differences were greater than those between many other congeneric passerine species. But populations in Peru and Panama differ also at levels consistent with species differentiation, suggesting that further splits may be justified. The race* flavidicollis *of north-western Peru differs from other races, such as the central Panamanian* isthmicus *(shown here), in having a yellow-tinged underside that lacks streaks, except in the juvenile plumage.*

[*Saltator striatipectus isthmicus*, Coclé, Panama. Photo: Mike Danzenbaker/ AGAMI]

Pyrrhuloxia alludes to its supposed similarity to the fringillid genera *Pyrrhula* and *Loxia*. The maxilla of the Northern Cardinal is longer and less curved, with little or no tomial notch. The lower mandibles of the two species differ even more, that of the Pyrrhuloxia being deeper and having a ventral bony boss at the gonys. The bill of the Vermilion Cardinal is intermediate between those of its two congeners. Jaw musculature in the genus parallels the differences in skull and bill morphology, the longer-billed Northern Cardinal having generally larger jaw muscles that allow it to crack larger seeds, which can be held farther forward in the bill for cracking than is the case with the Pyrrhuloxia.

Northern Cardinals in Bermuda appear to have undergone shifts in bill shape since their introduction in the eighteenth or nineteenth century (see Relationship with Man). In 1901, O. Bangs and T. S. Bradlee noted that the bills of this species from Bermuda had a grooved upper mandible, a feature absent from mainland populations of Northern Cardinals but, oddly enough, present in the Vermilion Cardinal. K. L. Crowell found that Bermuda cardinals had broader, deeper and slightly shorter bills than those of mainland individuals, possibly an adaptive response to reduced competition from the limited landbird fauna of the islands.

In common with other nine-primaried oscines and fringillids, but unlike most other passerines, cardinalids produce substantial amounts of 3-methyl fatty acids in the feather waxes secreted from their uropygial glands. Unusually, and perhaps uniquely, among nine-primaried oscines, the Dickcissel produces feather waxes that are low in 3-methyl but high in 2-methyl fatty acids, the type of compounds common in most other passerine groups.

Excluding the genera *Parkerthraustes* and *Saltator*, almost all cardinalids are sexually dichromatic in plumage, often strikingly so, with bright colours largely restricted to the males. The two species of *Caryothraustes*, in which the sexes are similar, are the only exceptions. The plumage patterns of male and female Black-thighed Grosbeaks are essentially similar, females differing from males only in being slightly paler on the head and breast, with more olive scaling on the back and, usually, less white in the wing. Bright male colours include various shades of red or pink, particularly in members of the "masked" subclade, but also in some *Passerina* species; yellow, found in Neotropical *Pheucticus* and the Orange-breasted Bunting; and an array of structural blues in the "blue" subclade.

In some cases, females may develop male characteristics, such as the rose-red wing-linings found on some female Rose-breasted Grosbeaks. One Northern Cardinal ringed in Tennessee, in the eastern USA, was a bilateral gynandromorph, having its right side bright red and its left side greyish-olive. Several researchers have remarked that the strong sexual dimorphism exhibited by the Northern Cardinal, a non-migratory monogamous species in which both parents care for the young, is an exception to the general tendency for such birds to be monomorphic.

Ornamental plumage is the rule, rather than the exception, among cardinalid males. Except for the crests of *Cardinalis*, however, feather ornamentation is a matter of colour, rather than of modified feather shape. Ornamental colours may signal the health or condition of their possessor, but crest length of the Northern Cardinal appears not to do so. Instead, it probably functions as a signal of behavioural intent (see General Habits). Male Blue Grosbeaks sometimes elevate their crown feathers, giving the appearance of a crest, and a male Crimson-collared Grosbeak (*Rhodothraupis celaeno*) observed in Texas raised its crown feathers when singing, lending it a crested appearance and a cardinal-like silhouette.

Red and, presumably, yellow coloration in cardinalids is produced largely, though not entirely, by carotenoid pigments. J. Hudon has identified canthaxanthin, astaxanthin, phoenicoxanthin, doradexanthin and ε,ε-carotene-3,3'-dione among the red carotenoid pigments (4-keto-carotenoids) of the Northern Cardinal, and astaxanthin and canthaxanthin among the rose-pink breast pigments of the Rose-breasted Grosbeak. Northern Cardinals also exhibit minor amounts of rhodoxanthin, a xanthophyll.

Birds are unable to synthesize or store carotenoids, but must take them up in their diets. S. U. Linville and R. Breitwisch found that a reduction in carotenoid-bearing foods, in this case a failure of grape and other fruit crops, resulted in a slight, but significant, reduction in colour brilliance among male cardinals in Ohio. Birds can, however, transform carotenoid precursors which they obtain in their diet into different forms of pigment deposited in their feathers. Northern Cardinals derive their red pigments primarily from orange or yellow carotenoid precursors; males can grow pale red feathers even if they are fed only with yellow carotenoids.

A single male Northern Cardinal collected in Louisiana, and studied by K. J. McGraw and his colleagues, had only yellow,



In addition to their strikingly patterned head, a number of Saltator *species also have a red or orange bill. The question of species limits in* Saltator *has been complicated by lack of information, including an absence of data on zones of overlap and/or intergradation between closely related forms. The* ***Golden-billed Saltator*** *has been considered conspecific with both the Black-cowled Saltator* (Saltator nigriceps), *which has an orange or salmon-red bill, and the Thick-billed Saltator* (S. maxillosus), *which has a dark bill with some orange at the base. In the Black-cowled Saltator the sexes are alike, but the other two species have some degree of sexual dimorphism. The bill of the female Golden-billed Saltator is dusky, the black of the head and face replaced by dark brown, the supercilium and chin buffy yellow rather than white, and she has little or no pectoral band. Golden-billed and Thick-billed Saltators are reported to interbreed extensively in Corrientes Province, in north-eastern Argentina, but there seems to be little or no intergradation between the Thick-billed Saltator and the subspecies* parkesi *of the Golden-billed Saltator in Rio Grande do Sul, in south-eastern Brazil, where the ranges of the two meet. Where the Golden-billed Saltator has a white chin and throat and a very pronounced white supercilium, the Black-cowled Saltator's head and upper chest are entirely black, except for an occasional few white feathers behind the eye and on the chin. These species differ also in their vocalizations.*

[*Saltator aurantiirostris aurantiirostris*, Salta, Argentina. Photo: Neil Bowman/FLPA]



*The **Black-throated Grosbeak** (not to be confused with the Black-throated Saltator,* S. atricollis*) and the Slate-colored Grosbeak* (Saltator grossus) *were formerly placed in a separate genus,* Pitylus, *on the basis of their bill and tarsal morphology. Molecular data, however, reveal that these species are nested within* Saltator. *In both species the males are dark (slaty blue and blue-black, respectively), although they are not uniform in colour; the Black-throated has its lores, face, ear-coverts, throat and chest black. Both have a bright red bill and in both species the female is generally duller than the male, making these among the handful of Saltator species to show sexual dimorphism.*

[*Saltator fuliginosus*, Parque do Zizo Lodge, São Miguel Arcanjo, São Paulo, Brazil. Photo: Edson Endrigo]

instead of red, pigments. Presumably, this was the result of a genetic mutation that interrupted the bird's ability to complete the metabolic pathways necessary to produce the compounds responsible for normal coloration. Interestingly, a similar mutation appears to be responsible for the yellow pigments in the Western Tanager (*Piranga ludoviciana*), a species now known to be a cardinalid (see Systematics) with close, red-plumaged relatives.

The presence of carotenoids can be an indicator of a bird's condition, at least at the time when its feathers are growing. In the case of Northern Cardinals, carotenoid feather ornaments act as guides to the health and fitness of prospective mates, or serve to reinforce existing pair-bonds, for both male and female birds. Males display the bright red plumage of the upper breast to females, while females expose their red underwing-coverts to males (see Breeding). Red coloration seems not to serve as a status signal for cardinals outside the breeding season; for example, L. LaReesa Wolfenbarger found that the artificial intensifying of the birds' red colour gave them no advantage over other males at a food source.

Brown colours, such as those in the wingbars of the Blue Grosbeak, result from a mix of eumelanins and phaeomelanins. Melanin ornaments, such as the black face mask of the Northern Cardinal, are often associated with high testosterone levels and increased aggression. In a study by J. M. Jawor and her colleagues, female cardinals having a larger, darker black face mask were found to be more aggressive towards mounted models, but were also better provisioners of their young. Males with a larger face mask, however, had lower reproductive success, perhaps because they spent more time in aggressive behaviour and less in provisioning their broods.

The blue colours in the feathers of *Passerina*, *Guiraca*, *Cyanoloxia* and *Cyanocompsa* are, like almost all such colours in birds, structural, being produced by light scattering from the spongy medullary layer of feather barbs rather than by pigment. Males of *Passerina* and *Cyanocompsa* species employ structural colours, pigments including eumelanins, phaeomelanins and carotenoids, and combinations of the two to produce a range of colours, visible to birds, across a greater spectrum than the human eye can perceive.

Plumage patterns of *Cyanocompsa* are almost entirely the result of blackish eumelanin-pigmented patches and structural ultraviolet/blue colours that, together, appear to human eyes as deep blue. The ultraviolet-rich blue and turquoise plumage of the Indigo Bunting is entirely structural. Blue Grosbeaks and Lazuli Buntings add deep red-brown patches produced by phaeomelanin. The belly-patch colour of the Lazuli Bunting, appearing to humans as white, is structural, resulting from the morphology of the species' unpigmented feathers. The reds, yellows and oranges of Painted, Varied, Rose-bellied and Orange-breasted Buntings are carotenoid colours, while the Painted Bunting's green back, the purple hues of the Varied Bunting and the Rose-bellied Bunting's pink belly are apparently produced by a combination of carotenoids and structural colours.

M. C. Stoddard and R. O. Prum concluded that blue structural colours evolved only once in the "blue" subclade (see Systematics), and that phaeomelanin-based and carotenoid-based colours in subclade-members were later evolutionary developments; the authors did not examine *Cyanoloxia* or *Amaurospiza*. The ancestral plumage probably resembled the deep blue coloration of *Cyanocompsa*, the colours increasing in range and brilliance during the course of the group's evolution. Loss of brilliance in the colours of the Lazuli and Varied Buntings probably represents later, secondary developments.

In addition to white, black, violet, blue, turquoise, green, yellow, orange, brown, pink and red, the feathers of *Passerina* and *Cyanocompsa* display ultraviolet (UV), UV-yellow and UV-red, the last two being colours visible to us as yellow and red, but reflecting strongly in the ultraviolet as well. Avian eyes contain four types of cone receptor, with one sensitive to UV-violet wavelengths in addition to those responsive to blue, yellow and red, and the evolutionary significance of plumage colours may have to be understood in the context of the way in which the birds themselves perceive them, including their reaction to colours that we humans cannot see. The breast of an Orange-breasted Bunting, which reflects strongly in the ultraviolet in addition to being pigmented with yellow carotenoids, must appear an unimaginable shade to a bird's eye.

Feathers on the Blue Grosbeak reflect more strongly in the ultraviolet than in the visible blue spectrum. A. J. Keyser and G. E. Hill found that males showing little variation in their visible

blue colours varied in the intensity with which they reflected ultraviolet wavelengths. The richness of structural blue and UV colours may be affected by the rate at which the feathers grow, which is, in turn, a reflection of nutritional condition during the autumn moult. The degree of brightness of Lazuli Buntings, for example, may thus be due more to environmental factors than to direct genetic control. Keyser and Hill found that male Blue Grosbeaks that grew their tail feathers at a faster rate also had brighter rump and breast plumage, suggesting that structural brightness may be related to the individual's condition.

In another study, A. S. Barreira and her colleagues found differences in colour intensity and UV reflectance between subspecies of the Ultramarine Grosbeak occupying different habitats. Males of the subspecies *argentina*, which lives in semi-open areas, had brighter and less saturated coloration, with higher hue and lower UV reflectance, than males of the race *sterea*, which occupies densely vegetated forests where luminosity is lower and blue wavelengths prevail. The differences could be a response to the quality of ambient light in the two habitats.

Moult strategies of cardinalids resemble those of many other songbird groups, although it must be noted that, as with numerous aspects of their biology, little is known of the situation with regard to tropical and south-temperate species. Juveniles moult at least once in their first year, which results in a plumage that is replaced, in subsequent cycles, by the adult plumage. Depending on the species, adult plumage may be much the same in appearance throughout the year, being replenished by an annual moult, or there may be two moults per year, producing an alternation of breeding and non-breeding plumages. In the Orange-breasted Bunting, these two plumages are essentially identical, and brightly coloured.

Species of *Cardinalis*, *Passerina* and *Cyanocompsa*, and possibly the Rose-breasted Grosbeak in the genus *Pheucticus*, have been described as having an extra juvenile moult just after fledging and before the moult producing the first-year plumage. For individuals that hatched late in the season, these moults may overlap. In the case of young Rose-breasted and Black-headed Grosbeaks, the moult producing first-year plumage may overlap with that producing the first breeding plumage.

S. Rohwer and others have claimed that *Passerina* buntings undergo a further moult, this one involving the rectrices, the three outermost primaries and, typically, the three innermost secondaries and all of the body feathers. With Indigo Buntings this produces the first sexually dimorphic plumage, young females then resembling adult females and young males resembling males in non-breeding plumage. Indigo Buntings generally undergo this moult on the wintering grounds; fewer than 10% of individuals complete it prior to autumn migration. Moults during the first year may not be clear-cut events, however, and R. B. Payne has argued, on the basis of his studies of Indigo Buntings, that this pattern in fact represents an extended overlap between the juvenile and first-year moults, rather than a separate moult.

According to a study by T. C. Grubb and his colleagues, the rate of feather growth during moult in Northern Cardinals is affected by ambient temperature, as well as by health and condition. Rectrix growth is slowest during the winter. It is more rapid in males than in females, and in adults than in juveniles.

Northern Cardinals moult their wing and tail feathers simultaneously. Early-hatched young of this species often undergo a complete moult, but the moult of the primary feathers, which may begin after the onset of moult of the wing-coverts, becomes less extensive among individuals hatched later in the season. These late-hatched cardinals may retain their flight-feathers during the winter. In Kentucky, juvenile Northern Cardinals stop moulting at some time in November, regardless of when they began or whether the moult is complete. Those moulting into first-year plumage usually replace their wing feathers in typical passerine fashion, starting with the innermost primaries first, but retaining some outer primaries from the juvenile plumage. This is the same sequence as that followed by adult Pyrrhuloxias, whereas young Pyrrhuloxias begin the moult from a middle primary. The reason for this marked difference is unknown.

Northern Cardinals and Pyrrhuloxias moult once per year. Breeding plumage is gained not by moult, but by the wearing-away of the grey or brownish tips of the body feathers. Other North American species usually moult twice annually. The pre-breeding moult, however, may be very limited or even absent, particularly in the genus *Passerina*, in which it may be restricted



Treatment of the generic boundaries within the Passerina–Guiraca–Cyanoloxia–Cyanocompsa *complex of largely blue cardinalids has varied, some authorities lumping the genera in various combinations and others keeping them separate. The* ***Glaucous-blue Grosbeak****, here occupying the monotypic genus* Cyanoloxia, *is sometimes subsumed in* Passerina. *The dark sky-blue male is shown here; the female is warm dark brown above and more orange-brown below. The blue colours in these four genera are structural, produced by light scattering from the medullary layer of the feather barbs, rather than by pigment.*

[*Cyanoloxia glaucocaerulea*, El Palmar National Park, Entre Ríos, Argentina. Photo: Julián M. Alonso]

to the feathers of the head, particularly those around the ear-coverts, eyes, bill and throat. Other changes into breeding plumage are again the result of feather wear. Feather wear may be responsible also for the gradual decrease in UV chroma and hue in male Ultramarine Grosbeaks after the conclusion of the breeding season.

Before the onset of the breeding season, the process of abrasion wears away the buff tips of the male Blue Grosbeak's otherwise blue body feathers and the brown edgings of the body feathers of the Varied Bunting. In adult male Lazuli Buntings, the change from dull winter plumage to bright breeding dress is accomplished mostly by abrasion of the buff feather tips, but the Indigo Bunting changes to breeding plumage through an extensive moult. Second-year male Lazuli Buntings are similar in plumage to the adults, but they remain dull because, in contrast to the situation with adults, the feather tips generally do not wear away. Why this is so—whether it is the result of a hormonal difference between younger and older males, or whether there is some difference in behaviour that affects feather wear—is not understood.

Among migratory species, the post-breeding moult is generally completed on the breeding grounds or, sometimes, as may be the case with some Rose-breasted Grosbeaks, for example, it is begun on the breeding grounds and completed after migration. Most individuals moult into breeding plumage on their wintering grounds, but some Black-headed Grosbeaks may complete this moult during the course of the northward migration, and some Indigo Buntings arrive on their breeding grounds while still growing blue feathers on the head.

Some Black-headed Grosbeaks begin, or even complete, the post-breeding moult on the breeding grounds. Most, however, undertake moult migrations after the breeding season, transferring to monsoonal staging areas in the south-western USA or north-west Mexico, where the moult takes place. This strategy allows these birds to leave the nesting areas, where food may be scarce during late-summer dry spells, and take advantage of areas where a food supply sufficient to fulfil the energy needs of moulting birds is still available.

Blue Grosbeaks, Lazuli Buntings and western populations of the Painted Bunting are also known to be moult migrants. Some Lazuli Buntings fly directly to their wintering grounds in western Mexico and moult there. Most, however, begin their moult on the breeding grounds, interrupt it for migration, and complete it either in southern Baja California or in an area reaching from southern Arizona and south-west New Mexico south into northern Sonora, in extreme north Mexico. Here, in these "migratory hot spots", they remain for approximately one month while the intensity of moult increases to about twice that on the breeding grounds. Indigo Buntings are not moult migrants, and it is unclear where Indigo × Lazuli Bunting hybrids undergo their post-breeding moult.

Delayed plumage maturation, in which juvenile males take two years or longer to gain full adult colours, is recorded for the Yellow, Rose-breasted, Black-headed and Blue Grosbeaks and for the Indigo, Lazuli, Varied, Painted and Orange-breasted Buntings. Second-year male Black-headed Grosbeaks vary in plumage, ranging from individuals that resemble adult females to others that are much like older males. The difference between first-year and adult male Indigo Buntings is poorly marked. Of particular interest is the fact that Orange-breasted and, apparently, Rose-bellied Buntings, unlike other *Passerina* species, show delayed plumage maturation of females too, an unusual condition among passerines. Females of these two species retain a duller juvenile plumage until after their first breeding season.

Hill found that delayed plumage maturation among Black-headed Grosbeaks was correlated with lower testis mass in yearling birds. The small likelihood that a yearling male grosbeak will be able to win a high-quality territory and breed successfully, coupled with the need to avoid aggression from older males (see Breeding), may have favoured the evolution of delayed plumage maturation in this species.

Yearling cardinalids are, nevertheless, physically capable of breeding. After the first week on the breeding grounds, the sperm count of yearling male Indigo Buntings is equal to that of adults, and yearlings are equally likely to find mating opportunities. In the case of Lazuli Buntings, adult males are less aggressive to second-year males than to older birds. Both very bright males and dull-coloured males tend to gain better territories than those of intermediate-plumaged birds (see Breeding), suggesting that



Colour differences visible to human eyes, as described in the common names of the ***Blue Bunting*** *and the Blue-black* (Cyanocompsa cyanoides) *and Ultramarine Grosbeaks* (C. brissonii), *underestimate the degree of colour variation that birds themselves perceive. Birds have a fourth type of retinal cone that extends their range of colour perception into the near-ultraviolet (UV) wavelengths. Studies of two races of Ultramarine Grosbeak found that males of* C. b. argentina *had brighter and less saturated coloration, with lower UV reflectance, than males of* C. b. sterea. *The differences could be the result of the kind of ambient light in the environments that each uses:* argentina *is found in semi-open country,* sterea *in shadier woodlands.*

[*Cyanocompsa parellina beneplacita*, Rancho Los Ebanos, Tamaulipas, Mexico. Photo: Greg Lasley/VIREO]

delayed plumage maturation confers an advantage on yearlings by allowing them to mate without attracting adult aggression. Further, it has been suggested that delayed plumage maturation allows young males to mimic females on the wintering grounds and thereby reduce competition with adult males. V. R. Muehter and his colleagues, however, showed that adult male Lazuli Buntings could discriminate between second-year males and females, rendering the female-mimicry hypothesis unlikely for that species, at least.

Saltators, which probably do not belong in the family Cardinalidae (see Systematics), are about the size of a *Catharus* thrush, the Green-winged Saltator weighing 38–46 g. They have a relatively long tail and relatively long, strong legs, as reflected in the genus name *Saltator*, which means "dancer" or "jumper". No saltator is brightly coloured, although some have a red or orange bill and/or a striking head and throat pattern, including white superciliaries and a black-bordered throat patch. With the exception of the Slate-colored and Black-throated Grosbeaks and the Thick-billed Saltator, which have limited differences between male and female, *Saltator* species lack sexual plumage dimorphism. Some species, including the Golden-billed Saltator, have duller juvenile plumages, sometimes with streaked underparts. The bills of saltators vary considerably in length and relative thickness. That of the Thick-billed Saltator is, as its English name implies, particularly short and stout compared with the bills of other members of the genus.

The genus, as represented by the Buff-throated Saltator (*Saltator maximus*), has a well-developed M. coracobranchialis cranialis, a shoulder muscle that is vestigial in most nine-primaried oscines, but well-developed in the parulid genus *Zeledonia* and the thraupid *Catamblyrhynchus*. R. J. Raikow considered the condition in these genera to be primitive for the group. In contrast, the dorsal belly of M. obturatorius lateralis is small, a condition that Raikow considered to be derived; the muscle is large, the presumed basal condition, in the genera *Pheucticus*, *Cardinalis* and *Passerina*.

Although some saltators include leaves in the diet (see Food and Feeding), their gut morphology is similar to that of other frugivorous birds. Their only apparent adaptation to leaf-eating may be a serrated inner edge on the maxilla. Another possible morphological consequence of their largely frugivorous diet may be the fact, noted by A. Smith, that saltator carcasses decay particularly rapidly after the birds have been killed.

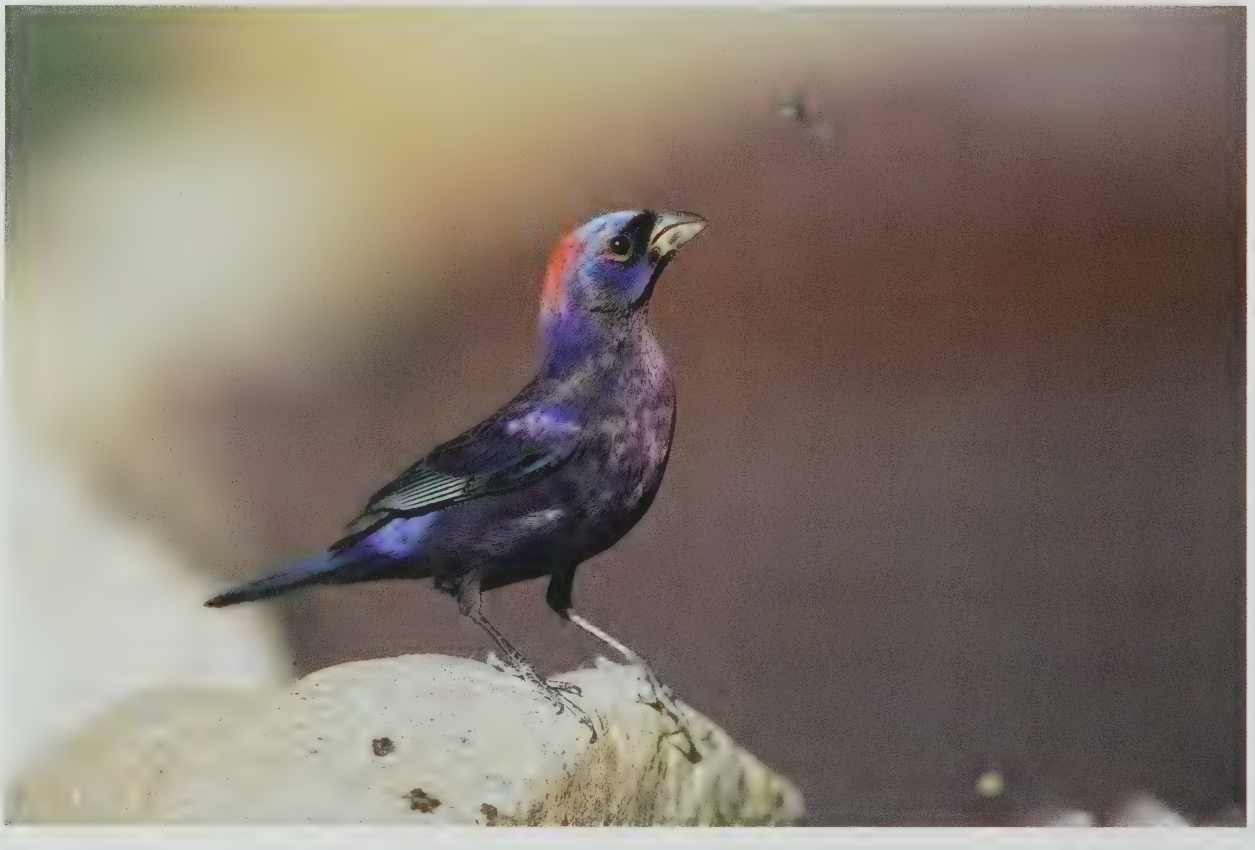
Habitat

Cardinalid habitats range from Amazonian rainforest to Andean forests, semi-arid scrub, temperate woodland and, for the Dickcissel, grassland and open prairie. Most species have broad habitat tolerances, generally preferring semi-open and edge situations with shrub or tree cover. Localized habitat differences can affect survival. As an example, Black-headed Grosbeaks in the Sacramento Valley of California, in the south-west USA, survived less well at a site that had been grazed by cattle and had, as a result, a less dense shrub community than they did at three other localities in the region.

A common feature of many cardinalid habitats, those occupied by Dickcissels being a possible exception, is a high degree of complexity in vegetation shape and structure. S. P. Brennan and Schnell found that abundances of Northern Cardinals, Blue Grosbeaks and Indigo and Painted Buntings recorded on Breeding Bird Survey transects in the central plains of the USA were correlated with fractal dimension, a measure of the shape complexity of habitat patches. Northern Cardinals and Painted Buntings reached their greatest density in areas with irregularly shaped patches, while abundance of all except the Indigo Bunting was correlated positively with edge density, a measure of the amount of edge in a habitat segment.

J. H. Vega Rivera and his colleagues analysed the habitat requirements of the Orange-breasted Bunting, a species confined to western Mexico, where less than 1% of its dry-forest habitat is under any form of protection regime. They found that the most important parameters for predicting the presence of the bunting were high seasonality in rainfall, low diurnal variation in temperature of no more than 9·5–15·5°C, and low elevation, from sea-level to 900 m. Within these parameters, the buntings occupied areas of forest varying widely in the extent of cover that they provided.

Indigo Buntings are historically inhabitants of successional-stage habitats, and have expanded into forest areas in southern Appalachia as new highways created additional edge situations.



Molecular data suggest that the genus Passerina *may contain two lineages, a "blue" lineage and a "painted" lineage. The* ***Varied Bunting*** *belongs to the latter. Male Varied Buntings may take two years to gain their full adult colours. In* Passerina*, the pre-breeding moult may be restricted to the feathers of the head. Instead of further moult, the brown edgings of the body feathers that give the non-breeding Varied Bunting its brownish appearance are worn away to reveal the breeding colours. Four races of Varied Bunting are currently recognized, but two are possibly too weakly differentiated to be tenable.*

[*Passerina versicolor dickeyae*, Arizona, USA. Photo: Tom Vezo/ naturepl.com]



*The **Indigo Bunting** and the Lazuli Bunting* (Passerina amoena) *belong to the "blue" lineage in the genus* Passerina. *These two species hybridize extensively. The juvenile Indigo Bunting is generally dark brown all over, though the rectrices of some males have blue edgings. The male takes two years to gain full plumage and some older males retain a substantial amount of brown on their body feathers. The adult male Lazuli Bunting changes from winter to breeding plumage mostly by abrasion of the feather tips, but Indigo Buntings undergo an extensive moult on their wintering grounds.*

[*Passerina cyanea*, Ontario, Canada. Photo: Glenn Bartley]

In north-east Texas, Indigo and Painted Buntings studied by J. G. Kopachena and C. J. Crist overlapped broadly in habitat choice, but differed in respect of habitat heterogeneity. Both are species of edge habitat, but Indigo Buntings were more likely to be found in openings in otherwise wooded areas, while Painted Buntings preferred clumps of trees in otherwise open habitat. Painted Bunting habitats provided subtle, natural edges, rather than the abrupt edges along forest clearings apparently preferred by Indigo Buntings. There seemed to be no difference between the two species in the vegetational structure of song perches that they used, although the tree species involved did differ.

Apart from the probably non-cardinalid genera *Parkerthraustes* and *Saltator* (see below), only the two *Caryothraustes* species and the single *Periporyphus* grosbeak are primarily forest-dwellers. *Caryothraustes* grosbeaks are inhabitants of the forest canopy, although the Black-faced Grosbeak will forage at lower levels in more open situations, such as shaded cacao plantations. The locally distributed Red-and-black Grosbeak keeps to lower and middle strata in the forest interior.

The dispersal of cardinalids, including *Caryothraustes* and *Periporphyrus*, in Amazonian forests has not been impeded by large rivers. In north-west Argentina, Black-backed Grosbeaks can cross habitat gaps between relict montane forest patches, presumably because they can also occupy non-forest habitats in the region. The Blue-black Grosbeak (*Cyanocompsa cyanoides*) is a bird of dense undergrowth, primarily in forest, but it will forage and nest hundreds of metres beyond the forest edge, even in cultivated maize (*Zea mays*) fields, so long as there is sufficient cover.

Some species, particularly the Varied Bunting, Vermilion Cardinal and Pyrrhuloxia, and Venezuelan populations of the Ultramarine Grosbeak, live in arid country, while the Black-backed Grosbeak prefers xeric open woodland with underbrush, usually in mountainous areas. Varied Buntings are typically inhabitants of dense thorn-scrub in canyons and arroyos (creeks), and can live in open desert provided there is a dense cover of mesquite (*Prosopis*), acacia (*Acacia*) and other woody shrubs. They do not require a source of open water. Typical habitat at the south-western edge of the Edwards Plateau, in Texas, usually includes scattered trees, which provide perches for territorial males. The Vermilion Cardinal is an arid-zone specialist whose abundance in undisturbed sites is correlated with the height of the vegetation, presumably because it moves through different levels while foraging and usually sings from the tops of columnar cacti. Genetic studies by A. Rodríguez-Ferraro suggest that it may have expanded into its range in arid regions of northern South America from a population base on Margarita Island, off north Venezuela. Encroachment by velvet mesquite (*Prosopis velutina*) into grassland habitats in south-eastern Arizona has favoured Pyrrhuloxias, which often use mesquites as nest-sites. Pyrrhuloxias have a slightly greater ability than Northern Cardinals to reduce loss of body mass during evaporative cooling, and this may give them a physiological advantage in hot, dry areas.

Dickcissels are obligate grassland specialists, but within that category they have specific habitat preferences. They prefer dense, moderately tall vegetation, with deep litter and a high proportion of forbs to provide nesting cover and support. Unlike some other grassland specialists, Dickcissels do not sing in flight, and as a consequence they require many elevated song perches. Optimal habitats include mature old fields, hay fields, fencerows, hedgerows, and moderately grazed to idle prairie.

On their breeding grounds, Dickcissels prefer the moister portions of grassy areas, including meadows and man-made habitats of clover (*Trifolium*), alfalfa (*Medicago sativa*) and other low-growing crops. They are more sparsely distributed in arid areas, and may have spread into eastern Colorado only after irrigation made possible the growing of alfalfa. R. S. Mulvihill has suggested that their regular invasions of eastern North America, including the establishment of isolated breeding populations along the eastern seaboard, may be a response to drought in the core portion of the species' range. D. B. McNair, however, failed to detect any correlation between invasions and climate (see Status and Conservation).

In Kansas, Dickcissel abundance is best predicted by examination of the vertical profile of the habitat, which relates to the availability of male song perches, while nest success is best predicted by the density of vegetation and litter cover. J. L. Zimmerman has proposed that the preference of Dickcissels for old fields is not driven by any advantage that this habitat confers on female nesting



Outside the breeding season, when it is territorial and usually seen in pairs, the ***Northern Cardinal*** *can form loose flocks. Such winter flocks have been observed throughout the species' range, reported sizes varying from fewer than ten to 60–70 individuals. The larger flocks may form during hard, snowy weather. True social behaviour is uncommon in the Cardinalidae and the flocks change in composition, new members joining and others leaving. The extent of aggression among and between age and sex classes is not known, but the possible relationship between the red coloration of males and their social status in winter flocks has been studied. Some males were artificially "reddened" and others "lightened" by means of cosmetics. This had no effect on their status in the winter flocks. Males that were naturally redder, however, had higher dominance status and gained weight at a higher rate than did subordinate males. This suggests that, although red coloration is an indicator of dominance, adult males are not using it alone as a signal of status. In a study in Ohio, USA, Northern Cardinals were found to be almost four times more abundant in urban forests than in rural ones during the non-breeding season. The results suggested that these differences in abundance stemmed from changes in habitat and micro-climate resulting from urbanization, such as the denser understorey vegetation and warmer minimum January temperatures.*

[*Cardinalis cardinalis cardinalis*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]

success. Old-field habitat does, however, provide a greater assortment of suitable nest-sites than a more homogeneous grassland would, and, since the Dickcissel is polygynous, a male can sequester a greater number of females within an old-field territory than he can in a territory on open prairie.

Dickcissel nests are more likely to be preyed on or parasitized if they are within 50 m of tree cover. This may contribute in some areas to the avoidance of woodland-edge habitats, although cropland edge apparently provides no such disadvantage. Dickcissels on reclaimed mining lands in Texas were more likely to select nest-sites farther from riparian areas, where cowbird (*Molothrus*) parasitism was at its highest, and closer to areas encroached by brush. In the Flint Hills of Kansas and Oklahoma, they reach their highest density in grasslands restored under the Conservation Reserve Program (CRP), but they have greater nesting success in unburnt hay fields, where the density is about half of that on CRP sites and the rate of cowbird parasitism is lower.

D. E. Burhans found that Indigo Buntings in Missouri were at greater risk from Brown-headed Cowbirds (*Molothrus ater*) in forest, where female cowbirds prefer to look for suitable hosts, than in old-field habitats. Within old fields, parasitism was lower at better-concealed nest-sites.

For migratory species, wintering habitat is often the same as, or similar to, the habitat that they occupy during the breeding season. Indigo Buntings, however, may winter in grasslands and crop fields, sometimes in association with such other avian species as grassquits (*Tiaris*). Large flocks, sometimes containing hundreds of individuals, feed in harvested rice fields in Belize. In La Sepultura Biosphere Reserve, in the south Mexican state of Chiapas, where wintering Indigo and Painted Buntings overlap with resident Rose-bellied and Orange-breasted Buntings, the resident species are restricted to tropical semi-deciduous forest, whereas the migrants have a much wider habitat range and also occupy pine (*Pinus*) and pine–oak forests and cloudforest.

E. Martínez-Meyer and his colleagues modelled the ecological niches of *Passerina* buntings on their breeding and wintering grounds. They concluded that in this genus, which presumably arose in Middle America, where it reaches its highest species diversity, wintering habitats are conservative while breeding-ground habitats are derived. The characteristics of winter habitats should also, therefore, be found in breeding habitats, but not necessarily vice versa. These scientists designated Lazuli and Varied Buntings as conservative "niche-followers" whose breeding habitat resembles that occupied in winter. Indigo Buntings, Painted Buntings and Blue Grosbeaks have undergone a shift in their choice of breeding habitat, so that, although characteristics of the winter habitat are good predictors of their breeding distribution, the reverse is not the case.

Pyrrhuloxias in Texas occupy winter roosts in dense mesquite thickets. Winter flocks of, at times, up to 1000 individuals feed on road shoulders, along fencerows, in weedy fields and at field edges. On their wintering grounds Dickcissels roost in huge numbers in sugar-cane (*Saccharum*) fields or tall stands of native grass, and feed primarily in cultivated rice and sorghum fields and, to a lesser extent, in native grasslands; they repair to fallow, bushy vegetation near water in order to rest between foraging bouts. All three types of habitat must be present to support a massive wintering flock of this species (see General Habits, Status and Conservation).

Both in their core range in Tennessee and in newly occupied areas in Ontario, Northern Cardinals occupy a wide range of types of woody cover. Some habitats that in Ontario supported only low population densities of the species in the 1960s held considerably higher concentrations in Tennessee. D. D. Dow suggested that the northward expansion of the species may have been limited by heavy winter snowfall, rather than by vegetation type.

In eastern Texas, Northern Cardinal territories are larger in areas having mature trees than in areas with only shrubby vegetation. This is presumably because the birds have a strong affinity for understorey foliage and because shrub cover is lower where large trees are present. In central Ohio, cardinals are more abundant in urban woods than in rural riparian forests, but are equally successful in both. Urban development, in Ohio at least, has apparently favoured cardinals by creating areas with dense exotic shrub cover, warmer minimum winter temperatures, and ready access to garden bird feeders.



North American cardinalids are particularly aggressive during the early part of the breeding season, when territories are being established, and fights may occur even before winter flocks have started to break up. In the male ***Blue Grosbeak****, the ability to compete with other males is linked to colour intensity. Brighter individuals tend to be larger, and to have larger and better territories. Females of some species can also be territorially aggressive towards other females. Compared with many passerines, both male and female cardinals have high testosterone levels throughout the year, which may have some bearing on their aggressiveness.*

[*Passerina caerulea caerulea*, High Island, Texas, USA. Photo: Rob Curtis/ The Early Birder]

In this case the urban landscape has not functioned as an ecological "trap", luring the birds into an area where they would fare poorly. The abundance of anthropogenic edge habitat, however, may create such a trap for Indigo Buntings. A. J. Weldon and N. M. Haddad, using experimental forest plots in South Carolina, found that these birds preferred patches with increased areas of edge, but did less well within them. Plots with greater edge areas experienced higher rates of nest predation in the first half of the breeding season; Indigo Buntings breeding within them fledged significantly fewer young than pairs in rectangular plots of the same area, even though predation increased in the rectangular plots in the late nesting period.

Farther north, in southern Canada, tree-harvesting in woodlots in southern Ontario appeared to have no effect on the breeding success of Rose-breasted Grosbeaks, as measured by nest survival, numbers of young fledged and other parameters. Woodlots which had suffered heavy removal of wood had more fruit-bearing trees, and higher densities of grosbeaks, than undisturbed sites. In all of the woodlots studied, both disturbed and undisturbed, however, the grosbeaks failed to produce enough young to replace themselves. Populations of Rose-breasted Grosbeaks require large tracts of continuous forest in order to thrive. Overharvested woodlots, with their increased food supplies, may also act as ecological traps, attracting birds into a population sink.

Northern Cardinals introduced in Hawaii are found throughout disturbed lowland forests and gardens, and also, less commonly, in native forest. They are most common in dry, open, lowland forests with a grassy or shrubby understorey. They have reached the Alaka'i Swamp, at 1200 m elevation on Kauai, and there is a record at 4055 m near the summit of Mauna Kea, on the main island of Hawaii. Some populations may nonetheless have declined since the 1970s. Those in open forests in the Hakalau Forest National Wildlife Refuge, on the island of Hawaii, showed a stable to declining trend in the 21 years after the refuge was established, in 1987. In the Puna forests on the same island, cardinals have benefited from the widespread presence of illegal marijuana (*Cannabis sativa*) plantations, which provide them with canopy openings and sources of seed.

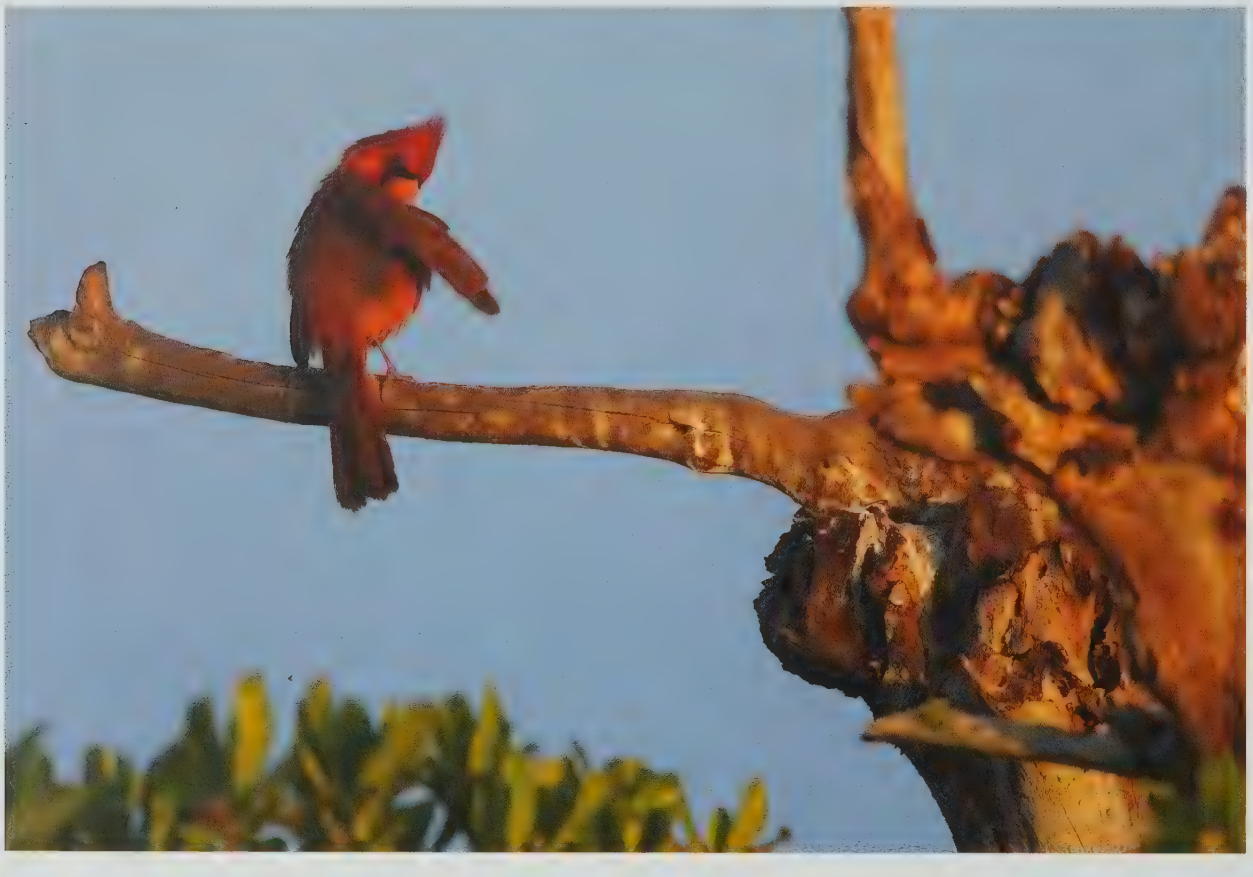
Mention must be made also of the two anomalous, probably non-cardinalid genera *Parkerthraustes* and *Saltator*. The first of these contains only one species, the Yellow-shouldered Grosbeak, which is an inhabitant of tropical forest interiors. The 16 species of *Saltator* range widely in habitat preferences, although most are birds of arid to semi-arid open country, including second growth and farmland. Green-winged Saltators in Argentina have recently spread into Entre Rios and the north-eastern part of Buenos Aires Province, where they are frequently found in farmlands. In *cerrado* habitat in São Paulo State, in south-east Brazil, G. Levy found that Black-throated Saltators occupied grassland savanna with low shrub density in preference to more heavily vegetated areas. Trees greater than 2 m in height, which the saltators use as sentinel posts, are important elements in the habitat.

Buff-throated Saltators in Costa Rica are denizens of second-growth thickets and forest edge, including forest treetops near the borders of clearings. In contrast, the Streaked Saltator avoids areas with continuous tree cover, being apparently restricted to areas of tangled vegetation, such as overgrown pastures. Where Green-winged and Greyish Saltators occur together in *chaco* vegetation, the former is found mainly in heavy brush bordering rivers, whereas Greyish Saltators occupy dense brushy areas in woodland, forest, savanna and grassland.

Some saltators, including the Slate-colored and Black-throated Grosbeaks and the Black-winged Saltator (*Saltator atripennis*), are primarily forest-dwellers. The rare and localized Masked Saltator occurs in humid montane forests in Ecuador and Peru, where it seems to depend largely on stands of *Podocarpus oleifolius*. In Colombia, these stands make up less than 10% of the total forest area within this saltator's range, so that the species occurs at very low densities in that country (see Food and Feeding, and Status and Conservation). The Rufous-bellied Saltator, confined to Bolivia and north-western Argentina, is a high-altitude specialist, found in montane scrub generally above 2500 m, including *Polylepis* woodland and adjacent cultivated areas.

General Habits

There is little information on the amount of time that cardinalids budget for daily activities. Captive cardinals studied by T. W. Shuman and her colleagues spent 74% of their time perching,



The range of feather-maintenance behaviour observed in the Northern Cardinal includes preening, sunning, anting, bathing in pools and puddles and rain-bathing, though apparently not dust-bathing. ***Northern Cardinals****, which are sedentary, have been found to carry twice as many potentially feather-degrading microbial species as do migratory birds visiting the same sites. Preen-gland (uropygial) oil, sunlight and formic acid from ants (Formicidae) may all have anti-bacterial properties.*

[*Cardinalis cardinalis floridanus*,
Everglades National Park, Florida, USA.
Photo: Tim Laman]



In the genus Passerina, *both the* ***Indigo Bunting*** *and the Varied Bunting* (Passerina versicolor) *have been observed to sun-bathe. Indigo Buntings also indulge in passive anting, allowing ants (Formicidae) to crawl over them, and at least go through the motions of active anting, placing the ants on particular parts of their bodies. Dust-bathing has never been recorded for this species, and seems rare or absent in the Cardinalidae. However, there is an account of a male Blue Grosbeak* (P. caerulea) *dust-bathing in a site used for this purpose by House Sparrows* (Passer domesticus), *before flying to a sunny perch and preening.*

[*Passerina cyanea*, N Kentucky, USA. Photo: Dave Maslowski/ Maslowski Productions]

13% feeding and 5% flying, and the remainder interacting, drinking and in miscellaneous unspecified activities. In the USA, male Dickcissels on their breeding grounds in Kansas spent 17–21% of their time in foraging, 8–10% in resting, and at least 50% in singing, the last figure rising to more than 70% during the major influx of returning females in spring. Other Dickcissel activities varied in intensity throughout the breeding season; territory defence occupied 3·5% of the birds' time during the second week, but diminished to near zero as the season progressed. The time devoted by females to maintenance activities rose during the incubation and brooding periods. Time budgets were affected by ambient temperature. At temperatures above 94°F (34·4°C) Dickcissels spent more time resting, especially if humidity was high; below 50–60°F (10–15·6°C) they increased their evening foraging bouts, presumably to gain enough energy to maintain body temperature through the night.

The flight of cardinalids is strong, and for many species it is also undulating, but that of Indigo Buntings and Dickcissels is direct. Cardinalids fly or hop from branch to branch in trees and bushes, and Blue Grosbeaks may sidle rapidly along a branch in the manner of a parrot. When on the ground, cardinalids generally hop, rather than walk, although Dickcissels both hop and walk and Painted Buntings may include walking in some of their displays.

Like other passerines, cardinalids preen regularly. Rose-breasted Grosbeaks, in addition to wiping the bill, ruffle their head feathers and rub the side of the face against a perch, especially after bathing. So far as is known, cardinalids, except very young birds, perform head-scratching by the indirect method, one leg being brought over the wing. When no more than nine days old, young Rose-breasted Grosbeaks may attempt to scratch the head with a leg held over the wing, often losing their balance in the process.

When water is available, bathing is a frequent maintenance activity of the members of this family, Rose-breasted Grosbeaks, for example, bathing at least once a day when possible. In contrast, the Dickcissel is the only member of the family that has been recorded dust-bathing. Anting has been recorded for the Northern Cardinal, the Black-faced Grosbeak and the Dickcissel. Northern Cardinals, Rose-breasted Grosbeaks and, at times, Indigo and Varied Buntings sun-bathe. Northern Cardinals indulge in this activity even on very warm days, and it has been suggested that the extra heat may make feather parasites more active and easier for the bird to remove while preening.

The roosting habits of several of the cardinalids are known. Northern Cardinals and Pyrrhuloxias roost in dense shrubs or thickets. In addition to nocturnal roosting, Northern Cardinals may spend a substantial portion of the daylight hours at a roost, resting and perhaps occasionally sleeping. Their roosts are not

When undisturbed, a sunning ***Northern Cardinal*** *will lean to expose first one flank and then the other to the sun. One moulting female was seen to spend a full 15 minutes first facing and then with her back to the early-morning sun, with bill slightly open and feathers ruffled. She interspersed sun-bathing with long bouts of preening. Northern Cardinals indulge in this activity even on very warm days, and it has been suggested that the extra heat may make feather parasites more active and easier for the bird to remove while preening.*

[*Cardinalis cardinalis*, Texas, USA. Photo: Rolf Nussbaumer/ naturepl.com]





Like other cardinalids, the ***Painted Bunting*** *is reported to bathe frequently, often after drinking. In a nine-year study of wintering Painted Buntings in Florida, however, birds which came regularly to raised feeders and drank occasionally at a ground-level birdbath only rarely bathed. Bathing has been described in detail for Rose-breasted Grosbeaks* (Pheucticus ludovicianus). *The bird hops in to the water and, as soon as its lowered head and breast break the surface, it beats its wings, throwing water over a wide area. The already thoroughly wet bird flings more water over itself with sideways flicks of its head and vertical movements of its spread tail. Some preening takes place during bathing. After bathing, the bird shakes its feathers and may preen and scratch, sometimes touching its preen (uropygial) gland with its bill and then its bill with its foot, presumably to transfer oil to those parts of the plumage that cannot be reached by preening and must be scratched instead.*

[*Passerina ciris pallidior*, Texas, USA.
Photo: Derrick Hamrick/ ImageBroker/FLPA]

shared. Pyrrhuloxias in Texas settle in roosts in mesquite–hackberry (*Prosopis–Celtis*) thickets from approximately half an hour after sunset to just before total darkness. Indigo Buntings have been seen to fly into dense *Rubus* bushes at dusk during the breeding season; on their wintering grounds, they roost in tall grass, in marshes and in trees.

The most expansive roosts in the family, however, are those of Dickcissels on their wintering grounds, where the numbers involved can be enormous. Roosts of between 20,000 and 2,950,000 individuals have been recorded in Venezuela, with an average roost size of about 580,000. Roost-sites may be used for several years. Most birds remain in the same roost throughout the winter, although some shifting from roost to roost may occur. Most of this species' roosts are in fields of sugar cane, although the birds may be forced to move when the plantations are harvested or rotated to other crops. They may also roost among cattails (*Typha*), in tall grass or shrubs, in small trees and in fallow rice fields. During the spring migration, thousands of Barn Swallows (*Hirundo rustica*), Collared Sand Martins (*Riparia riparia*) and Bobolinks (*Dolichonyx oryzivorus*) sometimes join Dickcissels at their roosts.

Dickcissels observed in Venezuela arrived at the roost about 90 minutes before sunset and began to depart 10–30 minutes after sunrise. In late March, shortly before migration, they left earlier and returned later. Roosting individuals perched on sugar-cane leaves or crowded together on the ground. It took nearly an hour for large roosts to fill up with birds, but in the morning the same roosts would empty in less than 30 minutes as hundreds of thousands of Dickcissels left together, spiralling upwards into tornado-shaped funnels or broad columns.

In addition to their enormous nocturnal roosts, Dickcissels gather close to their feeding grounds in daytime roosts containing from a few tens to hundreds of thousands of individuals. Here, they rest between morning and late-afternoon foraging bouts. Only rarely were daytime roosts sited in sugar cane, the preferred habitat for nocturnal roosts.

Roosts of this species in Trinidad, though considerably smaller than those in Venezuela, are still substantial. R. ffrench conservatively estimated that one roost contained some 66,000 individuals, and on another occasion he saw perhaps 100,000 birds fly out of the cane field within a period of little more than two minutes. The Dickcissels usually flew to their roosts at a height of about 60–90 m above the ground, breaking formation above the roost and cascading into it with a great deal of noise as the wind rushed through their flight-feathers. As in Venezuela, they normally left their roosts about 25 minutes after sunrise, their departure time becoming earlier in the three weeks before the spring migration. Unlike those observed in Venezuela, however, they did not rest on the ground while roosting but, instead, perched at least 2 m up in the sugar cane, perhaps in order to avoid snakes, rats and introduced small Indian mongooses (*Herpestes javanicus*).

True social behaviour is uncommon in the Cardinalidae. Black-faced and Yellow-green Grosbeaks are regularly found throughout the year in groups of up to a dozen or more, sometimes joining with other species. They apparently do not defend territories. The groups may consist of members of an extended family, larger groups being assemblages of family units (see Breeding).

Gaping is an aggressive display used by both Northern Cardinals and Rose-breasted Grosbeaks. In the case of the cardinals, it forms part of the "head-forward display" used at higher levels of aggression, in which an individual faces his opponent, lowers his body, flattens his crest, opens his bill, and may quiver or spread his wings. While giving this display, the bird may be silent or may give a variety of "chip" notes and other calls (see Voice). Rose-breasted Grosbeaks perform a similar display.

Alarmed or aroused Lazuli, Indigo and Varied Buntings perch upright, with the body feathers sleeked and the crown feathers raised. Among Indigo Buntings, the most intense response to playback of the species' recorded song appears to be a "moth flight" display, in which the male quickly flies towards the source of the sound, fluttering his extended wings as he lands on a nearby perch,



*The **Indigo Bunting** has been seen to bathe by making repeated dives from a perch above the water. After rolling its body and flicking its wings in the shallow water, the bird returns to its perch, shaking off water on the upswing, then vibrating its feathers, before plunging in again. Indigo Buntings also bathe in the more conventional manner, standing in shallow water and ducking the head while flicking water over themselves with their wings.*

[*Passerina cyanea*, High Island, Texas, USA. Photo: Rob Curtis/ The Early Birder]

and crouches with fluffed body plumage, lowered and rapidly quivering wings and raised beak and tail.

S. M. Lanyon and C. F. Thomson described a repertoire of displays by Painted Buntings, most of which are performed also, with variations, by Indigo and Lazuli Buntings. They include upright posture, bowing (a display apparently lacking in Indigo and Lazuli Buntings), wing-quivering, and fluffing of the body feathers, and are used in aggressive encounters, as well as in courtship (see Breeding).

Among ten North American cardinalid species, the maximum recorded longevity in the wild ranges from 4 years, for the Dickcissel, to 15 years 9 months, for the Northern Cardinal, with a mean maximum of 8–9 years. Two Indigo Buntings returned to A. Downer's feeding station in Jamaica for eight successive years. These figures probably do not, however, reflect either average life expectancy or potential longevity. R. B. Payne and L. L. Payne estimated the mean survival rate of colour-ringed Indigo Buntings in southern Michigan to be only 2·04–2·41 years; the mean survival of individuals recovered from ringing programmes fell within these limits. At the other extreme, the oldest Rose-breasted Grosbeak recovered in the wild was 12 years 11 months in age, but captive specimens have lived to an age of 24 years. Similarly, the maximum recorded longevity in the wild for the Black-headed Grosbeak is 9 years 1 month, but a captive specimen lived for 25 years. In the case of Pyrrhuloxias, males may have higher survival rates than females: in an unpublished study, of 44 individuals recaptured more than a year after ringing, 73% were males.

Domestic cats and hawks (Accipitridae) and owls (Strigidae) of various species have been recorded as taking cardinalids as prey. Pyrrhuloxias form a small part of the diet of Ferruginous Pygmy-owls (*Glaucidium brasilianum*) in Texas, and Great Grey Shrikes (*Lanius excubitor*) attack and kill Northern Cardinals. Rose-breasted Grosbeaks may be seized by Sharp-shinned (*Accipiter striatus*) and Cooper's Hawks (*Accipiter cooperii*). A grey squirrel (*Sciurus carolinensis*) has been recorded killing and eating an adult Northern Cardinal. Northern Cardinals adjust their foraging strategy to the potential presence of a predator; in one experiment, cardinals that were offered high-quality food at feeders away from cover visited these more frequently than they visited feeders with lower-quality food near cover, but they reversed this preference if exposed to calls of a predator, Cooper's Hawk, at two-hour intervals.

The enormous winter roosts of Dickcissels are magnets for predators. In Trinidad, ffrench noted Merlins (*Falco columbarius*), Common Barn-owls (*Tyto alba*) and an Aplomado Falcon (*Falco femoralis*) hunting at Dickcissel roosts. Further, at roosts in Venezuela, G. D. Basili and S. A. Temple recorded five species of falcon, seven hawks, two owls and three mammals as preying on Dickcissels; the mammals were the jaguarundi (*Puma yagouaroundi*), greater grison (*Galictis vittata*) and tayra (*Eira barbara*). Merlins were the most common diurnal predators, with 1–5 birds at each roost, and Common Barn-owls the most conspicuous by night.

Saltators, probably not true cardinalids (see Systematics), are in general not particularly well known. In the *llanos* of Venezuela, Greyish and Orinocan Saltators were found to spend 77% to 80% of their time in sitting, singing and preening. Buff-throated and Green-winged Saltators have been recorded anting, and A. F. Skutch observed a Buff-throated Saltator while it visited an arboreal ant nest for this purpose.

It appears that the social systems and display repertoires of saltators have never been thoroughly studied. Black-headed (*Saltator atriceps*) and Buff-throated Saltators are regularly found in small, loose groups, but whether the members of these groups are related to one another is not known. Other species, including the Greyish and Streaked Saltators, are usually found only singly or in twos and threes. H. Sick described a display of the Black-throated Grosbeak in which the bird opens its wings to show off the white underwing-coverts, but he did not mention the context in which this display occurs.

Black-throated Saltators associate in groups of 2–6 individuals. Helpers at the nest have been recorded for this species, suggesting that these groups consist of family members. One individual, very occasionally accompanied by one other, usually sits sentinel on a prominent exposed perch while other members of the group forage near the ground. Sentinels studied by J. Ragusa-Netto in the Brazilian *cerrado* stayed at their posts for usually less than six minutes, but sometimes for as long as 30 minutes, constantly turning



*The **Northern Cardinal** is reported to establish such regular bathing habits that it will continue to use water that has become stagnant or very muddy even when clean water is available nearby. Northern Cardinals continue to bathe in the winter, sometimes in melted-snow water, and there is a description of five males and two females taking turns to bathe while surrounded by five feet of snow. This species shows remarkable cold tolerance. Two individuals were subjected to reductions in temperature of 3°C every 20 minutes; after three hours, when the temperature had reached as low as –17°C, the birds had still not become hypothermic.*

[*Cardinalis cardinalis cardinalis*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]



Outside the hectic breeding period, the ***Northern Cardinal*** *can spend a considerable amount of time loafing or even sleeping in the daylight hours, sometimes remaining in its roost for much of the day. In the winter, these lengthy periods of inactivity help to conserve energy. Typical roost-sites are quite low down in thickets, among dense shrubs or in conifers. Adult Northern Cardinals do not share their roosts, but newly fledged nestmates may roost in the same vicinity.*

[*Cardinalis cardinalis cardinalis*, Whitnall Park, Milwaukee, Wisconsin, USA. Photo: Thomas Lazar/ naturepl.com]

the head from one side to the other. Individuals spent longer at their post if there were a large number of raptors in the area. If a bird of prey came into view, the sentinel sounded an alarm call, causing all fellow group-members to head for cover. Except during the breeding season, Black-throated Saltators constitute one of four nuclear species in mixed flocks in the *cerrado*. Up to 33 other species may be present in a saltator-centred flock, these other species taking advantage of the warnings that saltator sentinels provide. While Ragusa-Netto recorded attacks on mixed flocks by American Kestrels (*Falco sparverius*) and Aplomado Falcons, he never saw an attack on a group consisting of saltators alone.

Little is known about predation suffered by saltators. A Golden-billed Saltator was among the prey items found in the nest of a Ferruginous Pygmy-owl in Argentina.

Voice

The voices of cardinalids are among their most attractive features. Most species have musical songs consisting of a series of whistled or warbled phrases, as well as a repertoire of often sharp and distinctive calls. The primary song of the Dickcissel is an exception, being a short, dry series of notes from which the bird's English name is derived.

Very little research has been undertaken on the vocalizations of Mexican, Central American and South American cardinalids, some of which appear to have complex song repertoires. For example, Skutch describes the Blue-black Grosbeak as "a superb and generous songster". This species, the song of which varies geographically across its wide range, is deserving of further study. The singing behaviour of some North American species has, however, been the subject of intensive research, particularly by R. E. Lemon and G. Ritchison on Northern Cardinals, as well as recent work on the acoustics and neurophysiology of cardinal song by N. Fletcher and his colleagues, and studies by Ritchison on Black-headed Grosbeaks, by K. D. Groschupf and C. W. Thompson on Varied Buntings, and by R. B. Payne and his students at the University of Michigan on Indigo Buntings.

O. N. Larsen and F. Goller, in their investigation of song production in the syrinx of the Northern Cardinal, used endoscopic examination of the syrinx and electrical stimulation of syringeal muscles in living birds. Their studies represented the first direct examinations of the oscine syrinx in action. They demonstrated that, contrary to earlier belief, the medial tympaniform membranes are not the principal sound-generators in the syrinx; birds were able to produce nearly normal song even if these membranes were incapacitated. Instead, sound is generated primarily by the syringeal labia. The syrinx is controlled, according to Larsen and Goller, by complex interaction between muscles in combination with the complicated suspension of the cartilaginous framework upon which they act. Larsen and Goller found no significant difference in the operation of the syrinx between the Northern Cardinal and the American Crow (*Corvus brachyrhynchos*) and Brown Thrasher (*Toxostoma rufum*), the only other oscines that they examined. It is likely, therefore, that the syrinx in cardinalids functions in a manner typical for songbirds in general. The left side of the syrinx produces lower frequencies, up to about 3·5 kHz. Both sides are used for higher frequencies, but airflow is often reduced or even eliminated on the left side, suggesting that the right side specializes in producing higher-frequency sounds. Most song syllables, however, span the frequency ranges of the two sides, and the shift of airflow from one side to the other usually cannot be detected.

Beyond the syrinx, the volume and tonal quality of cardinal song are influenced by the degree of beak gape, and by complex movements of the hyoid apparatus that affect the position of the tongue, larynx and trachea. Northern Cardinals, like other songbirds, possess an oropharyngeal oesophageal cavity between the top of the trachea and the open beak which can be actively distended by movements of the hyoid skeleton. T. Riede and his colleagues have shown that the cavity acts as a resonator, the sounds filtered within it being radiated through the beak. By adjusting its size, the bird can effectively "set" the cavity so that its resonance frequency matches the fundamental tone produced in the syrinx, resulting in a nearly pure-tone song.

Female Northern Cardinals, as well as males, sing, both in duet with their mates and on their own. Jawor and S. A. MacDougall-Shackleton have demonstrated that the HVC, RA, and Area X nuclei in the brains of Northern Cardinals, which form part of the song-control system, vary in volume both seasonally



*The song of the **Rose-breasted Grosbeak** is usually given from a high perch, and occasionally in flight. These birds may begin singing as early as 03:00 hours, but they sing less frequently, if at all, during the midday hours. The female also sings when nest-building, relieving the male at the nest, incubating or brooding. In Quebec, Rose-breasted Grosbeaks had repertoires of 15–23 syllables per bird. Songs were of nine to eleven syllables, and consecutive songs often began with the same syllables, but overall sequences were usually different. Some individuals incorporate song elements of other species into their songs.*

[*Pheucticus ludovicianus*, Long Point, Ontario, Canada. Photo: Glenn Bartley]

and between the sexes. They are largest early in the breeding season, and male nuclei are 1·5–2 times larger than those in females. Both differences are small compared with those in bird species that have more restricted singing periods or whose females do not sing. In addition, females of a number of other cardinalids are known to sing, as documented for the Rose-breasted and Black-headed Grosbeaks and the Black-faced, Red-and-black and Blue-black Grosbeaks; female Pyrrhuloxias sing, albeit rarely, and females of two of the saltator species also do so (see below). Blue-black Grosbeak partners sing to each other while building the nest and while the female is incubating. In contrast, females of the Dickcissel and of *Passerina* species, including the Blue Grosbeak, are not known to sing.

Northern Cardinals may begin to produce soft warbling sounds at as early as three weeks of age, but true song development does not really get underway until the following winter and spring. Initial warbling is succeeded by disorganized, rambling subsong, which slowly develops into a more controlled plastic song as syllable morphology develops. Plastic song crystallizes into recognizable adult song when the bird reaches about ten months of age.

Some simple cardinalid sounds may be innate, but complex song elements are apparently learnt during a sensitive period early in life. The maintenance of song structure, once learnt, requires memory reinforced by auditory feedback. Experiments demonstrated that the songs of artificially deafened Northern Cardinals gradually deteriorated with time, and deafened juvenile Black-headed Grosbeaks were unable to develop normal song.

Hand-reared Northern Cardinals raised in isolation developed simple, but not more complex, two-note or three-note phrases resembling those of adults, but isolated Indigo Buntings were unable to produce more than a few adult-type syllables. In the case of the Northern Cardinal, both sexes learn song from their parents during their first summer. Females, but not males, require exposure to adult songs early in life in order to learn. Captive male cardinals younger than 15 weeks in age, if exposed to recordings of adults, developed songs that copied some or all of the recorded songs in the following spring; in addition, they invented material of their own. Male Northern Cardinals were able to learn songs played to them when they were 5·5–9 months of age.

A. Yamaguchi, working with captive Northern Cardinals, found that the sensitive period begins at a fairly similar time for both sexes, on average 27·8 days for males and 22·4 days for females. The learning period, however, lasts much longer for males, ending at an average age of 214·9 days, the corresponding figure for females being 71·1 days. Despite this, the number of songs in the birds' eventual repertoires was roughly the same. Each sex appeared capable of learning the song of the other, and showed no preference for learning the song of its own sex. The



*The song of the **Golden-bellied Grosbeak** is a rich carolling, similar to that of the Highland Hepatic-tanager* (Piranga lutea). *The number of syllables in the song repertoires of the different cardinalid genera varies substantially.* Cardinalis *species may use only ten or so syllables, but* Pheucticus *species generally have larger repertoires: 15–23 for Rose-breasted Grosbeaks* (Pheucticus ludovicianus) *(above) and up to 37 for male Black-headed Grosbeaks* (P. melanocephalus). *Female Black-headed Grosbeaks have smaller repertoires, on average 12–13 syllables.*

[*Pheucticus chrysogaster chrysogaster*, S Ecuador. Photo: Jon Hornbuckle]

difference between the sexes may be related to the need for the male, but not the female, to be able to learn the songs of neighbouring conspecifics after it settles on territory.

Male Indigo Buntings can learn syllables from recorded songs up to 18 months of age. In Indigo and Lazuli Buntings, the patterns of song-learning are quite different from those in the Northern Cardinal. Female buntings do not sing, and males learn their songs not from their parents, but from other males, although it is possible that they may learn some basic elements of song from hearing their fathers. Fledgling Indigo Buntings between 15 and 60 days old begin to sing highly variable, apparently random subsong; this crystallizes into adult song during the first spring, about 9–11 months after the bird hatched. Lazuli Buntings produce subsong at 29 days, but stop singing in winter and begin subsong again in early spring.

Approximately 80% of male Indigo Buntings copy the song of another male, usually an adult rather than another yearling, that they encounter when establishing their territories during their first spring season. As the birds normally settle several territories away from their natal area, only very rarely is the song that of their father, or, indeed, that of any close relative. Members of a song neighbourhood, defined as an area in which all males sing essentially the same song, are, by and large, unrelated males.

The advantages of learning from a neighbouring bird may be considerable. First-year individuals that copy a neighbour's song have greater success in mating, nesting and bringing off fledged young than those that do not. Possibly, they are able to deceive older birds, which may otherwise chase them off, into thinking that they are established territory-holders. Adults whose songs match those of their neighbours also tend to be more successful than adults that are not part of a song neighbourhood. The breeding success of Indigo Bunting males, however, seems not to depend on the specific song neighbourhood to which a bird belongs.

The choice of which individual bird to copy, out of a number of singing males that may be present, apparently requires intensive social interaction between learner and tutor. These interactions can include repeated chases across territorial boundaries and also countersinging, the younger bird matching the song of the older one.

Apparently, the 20% of Indigo Buntings that do not copy from a neighbour learn their first song before arriving on their territory. Some first-year males, and approximately 5% of older males, may switch songs in the course of a season, either when changing territories or, for older birds, if no neighbouring males match their current song. Adult Indigo Buntings appear to retain the ability to learn a new song even after their original song crystallizes, permitting them to replace it with another that matches that of a neighbouring male. This relearning ability contributes to the development and differentiation of song neighbourhoods.

The songs and other vocalizations of saltators have not been studied in detail. Some are notably fine singers, but others have been described as harsh or raucous. The song of the ***Orinocan Saltator*** *is a loud, rollicking series of notes, often given by more than one bird at a time. Black-throated Saltators* (Saltator atricollis) *may sing together as a group during the early hours of the morning. This species and possibly also Orinocan Saltators sing antiphonal duets, in which phrases given by one bird are replied to with similar phrases by another. One author has recently recommended that both of these saltators be removed to a different genus.*

[*Saltator orenocensis rufescens*, Coro, Venezuela. Photo: Jonathan Newman]



Song structure generally correlates with the acoustic properties of a bird's habitat. A study including twelve species of saltator found that long-distance songs in open country generally contained more elements, with wider bandwidths, higher frequencies and shorter lengths, than those from closed habitats. On the other hand, the songs of birds of the forest interior, such as the ***Slate-colored Grosbeak****, tended to be composed of whistled notes with slowly modulated frequencies, which perhaps took advantage of the reverberation in such closed habitats to create a louder and longer signal.*

[*Saltator grossus grossus*, Cristalino Jungle Lodge, Alta Floresta, Mato Grosso, Brazil. Photo: Edson Endrigo]





The number of syllables shared by cardinalid populations diminishes with distance. In Venezuela, the song of the ***Ultramarine Grosbeak*** *is described as a rich series of rising and falling warbles, while in Brazil it is said to be flowing and melodious, alternating higher and lower cadences. Within Brazil, the forest-dwelling subspecies* sterea*, shown here, also has louder and more complex songs than the subspecies* argentina*, found in semi-open country. This may be a compensatory response by* sterea *to low ambient light and dense vegetation in its habitat, where plumage signals may be harder to detect.*

[*Cyanocompsa brissonii sterea*, Jacutinga, Minas Gerais, Brazil. Photo: Geiser Trivelato]

Lazuli Buntings in their first spring may copy song segments from as many as ten other males before settling on a stable song. Second-year Painted Buntings rarely establish territories, but they may sing from within the territory of another male; in this instance, the pattern of song-learning is not known.

In general, the song repertoires of cardinalids contain a number of syllables, sometimes composed of more than one subunit, arranged in various combinations to produce different song types. The number of syllables used in any one song varies among species. Pyrrhuloxias frequently use only a single syllable, while Rose-breasted Grosbeaks may incorporate 9–11 syllables into a single song.

The song of the Blue-black Grosbeak has not been studied in detail, but Skutch and others have noted that it is frequently in two parts, a series of often descending tonal whistles being followed by a rapid warble at lower volume. The concluding warble is not audible at so great a distance as is the first part of the song, suggesting that it may function only in close encounters.

Syllable construction, length and amplitude vary among members of the family. In Canadian studies, most of the 14 syllables identified in the songs of Northern Cardinals at London, southern Ontario, were simple whistles, frequently slurred downwards or upwards, the lower frequencies ranging between 1·2 kHz and 1·6 kHz, but the upper frequencies varying more widely, from 1·2 kHz to 6·2 kHz. Mean syllable length varied from 0·10 seconds to 0·48 seconds. Rose-breasted Grosbeak syllables in Quebec ranged in frequency from 1·5 kHz to 4·0 kHz and had an average duration in the range 0·24–0·28 seconds.

When incorporated into a song, the intervals between successive syllables given by Northern Cardinals and Rose-breasted Grosbeaks relate directly to the duration of the preceding syllable. With Rose-breasted Grosbeaks, the interval is some three times longer than the syllable itself. Syllables in the songs of Painted and Orange-breasted Buntings are evenly spaced, whereas the intervals in songs of Indigo, Lazuli and Varied Buntings are more irregular. Syllables may be repeated in sequence. *Cardinalis* may repeat the same syllable a number of times, and Indigo Buntings normally sing each syllable at least twice before moving to the next. Rose-breasted Grosbeaks rarely repeat syllables consecutively.

The number of syllables in a song repertoire varies. *Cardinalis* may have only ten or so syllables available; in various studies, 8–21 were recorded for male Northern Cardinals, 8–10 being a frequent total, and 1–14 have been recorded for male Pyrrhuloxias. *Pheucticus* species, so far as is known, generally have larger repertoires: 15–23 for Rose-breasted Grosbeaks and 14–37 for male Black-headed Grosbeaks. *Passerina* buntings studied have much larger repertoires, of over 100 syllables: 127 are recorded for Indigo Buntings, more than 140 for Lazuli Buntings and 101 for Varied Buntings. The songs of 17 Blue Grosbeaks studied by B. Ballentine and her colleagues were each composed of a single song type, made up of combinations of 11–19 unique elements producing 5–138 minor variants. In contrast, the song of the Dickcissel consists of repetitions of only two phrases, "dick" and "cissel", occasionally with a third, a trill. Most male Dickcissels sing only a single song type, with slight variations in the number of elements utilized. They repeat the same song throughout the breeding season, and return to it in successive years.

Northern Cardinals organize their syllable repertoires into 8–12 song types. These can vary significantly in terms of the number of notes per song. The songs of the congeneric Pyrrhuloxia are organized in a similar manner, although the song syllables are generally shorter. Pyrrhuloxias have a higher number of song types than cardinals, but they are mostly repetitions of a single syllable, rather than consisting of two or three syllables per song, as is common among Northern Cardinals.

In the songs of both cardinals and Rose-breasted Grosbeaks, the order of syllables is not random. Short syllables tend to be repeated more often than longer ones during a single song. Certain syllables are used most frequently at the beginning of a song, and cardinals have distinctive syllables, including a dry "chirr", normally heard only last in the sequence. The "chirr" note may be a measure of fitness. Cardinals are able to replenish their air supply by taking extremely short "mini breaths" if syllables are repeated at rates lower than 16 per second. The elements of the



*In older individuals of the **Varied Bunting**, the series of short, rapidly repeated phrases which form the song is more prolonged than in younger birds. Adults of the closely related Indigo Bunting* (Passerina cyanea) *appear to retain the ability to learn a new song from their neighbours even after their original song "crystallizes". This relearning ability contributes to the development and differentiation of song neighbourhoods. Approximately 80% of male Indigo Buntings copy the song of another male, usually an adult, that they encounter when establishing territories during their first spring. But while the details of the Indigo Bunting's song are learnt, this learning seems to be primarily a refinement of a basic pattern which the bird is able to produce without ever having heard another Indigo Bunting sing. Five male Indigo Bunting nestlings were hand-reared in isolation from adults. As soon as the young began to sing subsongs, at between 15 and 60 days, they were isolated until their songs were fully developed. The early subsong was a variable warbling. During the first spring this "crystallized" into a series of figures which eventually formed the entire song of each bird. Siblings developed completely different songs. The songs of these isolated birds contained very few figures which were closely comparable to those of wild birds in the area where they hatched. However, the general characteristics of figure shape, spacing and repetition, and even the interval between songs, were all close to those of free-living birds.*

[*Passerina versicolor dickeyae*, Santa Cruz County, Arizona, USA. Photo: Brian E. Small]



*The **Lazuli Bunting** has a repertoire of over 140 syllables to draw on, but most individuals learn only a single song, the "crystallized song", and retain it throughout life. Lazuli Buntings may copy song segments from as many as ten other males in their first year, before settling on a stable song. The song is similar to that of the Indigo Bunting* (Passerina cyanea), *but twice as fast and less strident. In areas where only one of these species is found, it is usually indifferent to playback of the other's song. But where both occur, each reacts aggressively to the other's song, although they may also use phrases borrowed from the other. Hybrids between these species are relatively common because, at least to some degree, females use learnt song traits of males in mate choice.*

[*Passerina amoena*, Hollister, California, USA. Photo: John Sorensen]

"chirr" follow each other more rapidly than that, so that a male's ability to produce and prolong the "chirr" may be an indicator of his lung capacity and cardiovascular fitness.

Individual repertoires, once established, may persist unchanged for long periods, both through the breeding season and from year to year. Male Northern Cardinals have been recorded singing the same song types for four years.

Northern Cardinals may repeat the same song for a number of minutes, often with slight variations in volume and structure, but normally beginning with the same syllable. Such a sequence is referred to as a song "bout". Songs within a bout are separated by intervals of varying lengths. Cardinal singing bouts in Kentucky contained an average of 18·5 songs each. When an individual does switch to a different song type, its choice may be determined to a great extent by the song that has preceded it, so that the structure of singing over long periods of time is highly organized. Males in Kentucky varied in the number of notes per song and the number of songs per bout, perhaps reflecting differences in male quality. Oddly, in eastern Texas, Northern Cardinals having smaller repertoires and less complex song types held higher-quality territories and fledged more young, the reverse of what one might expect.

Male and female Northern Cardinals have similar song-syllable repertoires and combine them in the same way. However, Yamaguchi has shown that male and female songs are not identical, and that the birds themselves can distinguish the sex of the singer. Females may sing longer songs on the nest. Male cardinals repeat syllables in their repertoire in a more stereotyped manner than females, and female songs have a greater harmonic amplitude than those of males.

Female Black-headed Grosbeaks have smaller song-syllable repertoires, on average 12·8 syllables, as opposed to 24·5 for males, and their songs, with a mean of 4·5 syllables per song, are simpler and shorter than those of males, which have a mean of 10·3 syllables per song. Females tend to use fewer syllables from their available repertoire in each song. In one example, a female had a repertoire of 14 syllables, but just three of these accounted for 82% of the syllables that she used in her song.

Testosterone may function in controlling the precision and stereotypy of male songs. The songs of female Black-headed Grosbeaks are more variable than those of males, perhaps as a result of reduced testosterone levels. Occasionally, a female will sing a male-type song, with shorter syllables separated by smaller intervals, possibly in order to mimic a male (see Breeding). In general, males and females in a population share only about 10% of their song repertoires, but mated partners may share 25% of their syllables.

By selecting among their large repertoires of syllables and rearranging the order of these within a song sequence, *Passerina*



*Some cardinalids are primarily arboreal foragers, while others, such as the **Orange-breasted Bunting** and the Northern Cardinal* (Cardinalis cardinalis), *spend considerable time in feeding on the ground. Orange-breasted Buntings hop across field edges and roadsides, constantly tilting their head and peering. Most species in the family are opportunistic omnivores. While there are no published data on the diet of Orange-breasted Buntings in the wild, their food choices in captivity cover a spectrum from seed-eating, including canary seed and white millet, and fruit-eating (apples) to insects, such as ant pupae (Formicidae).*

[*Passerina leclancherii grandior*, Colima, Mexico. Photo: Pete Morris]



At the end of the breeding season, flocks of ***Blue Grosbeaks*** *assemble to feed on grass and weed seeds, and on cereal grains. They forage both on the ground and in vegetation, and frequently join flocks of other granivorous birds, including other* Passerina *buntings (as seen here). On migration, they may be found in rice fields, and wintering birds in Guatemala have been seen foraging on waste grain in mule corrals. During breeding, their diet is more animal-based. At all times of year they are opportunistic feeders, ready to take advantage of temporary abundances of prey, such as cicadas (Cicadidae) during emergence periods, and pursuing swarming winged insects and seizing them by flycatching.*

[*Passerina caerulea caerulea*, High Island, Texas, USA. Photo: Rob Curtis/ The Early Birder]

species can create an enormous variety of individual songs. Blue Grosbeaks usually begin their songs with the same combination of elements, introducing variation by rearranging and adding elements in the second half of the song. Unlike *Cardinalis* and *Pheucticus*, Indigo Buntings appear to lack any stereotyped system for organizing the sequence of syllables within a song, except for a single short note given to open a sequence. Some Lazuli Bunting syllables can occur anywhere in a song, but others tend to occur in specific positions; this species' songs usually end with "buzzes", which are rapidly frequency-modulated elements, or with "beeps", which are usually paired chevron-shaped figures with one overtone.

Indigo and Lazuli Buntings regularly use selected syllables more than once in a single song, but Painted and Varied Buntings rarely do so. Only about 1% of syllables are repeated in Painted Bunting songs, and Orange-breasted Buntings apparently never use the same syllable twice within a single song. Although the variety of individual songs that they could produce is potentially extremely large, most Indigo and Lazuli Buntings learn only a single, complex advertising song, the "crystallized song", and retain it throughout life; a few males, however, learn songs from neighbours and may remain "bilingual". In addition, Indigo Buntings occasionally sing longer songs incorporating extra syllable types, as well as low-amplitude squeaky songs incorporating high-frequency elements; the latter are employed in territorial encounters. D. Margoliash and his colleagues have established that adult Indigo Buntings commonly sing squeaky, highly variable "plastic" songs resembling those given by young birds during the critical learning period. These low-amplitude songs tend to be uttered in separate singing bouts later in the day than advertising songs, which are usually given at first light. There is evidence that Indigo Buntings may use these plastic songs to practise and "store" additional, newly learnt song syllables before incorporating them into stereotyped song.

Unlike Indigo and Lazuli Buntings, Painted and Varied Buntings do not develop a single crystallized song. Painted Buntings have 4–5 song types, differing primarily in the structure of individual figures in the middle of a song. Individual Varied Buntings have repertoires of some 9–35 syllables, first-year males having smaller repertoires than older birds. From these syllables the birds construct songs of varying length. They may add or remove syllables, particularly near the end of a song. Varied Buntings almost never repeat individual songs in the course of a song bout. This extreme variety makes it difficult to classify song types or to determine differences among individuals. Birds from different areas differ in the ordering of song syllables, so no song is shared among populations.

Vocal mimicry is rare among cardinalids, and very few examples have been documented. An adult Rose-breasted Grosbeak heard while singing at Savoy, in Massachusetts, intermixed, among phrases of its own primary song, imitations of the primary songs and calls of Red-eyed Vireos (*Vireo olivaceus*), Eastern Towhees (*Pipilo erythrophthalmus*) and Northern Cardinals, as well as the "mew" call and a scold note of the Grey Catbird (*Dumetella carolinensis*).

With birds, song structure generally correlates with the acoustic properties of the habitat and, in particular, with the ability of song signals to resist degradation with distance. The relatively unmusical song of the Dickcissel may be a response to the increased carrying properties of harmonic, as opposed to tonal, sounds in open habitats. Tonal sounds carry better in closed habitats, and the song of the Blue-black Grosbeak, an interior-forest bird, is composed of pure tone-like sounds with a narrow frequency range. The forest-dwelling subspecies *sterea* of the Ultramarine Grosbeak has louder and more complex songs than those of the subspecies *argentina*, which lives in semi-open country. The difference in this case may be a compensatory response by *sterea* to low ambient light in its habitat, where plumage signals may be harder to detect.

A study in eastern Texas by M. E. Anderson and R. N. Connor revealed significant differences in frequency and amplitude, correlated with habitat type, among song syllables of Northern Cardinal populations located only 4·5 km from one another. Individuals in younger tree stands lacking a closed canopy produced sounds with a greater degree of frequency modulation than those voiced by cardinals in older stands. In contrast, a study of Indigo Buntings by R. Hylton and R. D. Godard found no significant difference between the songs of birds in open habitats and those in

forest habitats. This may reflect insufficient acoustic differences between the two types of habitat. It may, however, be a result of the social learning system for Indigo Bunting song, in which an individual may copy the song of a neighbour even if that neighbour is in a different habitat type.

P. L. Tubaro and D. A. Lijtmaer found similar patterns in the songs of the Red-and-black Grosbeak, *Pheucticus* grosbeaks and twelve species of *Saltator* (see below). Vocalizations used in short-distance communication, such as the wide-band duet songs of the Greyish Saltator, were an exception, but signal degradation is less of a problem if the recipient is close to the singer. Long-distance songs in open country generally contained more elements, with wider bandwidths, higher frequencies and shorter lengths, than those from birds in closed habitats. Songs in mixed habitats were intermediate in structure. The songs of birds of the forest interior, where reverberation can cause overlap between the echoes of a note and the following song elements, tended to be composed of whistled notes with slowly modulated frequencies. Tubaro and Lijtmaer suggest that the long, slowly modulated terminal notes in songs of the Black-winged Saltator, Black-throated Grosbeak, Slate-colored Grosbeak, Green-winged Saltator and Red-and-black Grosbeak may benefit from reverberation, which could help to create a louder and longer signal.

Song production is subject to the control of hormones, particularly testosterone and luteinizing hormone. Increased singing by laboratory-reared male Northern Cardinals in their first spring was associated with a significant increase in levels of these hormones. The increase was much smaller in females. Wild male cardinals have also been found to have far higher breeding-season levels of testosterone and luteinizing hormone than wild females.

Blue-black Grosbeaks may sing throughout the year in lowland forests of southern Central America, but at El General, in Costa Rica, which is more than 600 m above sea level, singing begins only in February or March, reaching its peak during the breeding season, from April to September, and diminishing during the heavy rains of October and November.

Indigo Buntings begin singing just before or during spring migration, and stop prior to moult and the autumn migration. The singing rate of Painted Buntings declines by more than half between the males' arrival on the breeding grounds and the arrival of the females, and declines by half again after pairing. Ballentine and her colleagues found that Blue Grosbeaks sang longer dawn choruses and sang with increased song rates, as well as using more versatile arrangements of elements and maintaining more syntax consistency, during the dawn chorus of their females' fertile period than in the non-fertile periods. C. Lattin and Ritchison found that Blue Grosbeaks sang at highest rates prior to pairing, then maintained relatively high rates up to the egg-laying stage, but sang at lower rates during the incubation to fledgling stages. Male Black-headed Grosbeaks reach their peak of singing between the time of arrival on the breeding grounds and the stage at which egg-laying is completed. The frequency of song drops off sharply from the time of laying until the young fledge, although it may rise to pre-laying levels if the nesting attempt fails. Females of this grosbeak begin to sing only during incubation, and their level of singing increases sharply once the young leave the nest. When the young reach independence, both males and females stop singing.

Dickcissels and Northern Cardinals may sing throughout the year, but do so more frequently during the breeding season. In Arizona, both cardinals and Pyrrhuloxias begin singing in mid-February, reaching a peak in mid-March, and diminishing by September to a few scattered and incomplete songs. Pyrrhuloxias reduce their singing in the latter stages of incubation, but increase it again after the first brood becomes independent. On the wintering grounds Rose-breasted and Black-headed Grosbeaks rarely sing, and *Passerina* buntings are not known to do so.

Time of year may affect not only the frequency but also the structure of cardinal song. In the case of the Northern Cardinal, Ritchison found that the number of syllables per song varied through the season, being significantly higher in February, March, April and again in August. The number of songs per bout was also greater early in the season. Female Northern Cardinals sing less frequently than males, and sing at their peak for a shorter period. Like males, they can and do sing occasionally in any month of the year. In a Kentucky population studied by Ritchison, males began singing in January and continued until late August or early September, while females did not sing until March, reached a



*The **Black-faced Grosbeak** has a broad, deep bill, but can feed on fruits even wider than its gape. Like other cardinalids, it is a "masher" rather than a "gulper", mandibulating fruit in its bill and separating and ejecting seeds and other hard and indigestible parts, rather than trying to swallow the fruit whole. Although largely frugivorous, Black-faced Grosbeaks cannot meet their protein requirements by fruit alone. Fruit-fed captives lose weight if not given additional protein. Caryothraustes grosbeaks are mainly inhabitants of the forest canopy, but the Black-faced Grosbeak will forage at lower levels in more open situations, such as shaded cacao plantations.*

[*Caryothraustes poliogaster poliogaster*, Mexico.
Photo: Roy de Haas/ AGAMI]



*The **Lazuli Bunting** will eat the seeds of wild oats* (Avena) *and other grasses by perching on the stems or reaching from perches on more rigid plants growing among the grasses. It will also reach up from the ground to take the seeds from drooping seedheads and will forage for fallen seeds. Seeds, however, made up only 30% of the plant matter in Lazuli Bunting stomachs in California. Lazuli Buntings also eat substantial amounts of animal matter, especially during spring and summer. Wintering Lazuli Buntings are found in habitat with the same characteristics as their breeding grounds.*

[*Passerina amoena*, USA. Photo: Mike Danzenbaker/ AGAMI]

peak in the weeks just prior to nesting, and were rarely heard to sing after mid-May.

Northern Cardinals begin singing earlier in the day during the breeding season. In the northern USA, A. Leopold and A. E. Enyon noted that cardinals in Wisconsin sang more than an hour before sunrise in late June, particularly when the skies were clear. Rose-breasted Grosbeaks may start to sing as early as 03:00 hours. Both species sing less frequently, if at all, during the midday hours. Indigo Buntings sing from dawn to dusk, reaching a peak in the early-morning hours before sunrise. Lazuli Buntings sing from about one hour before sunrise until 45 minutes after sunset, with a peak in the morning and another at dusk. Varied Buntings sing at any time of day during the breeding season, with no "dawn chorus" or peak singing period. Similarly, at the beginning of the breeding season, when song activity is most intense, male Dickcissels sing throughout the daylight hours, often devoting 50% or more of their time to singing.

Many cardinalids sing from a series of elevated perches, either centrally, near the nest tree, or along the perimeter of the territory. Ultramarine and Crimson-collared Grosbeaks reportedly sing from deep cover in a tree or bush, although an extralimital Crimson-collared Grosbeak in Texas sang from exposed dead limbs and treetops. Painted Buntings prefer to sing from cover until the females arrive, but after that they do more than half of their singing from exposed perches. Dickcissels sing persistently from elevated perches within their territory, repeating their fairly simple songs every 3–8 seconds.

Northern Cardinals use specific song perches more than 10 m above ground, each territory usually having 4–7 such songposts. They will sing also, usually at lower amplitude, from low shrubbery or the ground. Pyrrhuloxias deliver their songs from a number of perches either in the centre or at the edge of their territories. They use the same perches throughout the breeding season, visiting them in a specific order. Varied Buntings do most of their singing from 3–4 exposed perches at the edge of the territory, but they sing from shade if the temperature rises above 37°C. Male Varied Buntings feeding young sing from a standard perch near the nest before delivering food to the nestlings.

A number of species, including the Rose-breasted and Black-headed Grosbeaks, sing from the nest while incubating or brooding. Furthermore, these two grosbeaks will sing during flight displays, and Indigo Buntings may sing during aerial chases with other males.

Among cardinalids, the male's advertising song, as is common in oscines, seems to function in the establishing and maintaining of territory, particularly early in the breeding season. The fine structure of the songs of Indigo Buntings apparently contains a number of cues, including redundant information, that signals the territorial intent of the singer. The placement, spacing and structure of the initial figures in the song may serve to attract attention, while precise details of frequency and spacing may contain specific information enabling other birds to recognize the song as that of a conspecific on territory.

Countersinging and song-matching (replying to a song by giving a similar song) among males is documented for a number of species in the family. Northern Cardinals countersing with neighbouring males, as well as with their mates. As they do so, the number of songs per bout decreases, and the number of syllables per song and the number of syllable types per song increase. Male Pyrrhuloxias in adjacent territories sing either in unison or alternately. Lazuli Buntings sing most vigorously during territorial disputes, and they countersing with neighbouring males throughout the breeding season. Several Varied Bunting males within a canyon may sing at the same time. At times, it appears that one male leads the singing and neighbouring males follow.

Male song may reinforce the pair-bond. The male Lazuli Bunting, for example, sings quietly close to his mate just before egg-laying. With Black-headed Grosbeaks, the territorial function of male song may give way to pair-bond and family maintenance as the breeding season progresses. After egg-laying is complete, males sing mostly in the presence of their mates and are less aggressive towards other males. Once the young have left the nest, the parent Black-headed Grosbeaks sing near their fledglings.

Female song seems to function primarily in reinforcing the pair-bond, rather than in defending the territory, although it may



*Analyses of the stomach contents of the **Painted Bunting** (left) showed that 70–73% of its diet consisted of grass and other seeds. As well as perching on stems, Painted Buntings will use their weight to bring a seedhead to the ground and hold it down with their feet while stripping it with the bill. They generally forage near the ground, but will go much higher during the breeding season. The diet of the **Indigo Bunting** (right) varies over the course of the year, but always includes seeds. On their breeding grounds, Indigo Buntings are likely to be found in openings in wooded areas, but they may winter in grasslands and crop fields. Flocks of hundreds feed in harvested rice fields in Belize.*

[*Passerina ciris pallidior* and *Passerina cyanea*, Port Aransas, Texas, USA. Photo: Rolf Nussbaumer/ naturepl.com]

serve also to advertise to other females that a male is spoken for. In the case of the Black-headed Grosbeak, female song appears to have no territorial role, as neither males nor females respond to playback of the songs of other females of the species, but it is probably important in reinforcing the pair-bond and may serve to maintain the integrity of the family group.

For some species, however, female song may have a territorial role. For example, Skutch heard a female Blue-black Grosbeak sing during a chase involving two or three other birds. Female cardinals may sing in aggressive encounters with other females, and female Pyrrhuloxias, which sing only rarely, may do so while defending the nest. J. Vondrasek found that female, but not male, Northern Cardinals in newly formed pairs sing more often than those in pairs that had previously bred. This may be because new partners establishing a territory are more likely to find themselves in aggressive encounters with others of the species.

With both Black-headed Grosbeaks and Northern Cardinals, females normally sing only when their mates are present. Unlike those of some other species, female Northern Cardinals apparently do not sing to re-establish contact with a mate or to advertise for a new one; females were found not to increase their song rates if the males were experimentally removed. Male Northern Cardinals frequently duet with their mates, joining the female after she starts to sing. Duetting may provide an opportunity for members of a pair to learn each other's repertoires.

Female Rose-breasted Grosbeaks sing while nest-building, incubating, brooding, and relieving their mate at the nest, while female Black-headed Grosbeaks sing at the nest in the presence of the mate, away from the nest in the presence of the mate, and from foliage as they seek food for the fledglings. Skutch observed a Blue-black Grosbeak female that sang while nest-building with her mate, and he noted that incubating females sang in response to their mates while sitting. A study by S. L. Halkin suggests that singing from the nest by the female Northern Cardinal may signal to the male that food is, or is not, needed, so that the brightly coloured male can avoid unnecessary visits that could attract the attention of predators. Males approached the nest most frequently when the female sang, but, if she sang a song matching his own, a male was more likely to stay away.

In addition to normal female song, Ritchison twice heard a male-type song given by female Black-headed Grobeaks, on both occasions when the male was long overdue at the nest. Ritchison has speculated that the females may have been trying to lure their mate to the nest by deceiving him into thinking that an intruding male was in the vicinity. He did not record whether the attempts had been successful.

In a study by W. L. Thompson, Painted and Indigo Buntings reacted strongly to songs of their own species, but very little or not at all to the songs of other *Passerina*. Spacing and frequency range of song elements appeared to be the most important clues in species recognition. Emlen used artificially modified songs to identify the critical features for species identification in the songs of Indigo Buntings. These proved to be the morphology of individual syllables and the duration of the intervals between them. These are among the least variable aspects of song among individuals, and are therefore presumably of greater value in species recognition, as opposed to individual or neighbourhood recognition.

Indigo and Lazuli Buntings outside the zone of range overlap (see Systematics) ignore each other's songs, but within it song distinctiveness of the two species tends to break down. In the zone of overlap, the two species defend territories against each other and each responds aggressively to the song of the other species. M. C. Baker found evidence that syllable structure, rather than timing, is the key feature used by non-sympatric populations to identify their own species' song. This is despite the fact that timing does differ between the two species, in that intervals between dissimilar songs are longer in Indigo Buntings than in Lazuli Buntings. This finding conflicts to some extent with Emlen's results.

Indigo Buntings seem not to discriminate between the songs of individual birds, although a male will be more likely to countersing with another male that sings similar song themes to his own. In some circumstances, a male may react less aggressively to songs of neighbouring birds than to those of strangers. Male Black-headed Grosbeaks, on the other hand, can distinguish songs of neighbouring males from those of strangers, and, presumably because a stranger is more likely to be a challenger



*Depending on the time of the year and the type of food available, the **Indigo Bunting** can be found foraging at any level, searching the ground for seeds, using perches in bushes to reach the seedheads of tall slender plants, exploring fruiting shrubs for berries or hunting for insects high in the canopy. This bird, a vagrant in the Azores, is making opportunistic use of what may be an unfamiliar food plant. The Indigo Bunting originally depended on naturally occurring disturbances in shrublands and forests for its breeding habitat, but now uses primarily human-created habitats. Over a 16-year study in Vermont, the bird made use of logged clearings and adjacent forest but was never seen in nearby undisturbed forest.*

[*Passerina cyanea*, Corvo, Azores. Photo: Rafael Armada]

than a neighbour on his own territory, will respond more strongly to it.

Because Indigo Buntings learn their songs from adjacent territorial males, the songs of individuals in neighbouring territories may be nearly identical. A song neighbourhood can have as many as 22 males sharing a song theme. Although the same song elements can be found throughout the birds' breeding range, specific sequences of three or more elements are more localized. No such sequences were shared between populations 250 km apart.

Similarly, Varied Buntings develop song neighbourhoods, areas in which neighbouring males share either entire songs or shorter sequences of syllables. Painted Buntings were found to share song "figures". Of 129 figures identified in the songs of 93 individuals of this species from Georgia and Florida, only seven were unique to single birds. Painted Buntings farther west in the USA, at the Welder Wildlife Refuge, in Texas, shared song elements, but not whole songs.

D. M. Schook and his colleagues, who examined song-sharing among Dickcissels, found that males in adjacent territories sang similar songs. Song similarity decreased with distance, especially for the somewhat more complex "cissel" element of the song.

Songs of singing male Northern Cardinals tend to resemble, in terms of syllable structure, syllable choice, use of variant syllables, and the organization of syllables into song types, those of other males in the same locality. The territorial fidelity of Northern Cardinals may contribute to the development and persistence of local dialects. The number of syllables shared among cardinal populations diminishes with distance, although some syllables can be heard throughout North America. Of 27 syllables identified in songs in Ontario, nine were shared with cardinals from Ohio but only four with birds from Mexico and British Honduras. Cardinals are more likely to respond to their own dialect than to songs from more distant regions. They may not respond at all, at least on first hearing, to songs from geographically distant populations.

In Panama, Blue-black Grosbeaks living along wide stretches of the Chagres River near Gamboa cannot hear conspecifics on the other side, and the species sings different dialects on each bank. On nearby Barro Colorado Island, a distinctive Blue-black Grosbeak dialect has persisted unchanged since at least 1964.

Some Indigo Bunting song traditions can persist for twenty years or more, across many generations of the species. The larger the number of birds in a song neighbourhood, the more likely it is to persist. This species' song themes do, however, change in the course of time. Local immigration and the deaths of males singing certain song types are partly responsible. Some first-year males modify the song that they learn from a neighbour, by adding, subtracting or modifying a song element. These modifications are, in subsequent years, learnt by new first-year birds, leading over time to gradual shifts in the local dialect. At the Edwin S. George Reserve, in Michigan, about 60% of Indigo Bunting songs were new in each year from 1979 to 1984. Most of these new songs failed to reappear in the following year, and fewer than 20% were copied by another male.

R. B. Payne estimated the half-life for the survival of songs to be 3·8 years. Survival of a song tradition over time is purely cultural. Because the birds do not learn their songs from relatives, and because females show no preference for males singing their father's song type, the persistence of a song type appears not to depend on any selective advantage that it may confer.

Cardinalids produce a wide variety of non-song vocalizations. According to Skutch, both sexes of the Black-faced Grosbeak give a series of 3–4, or sometimes 5–6, "chip" notes which may be a call or a song, but which differ from a more melodious song given only by the males. At least 13 calls are given by adult Lazuli Buntings, the most commonly used being essentially identical in structure to those of Indigo Buntings. Northern Cardinals have a vocabulary of at least 16 different calls. The calls of the last-named species, unlike its songs, appear not to be learnt; individuals raised in isolation have the same call repertoires as those of wild cardinals.

Non-song vocalizations of Northern Cardinals range from the faint sounds made by hatchlings to a variety of calls associated with specific aspects of adult behaviour. Loud "chip" calls may be used when a predator approaches the nest, or at similar moments of excitement. Female cardinals use the "chip" call primarily when approaching or leaving the nest. Males give a

specific piping call during courtship feeding, and females make quiet "twitter" calls, possibly indicating submission, in the presence of their mate. Black-headed Grosbeaks have a "wheet!" call that they use only when taking flight. Young of this species, from a few days prior to fledging and for several weeks afterwards, give a "phee-oo" call when they sight a parent with food or hear it calling or singing. Dickcissels have a special call given on long flights, including migratory flights, that sounds like an electric buzzer.

The female Lazuli Bunting uses two calls to stimulate nestlings to beg. She gives a "took" call if the chicks do not beg when she arrives at the nest, and a "cheek" call if the "took" does not elicit the correct response. The begging calls of young Lazuli Buntings 2–5 days old are variable and non-specific, but by 7–8 days of age each chick within a nest has its own distinctive "signature" call. Male Indigo Buntings give a buzzy "tseep", audible for only a few metres, when approaching a female for copulation. This call, accompanied by song, is apparently necessary to arouse the female (see Breeding).

Although a number of cardinalids can make audible non-vocal sounds, including the whirring noise produced by the wings of a large flock of Dickcissels in flight, there seem to be no examples of specialized or deliberately made non-vocal sounds in the family.

Finally, turning to the two probable non-cardinalid genera *Parkerthraustes* and *Saltator* (see Systematics), the Yellow-shouldered Grosbeak is vocally distinctive. Its thin, lisping song is quite unlike the songs of true cardinalids, but is reminiscent of that of some tanagers. The vocal behaviour of the saltators appears never to have been studied in detail. Some saltators are notably fine singers, a characteristic that has made them, despite their sombre plumage, popular as cagebirds in South America (see Relationship with Man). The voices of the Black-headed, Lesser Antillean and Streaked Saltators, on the other hand, have been described as being harsh, and the call of the Black-headed has been said also to be "raucous". Songs of Greyish Saltator inhabiting dry and relatively open areas in northern South America are less tonal, and have wider bandwidths and higher frequencies, than those from more heavily vegetated habitats elsewhere within the species' range. Female song has been recorded for the Black-headed and Buff-throated Saltators.

Black-throated Saltators, which have a warbling song unlike that of other members of the genus, may sing together as a group during the early hours of the morning. Pairs of Greyish and Buff-throated Saltators sing antiphonal duets. A phrase of three or four syllables given by one individual is replied to with a similar phrase, and the process is repeated many times over. Skutch heard one female Buff-throated Saltator deliver both parts of this duet while approaching her nest. A longer and more powerful song is apparently given by the male alone, either from an elevated song perch or within cover. A rarely heard whisper song, given just before sunrise, is apparently addressed by the male to his mate.

Streaked Saltators generally sing from a lower perch than those preferred by the Buff-throated Saltator. Skutch described a flight display by the former, given at dusk, in which the bird rises in a circling flight to about 30 m into the air, singing loudly, before diving back into the shrubbery. Skutch never observed such a display performed by the three other saltators that he studied, namely the Buff-throated, Black-headed and Greyish Saltators. Black-throated Saltators sing in horizontal flight from one tree to another across the savanna, and Green-winged Saltators likewise sing in flight from tree to tree.

In the upper Térraba Valley, in Costa Rica, both Buff-throated and Streaked Saltators begin singing early in the year. They sing most persistently from the end of March until the beginning of the rainy season, in early June. Buff-throated Saltators also sing actively, mostly at dawn, during July and August, but they rarely do so from September onwards.

The songs of some saltators vary geographically, a fact well known to Brazilian cagebird-fanciers. Skutch noted that Buff-throated Saltator song can vary considerably even between individuals living not many kilometres apart. Moreover, Black-throated Grosbeaks may not recognize the songs of conspecifics that sing in a different dialect.

Food and Feeding

Cardinalids are, by and large, opportunistic omnivores. Plant material, including fruits, flowers, buds, stems, seeds and occasionally nectar, normally represents a higher bulk in the diet than



*The diet of the **Greyish Saltator** appears to vary quite markedly in different parts of its enormous range. Birds studied in Argentina were omnivorous, eating both seeds and insects. But in the* llanos *(seasonally flooded plains) of Venezuela, Greyish Saltators were found to feed almost exclusively on plant tissues, including a wide variety of fruits, leaves, flowers, flower buds, leaf buds, seedpod skins and tendrils from 49 plant species. The Venezuelan birds spent very little time in foraging (5% and 17% of the time in the rainy and dry seasons, respectively) and around 50% of their time was dedicated to resting.*

[*Saltator coerulescens coerulescens*, Mato Grosso, Brazil. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]



*The **Black-thighed Grosbeak** usually forages fairly high up in trees, gleaning items from the tips of branches and occasionally descending to middle levels. Although this species appears not to have been previously recorded as eating buds, the congeneric Rose-breasted Grosbeak* (Pheucticus ludovicianus) *is known to take the leaf buds and emerging and young leaves of various trees. Leaf and flower buds can be a seasonally important food for many cardinalids and saltators: in Brazil, flower buds made up almost 37% of the diet of Black-throated Saltators* (Saltator atricollis) *in Minas Gerais.*

[*Pheucticus tibialis*, Monteverde Forest Reserve, Costa Rica. Photo: Michael & Patricia Fogden]

animal matter. Black-backed Grosbeaks near Bogotá, Colombia, have been recorded foraging in the upper levels of arboloco trees (*Polymnia pyramidalis*), taking flowers and seeds and capturing insects from both flowers and the trunk. Northern Cardinals in Florida take nectar on occasion, and Yellow Grosbeaks in Mexico have been recorded as destroying flowers of *Erythrina oliviae* in order to rob them of nectar.

Some cardinalids are primarily arboreal foragers, while others, such as the Northern Cardinal and Painted Bunting, spend considerable time feeding on the ground. Indigo Buntings, Dickcissels and other smaller species take seeds from grasses and herbaceous plants. A single species, for example the Indigo Bunting, may hunt for seeds and insects on the ground, explore fruiting shrubs for berries, and forage for insects high in the canopy.

In a recent worldwide survey of fruit-eating by birds, W. D. Kissling and his colleagues classified the Black-faced, Crimson-collared and Red-and-black Grosbeaks and the Orinocan Saltator as frugivores. Most other cardinalids are at least partially frugivorous; perhaps only the Dickcissel rarely, if ever, eats fruit, although there are no data on frugivory for the Vermilion Cardinal, nor for the Yellow-shouldered Grosbeak and some saltators.

In 1908, W. L. McAtee published a thorough survey of the stomach contents of species of *Cardinalis* and *Pheucticus* native to the USA. For Northern Cardinals, he found wild grape (*Vitis*) to be the most important food item, the birds crushing the seeds as well as devouring the fruit. McAtee found that grape seeds constituted 17% of the Northern Cardinal's diet between November and April. Northern Cardinals in southern Ontario have been observed to crack and eat seeds of the riverbank grape (*Vitis riparia*).

Pyrrhuloxias eat the fruits of the christmasberry cholla (*Opuntia lepticollis*). Rose-breasted Grosbeaks in Pennsylvania are major consumers of elderberry (*Sambucus*) fruits, being second only to Scarlet Tanagers (*Piranga olivacea*) in this respect. Rose-breasted Grosbeaks are almost entirely frugivorous on migration, fruit amounting to 96% by volume of faecal samples taken at an autumn migration site on Block Island, in the US state of Rhode Island, although they take both fruits and insects on their wintering grounds in Costa Rica.

Yellow Grosbeaks observed in Jalisco, in western Mexico, commonly took fruits of the fig *Ficus pertusa* and of the hoop vine (*Trichostigma octandrum*), but visited *Recchia mexicana* more rarely. Both Black-faced and Blue-black Grosbeaks at La Selva Field Station, in Costa Rica, have been noted taking fruits of *Ficus pertusa*. The Black-faced Grosbeak usually ate at least three fruits on each visit, with a mean 3·14 fruits over seven visits during two days, and it may be an important seed-disperser of this species. Fruit, however, appears insufficient to satisfy the protein requirements of these two species; T. C. Moermond and J. S. Denslow found that, unlike birds of purely frugivorous species, captive individuals of these grosbeaks, when fed on a fruit diet, lost weight if they were not given a protein supplement.

Fruit-eating cardinalids, like tanagers and emberizid finches, mash fruits in the bill, separating larger seeds from the pulp and ejecting them before swallowing. Mashing behaviour increases the processing time, but it allows fruit-eating birds to take larger fruits than those which they could comfortably swallow whole, and also avoids the inconvenience of having to carry large, indigestible seeds in the gut. Captive Black-faced Grosbeaks observed by D. J. Levey handled 3–5 small fruits at a time, crushing them for more than a minute and sucking the juices, before ejecting a dry mass of seeds from the bill.

The size and hardness of seeds to some extent determines which ones cardinalids include in their diets. Even the heavy-billed Blue-black Grosbeak cannot handle the hard seeds of *Heliconia*, but both it and the Black-faced Grosbeak can and do crack the smaller seeds of *Psychotria brachiata* (Rubiaceae). The arillate seeds of a number of tropical plants attract cardinalids, as well as other bird species. Black-faced Grosbeaks, for example, eat the large red arils of *Stemmadenia donnell-smithii* (Apocynaceae). Skutch recorded this species feeding on the arils of *Alchornea costaricensis* (Euphorbiaceae), and Blue-black Grosbeaks eating the oil-rich arillate seeds of *Siparuna nicaraguensis* (Monimiaceae), plucking the seeds one by one from the pale red inner surface of the receptacle. Skutch also noted that wintering Rose-breasted Grosbeaks took the arils of five species of Costa Rican plant.

In Middle America, Blue-black Grosbeaks visit multi-crop fields known as "milpas" to feed on crops of maize, as well as



*The **Greyish Saltator** is found in a range of habitats, including forest edge and second growth, dry scrub, and gallery forest. It forages mostly in the upper levels of vegetation. Eating the mature leaves of woody plants is relatively unusual among small passerines, but folivory has been reported for at least seven* Saltator *species. During the dry season in the Marumbi State Park (Paraná), in Brazil, when fruit was hard to come by, leaves from ten species of woody plant accounted for 91% of the food items taken by saltators. Leaves provide poor nutritive value relative to their bulk, which may partly account for the long periods of inactivity noted for Greyish Saltators in Venezuela.*

[*Saltator coerulescens coerulescens*, Corrientes, Argentina. Photo: Darío Podestá]

visiting rice fields in wooded zones. Painted Buntings are primarily ground-foragers and seed-eaters. Analyses of the stomach contents of individuals from Florida and Texas showed that 70–73% of the diet consisted of seeds, including those of grasses and other plants. Lazuli Bunting diets are lower in seeds, which constituted only some 30% of plant matter in stomachs of this species in California.

Northern Cardinals are efficient in digesting seeds, although less so than some emberizid sparrows that specialize on seeds to a greater degree. According to a number of metabolic studies, cardinals are able to extract 75–84% or more of the utilizable energy from sunflower seeds (*Helianthus*), 85% from millet, 84% from sorghum (*Sorghum*), 79% from hemp (*Cannabis*) and 77% from ragweed (*Ambrosia*) seeds.

Cardinalids take varying amounts of animal prey, usually insects and other arthropods but, very occasionally, larger items. A Northern Cardinal, for example, has been seen to eat a field-mouse (Cricetidae). They may increase the proportion of animal prey in the diet during the nesting period. According to McAtee, animal matter normally amounts to some 30% of the diet of Northern Cardinals, but rises to as much as 78% in May, when the birds are nesting. Rose-breasted Grosbeaks also shift from a preponderance of plant material outside the breeding season to a diet of almost 75% animal matter while nesting. In north-eastern Venezuela, 83% of emetic stomach samples taken from Vermilion Cardinals contained the remains of invertebrates, while 48% contained fruits and 84% held seeds.

Blue Grosbeaks at five nests observed by F. J. Alsop in Tennessee fed their nestlings almost exclusively with large mantids (Mantidae) in excess of 75 mm in length, from which the adults had removed the head, wings and most or all of the legs. These insects accounted for more than 96% of items delivered to the chicks. Female grosbeaks, followed by their mates, plucked the mantids from weedy vegetation while in short or hovering flight, or while hopping on the ground.

Indigo and Lazuli Buntings glean insects and spiders (Araneae) from the foliage of trees and shrubs, and Blue Buntings have been seen to peck at spider webs. In Hawaii, introduced Northern Cardinals hunt flying termites (Isoptera) in mid-air. Rose-breasted Grosbeaks are acrobatic feeders, capable of hanging upside-down from the ends of fine branches or pursuing flying insects on the wing. Individuals as young as 47 days have been seen to catch insects in the air. Females of this species hunting insects in New Hampshire foraged higher in trees than males, while males attacked prey on trunks and branches more often than females, a pattern exhibited also, interestingly, by Scarlet Tanagers. Grosbeaks treat animal food much as they do fruits, mashing and tenderizing it in the bill before swallowing.

Yellow Grosbeaks are rare components of mixed foraging flocks in western Mexico. Farther south, on Cerro Pirre, in east Panama, flocks of 6–10 individuals of the localized subspecies *simulans* of the Yellow-green Grosbeak regularly joined canopy flocks of New World warblers, tanagers, foliage-gleaners (Furnariidae) and woodcreepers (Dendrocolaptidae). They also foraged on their own, moving quickly through upper, outer branches, searching bark and foliage. Yellow-green Grosbeaks are common in mixed foraging flocks in Amazonian Brazil. Their congener the Black-faced Grosbeak associates in feeding assemblages that may consist of 30 or more individuals. Moermond has suggested that these large assemblages are the product of several "feeding units", presumably family groups, which join together (see Breeding). They have been recorded searching for arthropods in curled-up dead leaves.

One of the few cardinalids with a considerably higher recorded proportion of animal material than plant matter in the overall diet, in McAtee's analysis 65% as against 34%, is the Black-headed Grosbeak. This species and the Black-backed Oriole (*Icterus abeillei*) are the major avian predators of overwintering monarch butterflies (*Danaus plexippus*) in Mexico. Particularly on cooler days, when the insects are less active, the two bird species attack the butterflies in synchronous waves, acting as a single large mixed flock. L. S. Fink and L. P. Brower showed in experiments that the grosbeaks, unlike the orioles, appear immune to the emetic properties of the butterflies' cardenolide defences. Although the grosbeaks are eventually affected by the cardenolides, they are nonetheless able to consume the butterflies in large numbers, and may take more than the orioles. The birds prefer male butterflies, which have lower





The nectar of the ocotillo (Fouquieria splendens) *provides a seasonally important food source for resident desert species such as the* ***Pyrrhuloxia*** *(above) and a refuelling opportunity for Neotropical migrants such as the* ***Black-headed Grosbeak*** *(below). The blooming of the ocotillo in the Sonoran and Chihuahuan Deserts coincides with the spring passage of a number of hummingbird species (Trochilidae), and the long red tubular flowers appear to be adapted to pollination by hummingbirds. Cardinalids, with their shorter bill, rob the flowers by plucking them, consuming the nectar and discarding the rest of the tough and indigestible flower. In Arizona, 26% of Pyrrhuloxia records come from semi-arid grasslands and Chihuahuan desert scrub that includes ocotillo, acacia* (Acacia), *soaptree yucca* (Yucca elata) *and scattered mesquite* (Prosopis). *A further 38% of records come from Sonoran desert-scrub associations, including saguaro* (Carnegiea), *paloverde and other cacti, and leguminous trees. The Pyrrhuloxia also visits saguaro cacti in bloom for its nectar and pollen.*

[Above: *Cardinalis sinuatus fulvescens*, SE Arizona, USA. Photo: Dave Maslowski/ Maslowski Productions.

Below: *Pheucticus melanocephalus*, Arizona, USA. Photo: John Sorensen]



Several members of the genus Pheucticus *consume flowers or rob them of their nectar. The* ***Golden-bellied Grosbeak*** *is seen here foraging on the flowers of* Bougainvillea *by plucking them. The closely related Yellow Grosbeak* (Pheucticus chrysopeplus) *takes nectar from the bird-pollinated* Erythrina oliviae *in Mexico, destroying the flowers in the process.* Pheucticus *species have also been recorded as chewing and dropping banana flowers. Black-headed Grosbeaks* (P. melanocephalus) *visit agave flowers for nectar and have also been seen to feed on sugar solution at hummingbird feeders.*

[*Pheucticus chrysogaster chrysogaster*, Jorupe, Ecuador. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]

cardenolide levels than females, and they may distinguish the sexes by taste during a preliminary bite. Brower and W. Calvert have suggested that the pattern of synchronous attacks on the butterflies by grosbeaks and orioles may be maintained by cultural transmission from one generation to the next.

Dickcissels studied in Kansas, in the central USA, hunted through lower vegetation in search of insects or seeds, including grains of wheat. Throughout the breeding season they spent 17–21% of their time each day in foraging (see General Habits). Males devoted most of their time to feeding in forbs, where insects, particularly grasshoppers (Orthoptera), were more abundant than they were among grasses. R. L. Schartz and Zimmerman have estimated that Dickcissels need to eat 23 grasshoppers per hour to supply their energy requirements. There may be an increased peak of feeding activity in the evening if the temperature drops below 10–15·5°C, presumably to supply extra energy for temperature regulation during the night.

On the wintering grounds in Venezuela, Dickcissels formerly foraged on native grasslands, but they now gather in often enormous flocks that descend on local rice and sorghum fields, as well as feeding in fallow agricultural fields with abundant wild grasses such as *Rottboellia cochinchinensis* and *Oryza latifolia* (see also Movements, and Status and Conservation). Although Dickcissels may prefer wild grains such as millets (e.g. *Echinochloa*) over cultivated ones, rice and sorghum now make up some 80% of the birds' winter diet. Basili and Temple recorded that the birds fed in the morning and afternoon, but rested during the day. The longest feeding bouts involved feeding on immature green sorghum, one female eating 52 seeds in 241 seconds and the male 80 seeds in just under 290 seconds. Basili and Temple estimated that the 6,450,000 or so Dickcissels wintering in Venezuela eat 4,442,760 kg of rice seeds, 2,300,070 kg of sorghum seeds and 1,677,000 kg of wild grass seeds in the course of a single season, figures that nonetheless amount to no more than between 0·74% and 1·35% of the total crop.

Leaf-eating, folivory, is uncommon among small birds, presumably because of the lower ratio of nutritive value to bulk in a leaf diet. Indigo Buntings in Michigan eat leaves of aspen (*Populus*) and other trees on first arrival in spring, but not later in the season when other foods are more readily available. G. M. Sutton recorded Crimson-collared Grosbeaks in Mexico "munching" leaves of mullein nightshade (*Solanum erianthum*).

Folivory is much better documented for some saltators. Leaf-eating has been reported for Buff-throated and Black-headed Saltators in Costa Rica, Greyish Saltators in Costa Rica and Venezuela, Rufous-bellied Saltators in Bolivia, Masked Saltators in Colombia, Green-winged and Thick-billed Saltators in Brazil, and Orinocan Saltators in Venezuela. Moreover, E. S. Munson and W. D. Robinson have suggested that the Thick-billed Saltator, a primarily Brazilian species, may be an obligate folivore, the only one so far known among the Passeriformes. Leaves from ten species of woody plant, particularly the tree *Piptocarpha angustifolia* (Asteraceae), accounted for 91% of the food items taken by the species in the Marumbi State Park, in Paraná, during August, admittedly at the height of the dry season when fruits, which the birds perhaps eat at other times, are harder to come by. These saltators worked plucked leaves slowly back and forth through the bill, folding them lengthwise and pinching them until they formed small, mashed balls suitable for swallowing. The processing time was 5–26 seconds per leaf.

In the *llanos* of Venezuela, Greyish Saltators were found to feed almost exclusively on plant tissues, including a wide variety of fruits, leaves, flowers, flower buds, leaf buds, seedpod skins and tendrils from 49 plant species. Fruit and mature leaves made up, respectively, 36% and 28% of the diet. The birds defecated the intact seeds of fruits. During the dry season, when deciduous plants lost their leaves, the saltators ate a higher proportion of flowers and seedpod skins. When offered a choice, captives strongly preferred fruits over leaves or flowers, and wild leaves over cultivated leaves.

Leaves and flowers may provide birds with nutrients, such as the elements calcium and phosphorus, that are scarce in fruits. Leaf-eating saltators, unlike larger obligate folivores such as the Hoatzin (*Opisthocomus hoazin*), appear not to retain food in the gut for long enough to ferment plant fibres. They appear to have adopted, instead, a "skimming" strategy, substituting rapid food intake and processing for more efficient digestion. Rodríguez-Ferraro and her colleagues found that captive Greyish Saltators retained leaves in the gut for an average of only 45 minutes, even less time than they did fruits, which were kept in the gut for a

mean of 54 minutes. They found no evidence that the birds could break down cellulose fibres. Presumably, the birds satisfied their energy requirements, to the extent that they were able, from soluble materials in leaf cells. This may not be enough for an active life. Captives spent 50% of their time in resting, and, in a study by C. Bosque and his colleagues, both Greyish and Orinocan Saltators, which have a similar diet but take fewer leaves and a higher proportion of flowers, had lower basal metabolic rates than would be expected for birds of their size.

Saltators in general are mostly frugivorous, although they will also take nectar and may include arthropod prey in their diets. Golden-billed and Greyish Saltators in the Paraná Valley, in Argentina, consume a wide range of foods, with seeds predominating, particularly those of *Solanum amygdalifolium*; they also take insects, primarily leafcutter ants of the genus *Acromyrmex*. The diets of the two species overlap broadly. Both appear to be opportunistic feeders, seasonal shifts in diet by the Golden-billed Saltator being due largely to the high availability of *Solanum* seeds in the austral spring.

Streaked Saltators in Venezuela consume both fruits and seeds of columnar cacti (*Stenocereus*). In Costa Rica, Buff-throated, Black-headed and Greyish Saltators feed primarily on fruits when not breeding, but switch almost exclusively to arthropods when feeding nestlings. Buff-throated and Greyish Saltators also eat the corollas of flowers, and Buff-throated and Streaked Saltators feed on the arillate seeds of a number of Costa Rican plants, including *Protium* (Burseraceae).

Buff-throated Saltators have been seen to eat army ants (Ecitoninae), and ants have been recorded in their stomach contents. This was the third most commonly seen species attending army-ant swarms in Yacambú National Park, in Venezuela, in 2006. Rodríguez-Ferraro observed Greyish Saltators in Venezuela as they caught insects in July and September, when they were feeding chicks and moulting the body and wing feathers. Unusually, a mist-netted Black-headed Saltator in Costa Rica was found to have eaten part of a hummingbird (Trochilidae) adjacent to it in the net.

At least one member of the genus, the Green-winged Saltator, is primarily an insect-eater. This species has been observed while feeding at a swarm of emerging winged termites, and, with Black-throated Grosbeaks, joining mixed-species foraging flocks in Atlantic rainforest. The Green-winged Saltator complements its diet with fruits, and has been seen to swallow fruits of *Eugenia* and *Solanum granuloso-leprosum*, and to glean fruits of *Psychotria brasiliensis* (Rubiaceae), crushing them with the beak turned upwards. Black-throated Saltators studied by C. Gomes de Almeida in Minas Gerais, in Brazil, foraged in small groups of, on average, three individuals, mostly on the ground or in low vegetation. Their diet consisted of 40% seeds, 36·9% flower buds and 13·8% fruit, as well as small numbers of invertebrates.

It has been suggested that the Rufous-bellied Saltator may be dependent on mistletoe berries of the genus *Tristerix*, but this species has been recorded also as taking fruits of a number of other plants, including *Berberis* and *Heteromelas*, as well as insects and seeds. An individual observed in Salta, in Argentina, fed mostly on *Brachyotum* berries, but also consumed young leaves of an introduced willow (*Salix*) and took young grass shoots from the ground.

The Masked Saltator may be a specialist on the cones of *Podocarpus oleifolius* (see Status and Conservation). J. A. Tobias and R. S. R. Williams found this species to be a component of mixed flocks of tanagers and chlorophonias visiting *Podocarpus* stands in the Andes of southern Ecuador. The birds often lingered for long periods in the canopies of podocarps, feeding on the cones, and the observers never saw them take any other kind of food. L. M. Renjifo, who observed what may be a distinct population of the species in Colombia, did record it taking other types of fruit, though in much smaller quantities. When eating



Although primarily a ground-feeder, the ***Orange-breasted Bunting*** *has been recorded as visiting the flowers of the liana* Combretum fruticosum *in a tropical dry forest in south-western Mexico, and is seen here feeding upon the flowers of a similar species. In contrast to the five* Passerina *species occurring in the USA, which are comparatively well studied, little is known of the ecology of the Orange-breasted Bunting and its congener in Mexico, the restricted-range Rose-bellied Bunting* (Passerina rositae). *It is not known, for example, why in Chiapas, in Mexico, the Orange-breasted Bunting occupies only a minor proportion of apparently suitable habitat.*

[*Passerina leclancherii*, Mexico. Photo: Roy de Haas/ AGAMI]



*Throughout the breeding season, the **Dickcissel** spends 17–21% of the time each day in foraging, flitting through lower vegetation in search of seeds and insects. In winter, its diet is more vegetable-based. Although Dickcissels may prefer wild grains, cultivated grains such as rice and sorghum (shown here) now make up some 80% of the birds' winter diet. The longest feeding bouts recorded in a study on the wintering grounds in Venezuela involved feeding on immature green sorghum. One female ate 52 seeds in 241 seconds, and a male 80 seeds in just under 290 seconds. Unlike most other cardinalids, the Dickcissel rarely, if ever, eats fruit.*

[*Spiza americana*, Harlingen, USA. Photo: Daniel Dupont]

Podocarpus cones, which they do at all times of year, the saltators concentrated on the seeds, discarding the fleshy red peduncle that attracted other birds.

The little-known Yellow-shouldered Grosbeak, the sole member of the genus *Parkerthraustes* and, like *Saltator*, probably not closely related to other members of this family (see Systematics), apparently forages as single individuals in the company of other canopy birds. It gleans items from foliage near the ends of branches.

So far as is known, "typical" cardinalids drink in the manner normal for most bird species, scooping up liquid in the bill and tilting the head upwards to swallow. Indigo Buntings drink only infrequently, but Varied Buntings do so occasionally, sometimes in groups, and Lazuli Buntings drink dew and rainwater from vegetation. Saltators are capable of suction-drinking, sucking liquid into the mouth, an ability otherwise unknown in the Cardinalidae, although Rose-breasted Grosbeaks have been seen to make throat movements while the bill is immersed in water. Suction-drinking is documented for many tanagers, among which it may have evolved as an adaptation for eating succulent fruits.

Breeding

Little information is available on the mating system of Neotropical members of the family. Indeed, the breeding behaviour of the Red-and-black Grosbeak, the sole member of the genus *Periporphyrus*, remains completely unknown. One Neotropical species, the Black-faced Grosbeak, may breed co-operatively, and the same presumably may apply to its congener, the Yellow-green Grosbeak, although the latter's breeding habits have not been studied. Skutch recorded that parent Black-faced Grosbeaks feeding the young were assisted by helpers, and Moermond observed groups of adults attending young in the nest at La Selva, in Costa Rica. Although the groups contained six to eight individuals, only four fed or defended the chicks. Moermond suggested that social organization in this species may consist of a breeding pair with one or two helpers, presumably offspring from earlier broods, accompanied by less closely related "hangers-on".

There is a single record of a Northern Cardinal nest shared by two females, one an albino, both apparently mated to a single male, and one record of a bigamous male in Ohio provisioning two independent nests and successfully fledging young from both. There are also at least two records, including a recent one from Oklahoma, of a single nest being occupied by two females, each mated to a different male. These appear to be incidents of nest-sharing, rather than co-operative breeding, although in the Oklahoma case one male fed all three nestlings.

All North American cardinalids with the exception of the Dickcissel are primarily monogamous, though with varying degrees of polygyny in some species. The Blue-black Grosbeak of Middle and South America, both sexes of which build the nest and feed the young, may likewise be monogamous. There is no evidence of any polygynous behaviour, including extra-pair copulations, by Black-headed Grosbeaks and Varied Buntings. Only 3·7% of male Lazuli Buntings in western Montana had more than one mate at a time, and none changed its mate over the course of the season. Indigo Buntings have been characterized as polygynous, although most males have only one mate per season. At different sites in Michigan, 8·8–19·2% of breeding males had two, or even three or four mates, either simultaneously or in sequence. In Indiana, Indigo Buntings holding higher-quality territories, with high vegetation density and lush ground cover, were more likely to be polygynous. Polygynous males were just as successful at fledging young as monogamous males, suggesting that polygyny, if it can be achieved, confers an advantage. As males take only a limited role in caring for their young, females do just as well in terms of reproductive output when mated to a polygynous male as they do with a monogamous one.

Birds will occasionally mate outside their social pair, and females may settle on territory whether or not the male occupying it is mated. A female Indigo Bunting may make no effort to prevent her partner from mating with another, although the Paynes recorded a case in which, after a new female Indigo Bunting mated with a returning male on his old territory, nested and laid eggs, the female of the previous year arrived and repeatedly chased the new one until she abandoned her nest. After her victory, the old female nested in her turn.

Dickcissels are polygynous, the male mating with up to six females, although males on poorer territories may go without a mate, and a variable proportion of males in a population will have only one partner. The number of females with which a male

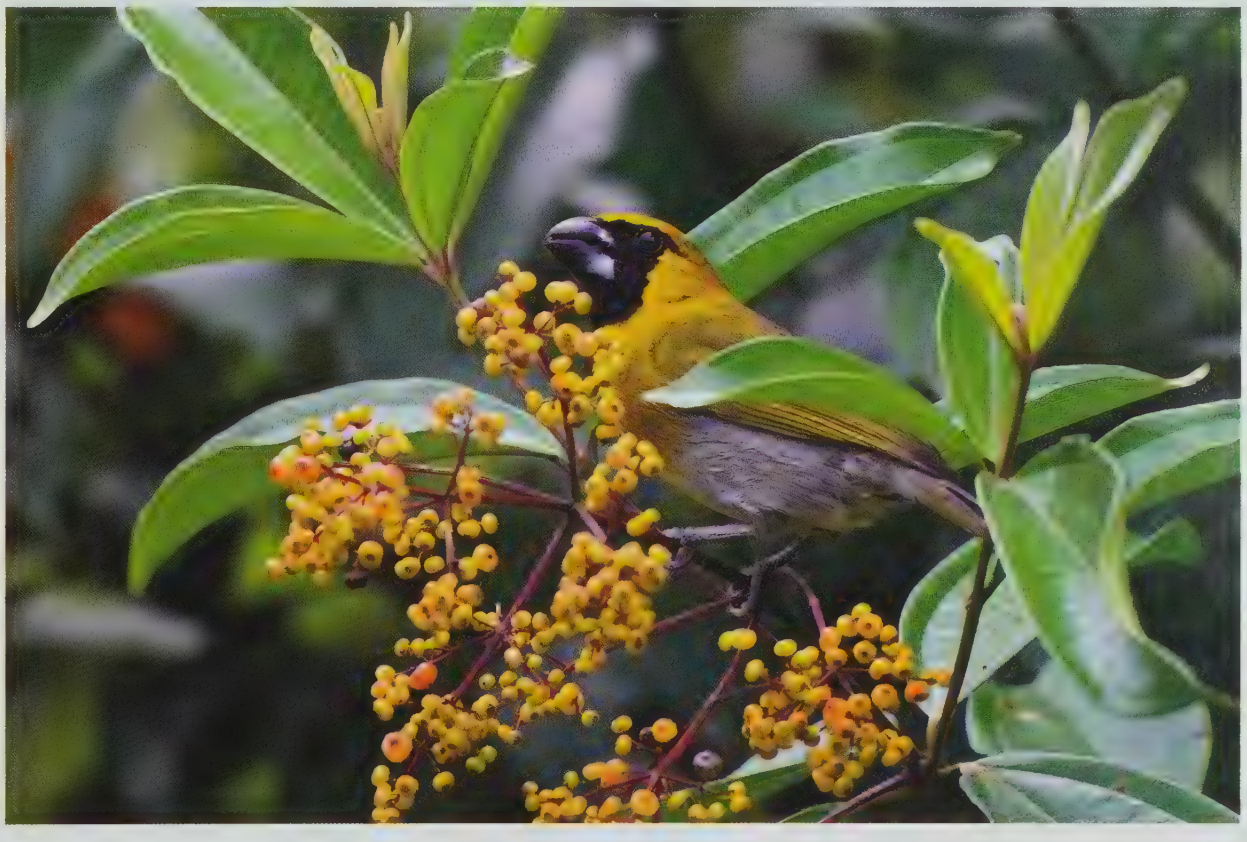


The few published data on the food and feeding of the ***Golden-bellied Grosbeak*** *include an analysis of the stomach contents, which found "purplish berries". Here, indeed, the bird is feeding on the purplish berries of the chaquirón tree* (Pithecellobium excelsum). *The Yellow Grosbeak* (Pheucticus chrysopeplus), *sometimes considered conspecific with the Golden-bellied Grosbeak, commonly takes fruits of the fig* Ficus pertusa *and the hoop vine* (Trichostigma octandrum) *in Jalisco, in western Mexico.*

[*Pheucticus chrysogaster chrysogaster*, Chaparri Ecological Reserve, N Peru. Photo: Heinz Plenge]

is likely to mate depends upon the quality of his territory, measured in terms of the number of possible nest-sites that it contains (see Habitat). E. J. Finck found that Dickcissels on prime territory in Kansas spent more time in territorial display than those on less suitable areas, but the amount of time that they put in was not related to the number of females they managed to attract. Instead, the primary purpose of territorial display appears to be defence against other males. Competition for optimal territories appears to be intense. If a territory-holder in Finck's study area disappeared, it was replaced within a couple of days.

Pair-bonds of cardinalids may be short-term arrangements, or, as has been recorded for Northern Cardinals and Varied Buntings, they may be maintained for repeated nesting through the breeding season or even into succeeding years. Northern Cardinals usually join flocks in the winter months, but pair-members in Tennessee remain together and on territory throughout the year.



Fruits eaten by the ***Black-faced Grosbeak*** *include the berries of* Hamelia, *shown here at their pre-ripe yellow stage. Captive Black-faced Grosbeaks were observed to handle 3–5 such small fruits at a time, crushing them for more than a minute and sucking the juices, before ejecting a dry mass of seeds from the bill. Small seeds were usually ingested, but, as seed size increased, the proportion of dropped seeds increased until, at about 4 mm, almost all seeds were dropped. Two cardinalid species, the Black-faced Grosbeak and the Blue Bunting* (Cyanocompsa parellina), *were among the three bird species that between them took 5% of all the fruit from a strangler fig* (Ficus) *in rainforest in Mexico.*

[*Caryothraustes poliogaster*, San Gerardo de Dota, Costa Rica. Photo: Paul Bannick]



Second only to the Scarlet Tanager (Piranga olivacea), *the* ***Rose-breasted Grosbeak*** *is a major consumer of elderberry* (Sambucus) *fruits in the north-eastern United States (Pennsylvania) and adjacent parts of Canada. Red elderberry* (Sambucus racemosa pubens), *typically found in forest gaps, is among the earliest woody plants to fruit in this region and is available to forest birds between mid-June and mid-July, while they are still nesting. Each fruiting plant typically has 20–50 clusters of fruit, with about 200 individual fruits per cluster. The glowing red fruits are small (3–5 mm) and juicy (as can be seen from the explosion of juice from this bird's bill), and have a relatively high energy content of 68·8 kcal/100 g. The fruit is eaten as soon as it ripens, and bushes are often completely depleted within a week to ten days. The Rose-breasted Grosbeak is almost entirely (96% by faecal content) frugivorous on migration, a dramatic shift from a diet that is about 75% insect-based during breeding. A study of migratory birds in Rhode Island, also in the north-eastern USA, found that omnivorous species which shifted their dietary intake to more than one-third fruit put on weight much faster than did those that remained mostly or strictly insectivorous. The extent of frugivory for a species was positively correlated with average change in energetic condition and fat score per day, while insectivorous species on average declined in energetic condition during their stopover.*

[*Pheucticus ludovicianus*, Saint-Lambert, Québec, Canada. Photo: Daniel Dupont]



*For the **Northern Cardinal** in the USA, the wild grape* (Vitis) *is the most important food item during the autumn. The birds continue to eat the grapes so long as any partly dried fruit remains. As their preferred fruit becomes exhausted, however, they turn to others which they previously ignored. In a study in Ohio between 18th September and 12th November 1993, 54% of fruits consumed were wild grapes, 15% rose hips* (Rosa multiflora), *8% honeysuckle* (Lonicera) *and 23% other fruits, including hackberry* (Celtis occidentalis) *and wild cherry* (Prunus serotina).

[*Cardinalis cardinalis cardinalis*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]

Partners may leave wintering flocks together, but it is not known whether these are individuals that were mated in the previous season or whether they have paired up over the winter. C. T. Perdue reported Northern Cardinals courtship feeding all year around, and suggested that this might reinforce the pair-bond. However, such behaviour has apparently not been observed by others, and is presumably rare. It is possible that some Painted Buntings pair on their wintering grounds in Costa Rica, as partners have been seen together there. Males usually arrive on the breeding grounds in advance of females, and it seems more likely that most pair formation takes place after arrival.

With Pyrrhuloxias the pair-bond tends to break down in late summer, but pair-members have been seen to be associating with each other in winter and it is possible that some bonds survive to the following season. Indigo Bunting mates separate after the completion of the breeding season, but roughly half of females whose males return in the next spring will reunite with their previous partner. The Paynes have recorded Indigo Bunting partners that bred together for as long as five years, although this may be less a reflection of a long-term pair-bond than of the fact that each member of the pair returned to the same territory. The act of reuniting with an old mate did not improve or reduce a female's nesting success. Some 11% of pairs broke up after the first breeding attempt, after which the female moved to a new territory and nested again with another male. She was more likely to do this if she had been successful in her first attempt, and she sometimes took her first brood with her to the new territory.

Dickcissels pair quickly once a female arrives on a male's territory. Similarly, female Black-headed Grosbeaks may select mates within hours of arriving on the breeding grounds, and it is possible that some pair before arrival, which may also be true for Rose-breasted Grosbeaks. Female Indigo Buntings, on the other hand, have been recorded spending as long as 34 days on a male's territory before completing a nest, suggesting that pair formation can sometimes be protracted. It has been suggested, however, that the birds might simply be postponing nesting because cowbirds are present in the area, or due to poor weather.

Pair-bonding itself is initiated with a series of courtship displays. Those of the Northern Cardinals include song flights in which the male, with the crest raised and the breast feathers fluffed, flies towards the female while singing, and alights near her. Aerial chases may follow. Males and females join in countersinging, and, in later stages, courtship feeding, during which the female assumes a submissive begging posture. Displays may show off carotenoid feather ornaments, including the breast feathers of males and the underwing-coverts of females, in the latter case an ornament that is normally not visible. These include lopsided displays in which the bird twists and angles its body to show off the feathers on its underside, including the underside of the tail, and often lifts the uppermost part of the wing away from the body.

North American cardinalids are particularly aggressive during the early part of the breeding season, when territories are being established. Males frequently chase each other in territorial disputes. Female Rose-breasted and Black-headed Grosbeaks are also aggressive towards one another during the breeding season. Male Lazuli Buntings are especially aggressive towards other males during pair-bonding, and also in the days preceding egg-laying, when females solicit copulation and their mates guard them. Chases can last for ten minutes as males pursue each other, flying through vegetation or spiralling into the air.

Male Dickcissels chase other males that fly across their territory, individuals taking up the pursuit as the flying intruder crosses one territory after another. Chases sometimes lead to physical combat as the birds grapple with each other, pecking at each other's eyes or pulling out feathers. Dickcissels encountering each other at territorial boundaries may drop to the ground and approach each other closely, flank to flank. Encounters end with a "winner" flying to a tall perch, while the "loser" squats in a submissive posture. Black-headed Grosbeaks and Painted Buntings have been recorded fighting to the death with conspecifics. In contrast, there are no documented observations of Varied Buntings fighting one another, although this species will engage in mutual chases.

In addition to chases and fights, cardinalids express their aggression through an array of agonistic displays. These can include wing-flicking, tail-spreading and other actions. Pyrrhuloxias in territorial encounters raise the crest and fluff up the plumage. A simi-



The mostly ground-feeding and seed-eating ***Painted Bunting*** *will eat fruit such as these mulberries* (Morus) *opportunistically. Like other omnivorous migrants, however, Painted Buntings may also increase the proportion of fruit in their diet after breeding, to build up energy reserves for the journey south. Although data on the winter diet are scant, they have been seen to feed on fruits such as figs* (Ficus)*, alongside other Neotropical migrants.*

[*Passerina ciris pallidior*, Galveston County, Texas, USA. Photo: Brian E. Small]

lar display by Northern Cardinals is used for expressing fear or submission. Both Pyrrhuloxias and Northern Cardinals lower the crest before or during proper chases or attacks. Similarly, Rose-breasted Grosbeaks raise and ruffle the crown feathers, but are more likely to flee than to attack when in this posture. At higher intensity, when an attack is more likely, the feathers are sleeked.

During the breeding season, all North American cardinalids establish and defend territories that include both nesting and feeding areas. Whether this is invariably true in Middle and South America is not known, although Black-faced and, possibly, Yellow-green Grosbeaks are apparently not territorial. No cardinalid is known to be territorial outside the breeding season.

Males generally establish their territories early in the breeding season. Northern Cardinals may do so as early as January, and may defend territories for seven months. Male Pyrrhuloxias become aggressive as their winter flocks break up, while females remain sociable for longer. Lazuli Buntings establish their territories within a week of arrival on the breeding grounds, and all available territories are rapidly occupied during the first two weeks of the breeding season. A returning territory-holder will usually evict another male "squatting" on his territory, and young birds are unlikely to gain a territory until one of the older males fails to return. Early-arriving Painted Buntings settling on optimum territories are also likely to be evicted by former territory-holders once they arrive on the breeding grounds.

The measure of territory quality may vary from species to species. In the case of Dickcissels, quality is determined by vegetation profile (see Habitat), whereas for Painted Buntings on St Catherine's Island, in Georgia, the key factor may be the greater abundance of marsh grasshoppers in edge habitats, as opposed to interior-forest sites. In mountain valleys in central New Mexico, the key factor affecting territory quality for Black-headed Grosbeaks appears to be the numbers of Steller's Jays (*Cyanocitta stelleri*) and Western Scrub-jays (*Aphelocoma californica*), the chief predators of grosbeak nests. The highest-quality territories are on the valley floors, where jay density is lower. Yearling grosbeaks left to occupy territories on the valley slopes, which have a high density of nest predators, are unlikely to breed successfully. As they become older, Black-headed Grosbeaks shift from these lower-quality territories to higher-quality sites on the valley floor, and their nesting success improves accordingly (see Morphological Aspects).

Northern Cardinals, Black-headed Grosbeaks and Lazuli and Painted Buntings are known to return to roughly the same territories year after year. In southern Canada, some Northern Cardinals in London, southern Ontario, remained on the same territory for as long as five or six years. Almost all male Painted Buntings observed on St Catherine's Island returned to the same territory in the following year. In southern Michigan, 95% of older Indigo



The "catkins" of the tropical American tree genus Cecropia *are an important food resource for many avian frugivores. In a study in Espírito Santo state, in Brazil, the* ***Buff-throated Saltator*** *made repeated visits to feed on* Cecropia*, both alone and in company with such other bird species as tanagers (Thraupidae). Buff-throated Saltators are frequently found in mixed-species feeding flocks, sometimes alongside Black-winged Saltators* (Saltator atripennis)*. In Costa Rica, Buff-throated Saltators feed primarily on fruits when not breeding, but switch almost exclusively to arthropods when feeding nestlings.*

[*Saltator maximus maximus*, Podocarpus National Park, SE Ecuador. Photo: Glenn Bartley]



The fruits of wild and cultivated palms can be an important food for frugivorous birds such as this ***Black-winged Saltator****. Because of their habit of mandibulating fruit and ejecting any seeds before swallowing the pulp, cardinalids are generally poor seed-dispersers. The Lesser Antillean Saltator* (Saltator albicollis)*, however, plays at least an indirect role in the dispersal of the buccaneer palm* (Pseudophoenix sargentii) *on the island of Dominica. The saltators take the cherry-like fruits to regular feeding perches, where they discard all but the pulp. But although bits of broken pericarp are found below the perches, seeds are rarely found, and it is thought that rats, lizards or crabs carry them away.*

[*Saltator atripennis*, Cali, Valle del Cauca, Colombia. Photo: Roland Seitre]

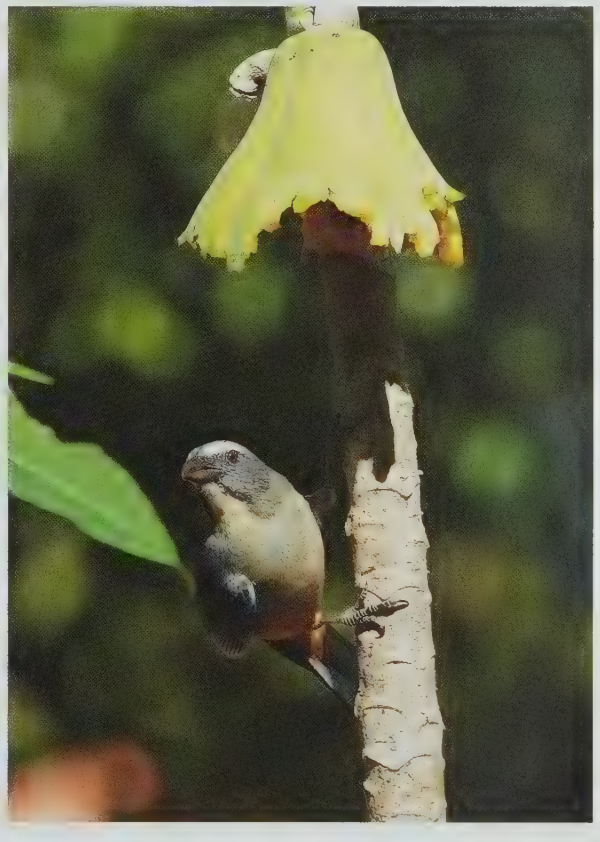
Buntings return to the same territory in successive years, but nearly half of those returning after their yearling season shift to a new territory. Yearling males, but not females, are more likely to disperse if they fail in their nesting attempts in their first season, but whether an individual remains on its old territory year after year or shifts to a new one seems to have little to do with its lifetime nesting success.

Female Dickcissels are not philopatric. On the other hand, of a population of males studied over a five-year period in Kansas, an average of 49% returned to the same territory in the following year. Dickcissels are polygynous, and males that had had fewer mates and fledged fewer young were more likely to switch territory than more successful males.

Male cardinalids tend to direct their aggression towards other males of the species, although a male Varied Bunting may tolerate yearlings on its territory even if they are singing, attacking them only if they approach his mate. Similarly, female Northern Cardinals, Rose-breasted and Black-headed Grosbeaks and Lazuli Buntings are territorially aggressive towards other females. Compared with many passerines, both male and female cardinals are relatively high in testosterone levels throughout the year, and this may have some bearing on their territorial aggressiveness. Rose-breasted Grosbeak females are aggressive towards conspecifics of both sexes, although male–female encounters are more frequent than female–female ones, and agonistic behaviour drops sharply after egg-laying begins. Female Pyrrhuloxias become defensive only if their eggs or nestlings are threatened.

Territory size varies a good deal, but for most species it tends to be, on average, roughly 1–1·5 ha. The size can differ considerably even within a species, depending upon such factors as territory quality and male density. In general, territories tend to be smallest in the optimum areas, either because size is limited by competition from other males or because a smaller size can satisfy food and nesting requirements. Painted Bunting territories in Missouri had an average size of 1·44 ha if they were bordered by territories of other males, but isolated males held territories covering on average of 3·92 ha. In Texas, Pyrrhuloxia territories were smallest in areas where there were no Northern Cardinals, and were largest where Pyrrhuloxias were outnumbered by their congener.

Dickcissel territories in Kansas varied in size from week to week and over successive years. The average weekly territory size was 1·76 acres (0·7 ha) in 1966 and 1·25 acres (0·5 ha) in 1967. With this species, territory size depends on the density of males, which is, in turn, governed by the structure of the vegetation. Mated males have larger territories than bachelors. In the central Platte River Valley, in adjacent Nebraska, Dickcissels begin nesting 2–3 weeks after Red-winged Blackbirds (*Agelaius phoeniceus*),



The ***Greyish Saltator*** *can survive on leaves through periods of low fruit availability, but over the year the bulk of its diet is thought to be fruit, in this case a papaya* (Carica)*. Saltators readily adapt to cages and maintain their body mass on a diet of fruit, which they prefer over leaves when offered the choice. When fed on banana mash, they have a fast rate of food passage and a relatively low digestive efficiency, which is compensated for by a high rate of food intake of up to 1·4 times their body mass. Greyish Saltators will come to gardens to eat cultivated beans and tomatoes.*

[*Saltator coerulescens coerulescens*, Pantanal, Mato Grosso, Brazil. Photo: Cassiano Zaparoli]

and male blackbirds often chase male Dickcissels from their territories. The Dickcissel's territorial defence diminishes as the season progresses. Males, particularly less successful ones, spend less time on their territories, an average of 7·5 weeks for males that subsequently switched territories, compared with 10·3 weeks for presumably successful males that returned to the same territory in the following season. Males may even abandon their territories before their females have completed their nesting duties.

Male Dickcissels periodically engage in flights away from their territories, particularly early in the breeding season. These distant flights may allow the birds to assess the numbers of males and the suitability of habitat in other areas (see Habitat). Unmated males will often abandon their territories and seek areas more likely to attract females; bachelor Dickcissels in Kansas usually remained on territory for less than two weeks.

Courtship feeding is uncommon among Rose-breasted Grosbeaks. Both this species and the Black-headed Grosbeak perform song flights that expose the black-and-white wing and tail feathers and the colourful wing-linings. H. R. Ivor documented a courtship dance of "indescribable beauty" by a captive Rose-breasted Grosbeak in which the male crouched on the floor of his cage, spread and quivered his wings, and sang with his head held tilted against the feathers of his back. The grosbeak followed this performance by lunging at the female and seizing her primaries, and copulation soon followed.

Dickcissels engage in sexual chases that end on the ground, where the male makes physical contact with the female and may pull her feathers. Male Painted Buntings, in addition to fluttering flight displays, display on the ground in a flattened posture, with wings and tail spread as they circle the female. Buntings performing this display reminded A. Sprunt of a "miniature turkey gobbler". Indigo Buntings sometimes perform a similar display. The male Indigo Buntings seldom sings during courtship, but he stays close to his prospective mate, chasing off other birds. At times he may force copulation on the female. A female Indigo Bunting will not solicit copulation unless she is in sight of a male, which must both sing and give the "tseep" call (see Voice). She will reply with a similar soft call, and the two will exchange further soft calls before mating.

The role that the bright male plumage of many cardinalids plays in female mate choice varies with species. For some, such as the Northern Cardinal, plumage has a direct role in mate selection. For others, including the Lazuli Bunting and the Dickcissel, quality of territory appears to be the deciding factor. E. Greene and his colleagues found that female Lazuli Buntings in Montana selected males on the basis of territory quality, rather than plumage brightness, preferring territories with high levels of shrub cover. Males holding these territories could be either very bright in plumage or very dull, and included yearling males able to settle in high-quality territories because they were tolerated by adults. Intermediate individuals had more difficulty in gaining good territories, and females were less likely to select them.

In terms of importance in mate attraction, the distinction between ornament and territory may not be clear-cut. Female Indigo Buntings appear to mate at random with regard to the genetic make-up of available males, and show no preference in respect of male song type (see Voice). Redder male Northern Cardinals may in themselves be more attractive to females, but they are also more likely to gain better territories as measured by vegetation density. Black-headed Grosbeak females apparently compete with other females for choice of territory, but active courtship by the male suggests that some direct choice of a mate may be involved.

The brilliant colour of male Northern Cardinals is unusual for a bird that is almost completely monogamous. Jawor and her colleagues have established, on the basis of intensity of red colour in a number of plumage ornaments and in the bill, that Northern Cardinals of both sexes mate assortatively, contradicting the results of an earlier study. Male cardinals, for example, prefer females with a brighter red bill and underwing-coverts. Each sex probably prefers more brightly coloured mates, although it is possible that duller birds may be choosing similar mates by preference, rather than being left with less suitable partners after the brighter birds have paired off.

Different ornaments possessed by cardinals may be correlated with, and thereby signal, different traits, and birds may be assessing several ornaments for various types of information before selecting a mate. Overall brightness, for example, correlates with body size, and bill colour with condition. Individuals with higher carotenoid loads have a better immune system—higher heterophil-to-lymphocyte ratios in males, and higher white



*The **Lesser Antillean Saltator** appears to eat less animal food than the Streaked Saltator* (Saltator striatipectus)*, with which it was considered conspecific until 1993. It brings its nestlings insects only rarely. It inhabits a very wide range of habitats on Guadeloupe and Dominica, Martinique and St Lucia, the four islands on which it is endemic. This species is significantly larger (39·8–51·6 g on St Lucia and reportedly up to 52 g on Guadeloupe) than the Streaked Saltator on Trinidad (30–44 g), perhaps partly because of differences in the frugivore communities of these islands.*

[*Saltator albicollis albicollis*,
St Lucia.
Photo: Roland Seitre]



Largely vegetarian on migration and in winter, the ***Dickcissel*** *is omnivorous while breeding, its diet then typically about two-thirds insects and other arthropods, and one third grass and cereal grains. It has been estimated that adult Dickcissels need to eat 23 grasshoppers (Orthoptera) per hour to supply their energy requirements. A study in the early part of the 20th century found that 44 Dickcissel stomachs, collected during May–August in Kansas, Minnesota, Wisconsin and Texas, USA, contained 70% animal and 30% vegetable matter. However, the ratio was reversed in the stomachs of 19 birds from near Atwood, in Illinois, in August, which contained 68% vegetable matter and 32% animal food. All but four of the Illinois birds were the young of that year, and the author of the study suggested that the inexperienced birds were not yet so adept as their parents at finding or capturing insects, whereas seeds were abundant at that time of year. A large proportion of the animal material consisted of grasshoppers, and at least traces of grasshoppers were found in all stomachs. During the first few days after hatching, Dickcissel nestlings were fed large quantities of butterfly and moth (Lepidoptera) larvae and soft-bodied insects, which were rarely found in the stomachs of adult Dickcissel. But from the fifth day onwards, the food brought to the nest consisted almost entirely of grasshopper nymphs and adults.*

[*Spiza americana*, E Nebraska, USA. Photo: Dave Maslowski/ Maslowski Productions]



*Like most true cardinalids, the **Indigo Bunting** eats much more animal matter during the breeding season, including insects and their larvae, and spiders, which it gleans from the foliage of trees and shrubs. The male Indigo Bunting is thought to forage higher in trees than the female. This sexual segregation may be reflected at a geographical scale on the wintering grounds. Male Indigo Buntings are commoner than females farther to the south in Mexico, a reversal of the typical pattern for Neotropical migrants, which are sexually segregated on their wintering grounds, where males generally predominate farther to the north.*

[*Passerina cyanea*, Waterfall Glen Forest Preserve, Illinois, USA. Photo: Rob Curtis/ The Early Birder]

blood-cell counts in females—possibly as a response to increased stress levels arising from aggressive encounters and increased parental care. Males with a brighter breast colour are better at provisioning young, as are females with brighter underwing-coverts. Even so, females pairing with brighter males feed the young less, presumably because the mate is doing a greater share of the work.

Cardinals continue to display their ornaments to each other even after pair formation. Partners may divorce both within the season and during the winter, so displays that reinforce existing pair-bonds may be important, especially as the birds nest repeatedly during the season. The female's underwing displays, which are performed away from the nest, may serve this purpose.

Females of blue-plumaged cardinalids may not rely directly on the structural blue and UV colours of males when selecting mates. B. Ballentine and Hill found that the intensity of male structural colours made little difference to female Blue Grosbeaks. Colour intensity may matter, however, in competition among males for better territories. Brighter male Blue Grosbeaks tend to be larger, and to have larger and higher-quality territories, but they are not necessarily better at feeding young—although they tend to feed first-brood nestlings at higher rates—suggesting that the qualities linked to colour intensity have more to do with competition among males than with parental ability. Bluer males, in addition to gaining better territories with greater food resources, are less likely to be cuckolded than duller individuals. Although females with duller mates might be seeking extra-pair copulations with brighter birds, it is still not clear if structural colours are, in fact, true indicators of male quality.

Extra-pair copulations and the chief response to them, mate-guarding by the male, have been recorded for the Northern Cardinal, the Blue Grosbeak, and the Indigo, Lazuli and Painted Buntings. Despite lengthy observation they have never been seen in the Black-headed Grosbeak, and Varied Bunting partners are so rarely out of each other's sight that such behaviour seems unlikely.

The frequency of extra-pair copulations among Northern Cardinals is lower than that found for many other songbirds, producing 13·5% of nestlings in a Kentucky study by Ritchison. One reason for this may be vigilant mate-guarding by the male. Males maintained contact with their mates an average of 72·8% of the time during initial nesting attempts, and usually followed the female if she flew off. In one of the pairs that did raise an extra-pair nestling, the male spent only 19·4% of his time with the female. Both male and female Northern Cardinals make forays from the territory, presumably in search of extra-pair copulations, although it is possible that they may be seeking food or nesting material, and extra-pair young have been found in 14% of cardinal nests. Female cardinals provided with extra food actually made more trips off-territory than unsupplemented females, supporting the hypothesis that extra-pair copulations, rather than foraging opportunities, may be the goal of such excursions.

In an Alabama study by L. K. Estep and her colleagues, 53% of Blue Grosbeak nestlings were sired by an extra-pair male, and at least 70% of nests had at least one extra-pair chick. The intensity with which males guarded their mates depended on the brilliance, and presumably the attractiveness, of surrounding males, though it may be that straying females were attracted by the food supply on the other males' territories, rather than by their plumage. A similar situation prevails with Lazuli Buntings. The tolerating of dull males has its benefits for brighter birds; the females of the former are available for extra-pair copulations, and their presence in nearby territories serves as a "paternity buffer" against other bright males seeking extra-pair copulations themselves. In Greene's study of Lazuli Buntings, 49% of nests contained at least one chick not sired by the resident male.

Morphometric studies suggest that about 40% of the offspring of Indigo Buntings in Michigan were sired by a male other than the territorial resident, although only 2% of observed copulations were extra-pair. D. F. Westneat found through genetic examination that 14·4% of Michigan offspring had genotypes incompatible with one of their putative parents. In a later study in North Carolina, using DNA fingerprinting, he found that 35% of all nestlings came from extra-pair copulations, and that 48% of broods had at least one extra-pair offspring. In a few cases, the entire brood appeared to have been sired by another male. Westneat also found that males attempting extra-pair copulations were often unsuccessful, failing to make cloacal contact with the female, usually because the female resisted. Females were more likely to resist extra-pair mating attempts than to resist





*Animal food forms a very small part of the diet of the **Black-throated Saltator**. It is probably taken opportunistically as the bird forages on the ground and through the shrub layer in dry grassland and scrub (*caatinga *and* cerrado*) habitats in Brazil, Bolivia and Paraguay. An individual was seen carrying a caterpillar in its beak during the breeding season, but this was assumed to be for the nestlings. Over the course of the year, the main items in the Black-throated Saltator's diet are seeds (40%), buds (37%) and fruit. Its behaviour is quite different from that of other members of the genus in which it is currently placed. It forages both in single-species flocks of up to seven birds and in mixed flocks. One bird is almost always perched in a bush or tree, constantly turning its head from side to side and presumably watching for predators. If a raptor appears, the sentinel calls and the entire flock, including the other species in a mixed flock, flees to cover. Groups of Black-throated Saltators are thought to be families. Parents are helped at the nest by non-breeding birds (presumably earlier offspring), and sentinel behaviour may be related to co-operative protection of the offspring at the nest.*

[Above: *Saltator atricollis*, Chapada dos Guimarães, Mato Grosso, Brazil. Photo: Edson Endrigo.

Below: *Saltator atricollis*, Itirapina, Brazil. Photo: José Carlos Motta-Junior]



*The **Indigo Bunting** (top left) and the **Painted Bunting** are regular visitors to feeding stations for white millet and other seeds. They also forage on the ground below the feeders for seeds spilled by other birds. Data from visits to backyard feeders are being used to monitor the population of the eastern race of the Painted Bunting in South Carolina. In many parts of its range, a substantial proportion of the diet of the Northern Cardinal* (Cardinalis cardinalis) *comes from artificial feeding stations, doubtless explaining the high population densities in suburbs. Rose-breasted Grosbeaks* (Pheucticus ludovicianus) *are also regular visitors to feeders.*

[*Passerina ciris ciris* and *Passerina cyanea*, S Florida, USA. Photo: Dave Maslowski/ Maslowski Productions]

copulations with their mates. The male Indigo Bunting does not guard his mate as vigilantly as the Northern Cardinal, but he may be more likely to copulate with her if an intruder is present.

Copulation by cardinalids appears to be typical of passerines in general. Reverse mounting, in which the female mounts the back of the male, has been recorded for a pair of Painted Buntings, the male in that case having been a yearling. Ivor's captive male Rose-breasted Grosbeak was also mounted by the female, but only after copulation. Although birds may copulate at various times throughout the breeding season, effective insemination by Northern Cardinals and Rose-breasted Grosbeaks may happen only during short periods prior to egg-laying. Indigo Buntings, with their more variable mating systems, appear to be capable of inseminating females for longer and more irregular periods.

Most north-temperate cardinalids begin nesting in early spring. In some areas Northern Cardinals may start as early as late February, while Rose-breasted Grosbeaks usually wait until mid-May. In the American Southwest, the laying of the first egg by Varied Buntings coincides with the first significant summer rainstorm. Blue Grosbeaks in the same region may delay the onset of breeding until the monsoonal summer rains, although farther south, in Costa Rica, females have been seen to gather nesting material in May, June and July.

In Costa Rica, the Blue-black Grosbeak reaches the peak of its breeding season in July and August, when the maize crops ripen. As with many other tropical birds, however, the nesting season may be protracted and can vary from place to place. In Colombia Blue-black Grosbeak nests have been found as early as February and as late as October, and in Brazil they have been discovered in March and April. The Glaucous-blue Grosbeak, in common with many south-temperate species, breeds between October and December in Uruguay. Black-backed Grosbeaks have been found nesting in November in Colombia, and Golden-bellied Grosbeaks in arid regions in western Ecuador nest during the rainy season, between February and May.

Some, but not all, members of the family are multiple-brooded. Northern Cardinals may begin a second brood as early as 13–14 days after the first brood fledges if no more than one young from the first attempt survives, but they will wait for an average of 19 days otherwise. Late clutches of this species can be very late indeed; in West Virginia, an active nest was found on 19th October. Pyrrhuloxias apparently do not raise a second brood, or they are rarely successful if they try, although a female has been seen while feeding fledged young as late as October. Vermilion Cardinals and Rose-breasted, Black-headed and Golden-bellied Grosbeaks are usually single-brooded, but in one Michigan case a pair of Rose-breasted Grosbeaks began a second clutch when the young of the first brood were only 2–6 days old.

Blue-black Grosbeaks may raise two or three broods in a season. Second broods are apparently common among Lazuli Buntings and Blue Grosbeaks, at least in the southern portions of their ranges. Varied Buntings, however, will normally renest only if their first breeding attempt fails before the eggs hatch. Dickcissels may renest if they lose their first brood, but usually they do not have enough time to rear a second before the autumn migration. There is a possibility that some very early nesters in the southern part of the Dickcissel's breeding range may move north and nest again later in the season.

Females of both the Indigo Bunting and the Lazuli Bunting normally take sole responsibility for nest-site selection and nest-building. Among other cardinalids, both sexes may help to select the nest-site or, as with Dickcissels, the female does so, her mate accompanying her. A female Northern Cardinal may visit a variety of locations, fluffing her feathers and turning around if she finds a possible site. The male follows her, and the two call to each other and, using the bill, manipulate nesting material. A female Indigo Bunting will often visit several sites before settling on one. She shows no apparent preference in subsequent nesting attempts for the plant species used for a previous successful brood. Instead, her selection appears to be based on such factors as the extent of canopy cover over the nest-site and the rigidity of the supporting stems.

Members of a pair of Rose-breasted Grosbeaks may turn around several times in an appropriate fork, as if testing its suitability as a nest-site. Pairs of Painted Buntings will investigate clumps of Spanish moss (*Tillandsia usneoides*) or other dense vegetation, searching through the foliage more rapidly than they



*Typical cardinalids such as the **Black-headed Grosbeak** drink by dipping the slightly open bill to scoop up water, then tilting the head back to swallow it. "Suction" drinking is not known for these species, though the Rose-breasted Grosbeak* (Pheucticus ludovicianus) *has been seen to make throat movements while the bill is immersed, as well as after the head is raised and tipped back. Rose-breasted Grosbeaks often wipe the bill after drinking, and drinking may precede bathing as a bird enters the water.*

[*Pheucticus melanocephalus*, Agua Caliente, California, USA. Photo: Rob Curtis/ The Early Birder]



Living in arid brushland habitats, the ***Pyrrhuloxia*** *seems to obtain most of its water needs from its food. However, it will drink water when available. Bird species of arid environments tend to have lower total evaporative water-loss rates (TEWL) than birds of wetter habitats, at least when tested in the laboratory. By storing heat in their body tissues during the hottest part of the day, and releasing it when ambient temperatures are lower, these birds can reduce the need for evaporative cooling. It has been estimated that the Pyrrhuloxia, by increasing its body temperature by 2·3°C at ambient temperatures of 38°C, can reduce its TEWL by 50%. Varied Buntings* (Passerina versicolor)*, another species often found in arid environments, including scrub and thorn-forest, have been seen to drink occasionally, sometimes in groups. On migration, Black-headed Grosbeaks* (Pheucticus melanocephalus) *(previous photo) have been seen to drink water at desert springs in California even when edible green vegetation is available.*

[*Cardinalis sinuatus sinuatus*, Rio Grande Valley, Texas, USA. Photo: Derrick Hamrick/ ImageBroker/FLPA]





*The male **Northern Cardinal** gives a specific piping call during courtship feeding, while the female makes quiet "twitter" calls and assumes a submissive begging posture. The courtship displays of the Northern Cardinal include song flights in which the male, with his crest raised and breast feathers fluffed, flies towards the female and alights near her. The displaying birds twist and angle the body to show off their feather ornaments, such as the breast feathers of the male and the red underwing-coverts of the female, which are normally not visible. The redness of the female's underwing feathers is correlated with body size, body condition, date of first nest produced and reproductive success. For the males, however, while redness of the breast plumage positively predicts body size, it negatively predicts nestling-feeding rate. Birds with a smaller black face mask, indicating lower levels of aggression, have greater reproductive success. Cardinals continue to display their ornaments to each other even after pair formation. Because partners may divorce both within the season and during the winter, displays that reinforce existing pair-bonds may be important, especially as the birds nest repeatedly during the season. The female's underwing displays, which are performed away from the nest, may serve this purpose. Northern Cardinals have also been observed courtship-feeding throughout the year. Pair-bonds of cardinalids are often short-term arrangements, but in Northern Cardinals they may be maintained for repeated nesting through the breeding season or even into succeeding years.*

[Above: *Cardinalis cardinalis canicaudus*, Bandera, Texas, USA. Photo: Bill Draker/ ImageBroker/FLPA.

Below: *Cardinalis cardinalis magnirostris*, High Island, Texas, USA. Photo: Rob Curtis/ The Early Birder]



In the Indigo Bunting (Passerina cyanea) *and the Lazuli Bunting* (P. amoena), *the female normally takes sole responsibility for nest-site selection as well as nest-building. But paired* ***Painted Buntings*** *will investigate suitable sites in dense vegetation together, and the male—though less often than the female—may indicate a suitable site by crouching. The site is usually 0·3–2·5 m up in low vegetation, though it can be up to 15 m above ground. The nest, a neat, deep, thin-walled cup, is built entirely by the female from grasses, fine weed stems and similar materials, occasionally incorporating artificial matter such as tissue paper, and bound together by cobweb. She starts it within a few days of finding the site and often completes it in two days.*

[*Passerina ciris*, SE USA. Photo: Roger Givens/DRK]

do while foraging. When they locate a potentially suitable spot, either the female or, in 12 out of 32 observed cases, the male enters the vegetation and crouches. The female may arrange nearby foliage around herself.

Nest-sites are usually at low to medium heights among dense vegetation, usually under some sort of cover, although the only known nest of the Yellow-green Grosbeak was placed 7 m up, and in Canada the average height of 50 Rose-breasted Grosbeak nests near London, in Ontario, was 6 m. Cover may be essential for both concealment and thermoregulation. For Black-headed Grosbeaks, a primary concern in site selection may be that of keeping the nest sufficiently cool. Northern Cardinal nests can be as low as 0·25 m from the ground or as high as 12 m, the height above ground increasing over the course of the breeding season. In western Montana, 95% of Lazuli Bunting nests were within 1 m of the ground, with the remaining nests no more than 2 m up, although some nests of this species have been as much as 8 m up. Indigo Bunting nests are frequently less than a metre from the ground; six nests followed in Michigan, for example, were at an average height of roughly 50 cm. Forty-five Painted Bunting nests found by D. F. Parmelee in Oklahoma were placed 0·3 m to 2·3 m above the ground, at an average height of almost 1 m. As with the Northern Cardinal, nests found late in the season were often higher up than those found earlier.

Dickcissel nests are often placed near the ground, usually in dense vegetation in grasses, forbs or low woody plants with nearly complete overhead cover. Ninety-four nests found by T. G. Overmire in Oklahoma were at heights ranging from 8 cm to 4·25 m, measured from the ground to the top of the nest. The average height of 20 nests on the Arkansas Grand Prairie, where the birds optimally nested in briar patches bordering maturing oat fields, was approximately 1 m. A recent study by J. W. Walk and his colleagues of 505 Dickcissel nests in Illinois grasslands suggests that the birds will nest close to cropland, but may avoid nesting in areas of grassland close to a woodland edge.

Vermilion Cardinals may place their nests in a shrub or a prickly pear cactus (*Opuntia*). The Black-faced Grosbeak apparently conceals its nest among arboreal epiphytes. The Blue-black Grosbeak frequently builds its nest among low forest palms armed with a formidable array of spines. One such nest found by Skutch had been built on the remains of the nest of a Thrush-like Mourner (*Schiffornis turdina*), which had itself apparently been built over another grosbeak nest.

Subsequent broods are normally raised in a new nest, although a pair of Rose-breasted Grosbeaks used the same nest two years in succession, and there are, incidentally, two records of a Rose-breasted Grosbeak nest in Ontario being reused by a Wood Thrush (*Hylocichla mustelina*). Painted Buntings will sometimes reuse an old nest. Although Indigo Buntings rarely do so, one nest of this species was built by the constructing of additional layers over an older one. Lazuli Buntings have not been recorded reusing a nest, but females may return to the same bush, and occasionally the same location within it, as that selected in the previous year. Sutton described an active Dickcissel nest that had been built on top of a failed nest used earlier in the season.

Both sexes of the Blue-black Grosbeak take part in the building process, bringing nesting material and sitting in the nest to give it shape. Both sing as they build. Both the male and the female of the Rose-breasted Grosbeak build, whereas the female of the Black-headed Grosbeak does most of the work of nest construction. With most members of the family, the female builds a nest either alone or, as in the case of the Northern Cardinal and perhaps the Blue Grosbeak, with only limited contributions from the male. The male may accompany his mate during the process, but he is more likely to stay nearby and sing as she proceeds. The nest of the Black-faced Grosbeak is built by both partners, although the female appears to take the major role. J. K. Strecker reported in 1893 that both sexes of the Painted Bunting take part in nest-building, but more recent observers state that the female builds alone.

Northern Cardinals and Black-headed Grosbeaks carry out most of the nest-building work in the early hours of the morning, but female Lazuli Buntings build at any time of day. Female Painted Buntings in Oklahoma engaged in nest-building after



*The female **Black-headed Grosbeak** apparently competes with other females for choice of territory, but active courtship by the male suggests that some direct choice of a mate may also be involved. The pair-bond is formed rapidly, often on the day of the female's appearance on the territory. The nest is built almost entirely by the female. As can be seen here, it is an untidy affair, a loose cup made from slender twigs, plant stems and rootlets. Sites are on average 3–4 m above the ground, usually (though not here) in the outer branches of a small deciduous tree, pinyon pine* (Pinus) *or juniper* (Juniperus). *The nest is lined with finer plant material and hair.*

[*Pheucticus melanocephalus maculatus*, Modoc, California, USA. Photo: Alex Navarro]

sunrise and sunset, but those attending an earlier brood while at the same time constructing a second nest built at sporadic intervals throughout the day. Dickcissel males may interrupt their nest-building mates for bouts of courtship and copulation.

The building of the first nest of the season can take much longer than the time required for subsequent ones. Northern Cardinals may spend 2–3 weeks on their first nest. Lazuli Buntings may take 5–7 days to build a nest early in the season, but they can complete a later nest in as few as two. A female Dickcissel will begin the construction of a number of tentative nests after she arrives on the breeding grounds, but she soon focuses on a single site and completes the building work in about 2–4 days.

So far as is known, all members of the family build open cup-nests. There is, however, a single record of a Blue Grosbeak pair in Arkansas that nested, apparently successfully, in an enclosed nestbox designed for Eastern Bluebirds (*Sialia sialis*). Nests are constructed from twigs, grasses or plant fibres, and lined with finer material. A Black-headed Grosbeak has been observed to steal material from a recently deserted nest of a Brewer's Blackbird (*Euphagus cyanocephalus*). Indigo Buntings bind the nesting materials in place by weaving and wrapping them with spider web, especially around the rim, and incorporate dead leaves into the nest structure. Indigo Buntings and Blue Grosbeaks tend to include pieces of paper, shed snakeskin and similar items, and Blue Grosbeak nests frequently contain pieces of cellophane, perhaps incorporated as a substitute for snakeskin.

Northern Cardinals and Pyrrhuloxias do not attach the nest to the surrounding branches, but simply wedge it into place. *Passerina* buntings anchor their nests in place by weaving strips of grass or bark around supporting twigs. Dickcissels either do not bind their nests to surrounding vegetation or make only a flimsy linkage, relying instead on a number of supporting plants to hold the nest.

The nests of Rose-breasted Grosbeaks can be so sparsely built that the eggs can be seen through the base from below, but they may contain slender forked stems of plants such as white avens (*Geum canadense*) to provide structural strength without adding bulk. The Black-faced Grosbeak's nest is a flimsy structure, with an unusual lining of green bromeliad leaves. Blue-black Grosbeaks may line the nest with black fungal filaments, while Varied Buntings in Arizona line the nest with reddish-brown to yellow stems and the inflorescences of littleseed muhly (*Muhlenbergia microsperma*). They may delay nesting until there has been enough rainfall to allow suitable plants to grow.

Nests can become infested with mites (Acarina) and other invertebrates. Northern Cardinal nests in Ontario each yielded hundreds or even thousands of mites, mostly *Ornithonyssus sylviarum*, as well as spiders, bark lice (Psocoptera) and insects of various sorts. A springtail, *Entomobrya assuta*, may have a particular affinity for cardinal nests.

Egg-laying begins only a few days after the nest has been completed, fewer than six days later in the case of Pyrrhuloxias but after only a day or two in Dickcissels. Black-headed Grosbeaks typically begin to lay eggs 2–3 days after nest-building ends. So far as is known, members of the family lay eggs sequentially, one per day, until the clutch is complete. Laying normally takes place early in the morning, within an hour after sunrise in the case of Black-headed Grosbeaks and Indigo Buntings, but as late as three hours after sunrise in the Rose-breasted Grosbeak.

In general, eggs of cardinalids range in colour from whitish to blue or greenish-blue, usually with some degree of brown, black or purplish mottling, spotting or streaking, particularly around the blunt end. Blue-black Grosbeak eggs, for example, are either white or tinged with blue, blotched and marked with chestnut, reddish-brown or pale lilac. Indigo Buntings, Dickcissels and some other species normally lay unmarked eggs. Some Indigo Bunting clutches contain both unmarked and spotted eggs, but there is no evidence to suggest that these are laid by different females.

Members of the family breeding in temperate climates normally lay three or four eggs in a clutch. Dickcissels may lay as many as six, although a proportion of the eggs may be sterile, possibly as an adaptive response to the ability of the female to provision a large brood. Dickcissel second-brood clutches on the Kentucky–Tennessee border contained, on average, about one egg fewer than those of first broods. Clutch size of tropical species is generally lower, between two and three eggs. One Black-faced Grosbeak clutch contained three dull white eggs, mottled and spotted with brown. The Blue-black Grosbeak lays two eggs, a typical clutch for a tropical passerine.

The clutch size of Northern Cardinals in Bermuda is significantly lower, by 18·2%, than that of the species in coastal North



So far as is known, all saltators have open cup-nests, although the nests of a few species have not been described. The ***Greyish Saltator*** *builds a bulky cup with a foundation of twigs, a middle layer of small leaves, and a thick lining of fine fibres and rootlets. Saltator nests are normally situated low in a bush or tree. In one of the few saltator species to have been studied in detail, the Buff-throated Saltator* (Saltator maximus)*, the female apparently builds her nest unassisted, although the male remains in attendance and brings her food. The female Buff-throated Saltator also incubates the eggs alone.*

[*Saltator coerulescens coerulescens*, Mato Grosso, Brazil. Photo: Anita Studer]

American habitats at similar latitudes. As cardinals have been in Bermuda for only a few centuries, Crowell and S. I. Rothstein believe that this probably represents not an evolutionary change, but a fine-tuned response to proximate factors in the environment, including a more stable climate.

Among most cardinalids for which the relevant information is available, incubation is carried out by the female alone, as typified by, for example, the Black-faced and Blue-black Grosbeaks, although the male usually stays in the vicinity. Incubation normally does not begin until the last egg or the penultimate one is laid, although Rose-breasted Grosbeaks may start to sit as early as the second day of laying, and female Northern Cardinals sometimes sleep on the nest after depositing the second of a three-egg clutch.

Males of the Indigo Bunting and the Dickcissel ignore the female during incubation. On the other hand, male Northern Cardinals, Pyrrhuloxias and Blue Grosbeaks may bring food to the female as she sits on the nest. When the female Black-faced Grosbeak returns to the nest, the male accompanies her in a looping flight as both birds sing. Skutch once recorded a female accompanied in this fashion by two other individuals, one presumably a helper (see above).

Males of the Rose-breasted, Black-headed and Golden-bellied Grosbeaks undertake some of the task of incubating the eggs, but the role of the male of other *Pheucticus* species is apparently not known. In the case of the Rose-breasted Grosbeak, the male may be responsible for one-third of the incubation work during the day, and male Black-headed Grosbeaks have been recorded as contributing up to 50% of the daytime incubation. Male grosbeaks may develop bare areas of skin similar to the brood patch of the female, but less heavily vascularized. Females apparently do all of the incubation at night.

Female Indigo Buntings spend up to 79% of the daytime hours incubating. The female Blue-black Grosbeak stays on the nest for approximately 70–75% of the time, but may incubate for as much as 95% of the day in rainy weather. One Blue-black Grosbeak observed by Skutch on a cool rainy day spent six hours in continuous incubation, the longest period that he recorded for any passerine bird. At two of three nests that Skutch observed, the male occasionally brought food to the female while she sat on the eggs.

The eggs generally hatch after 11–14 days, 12 days being the average for most cardinalid species. Young Northern Cardinals may take from 12 to 24 hours to break out of the egg, whereas Dickcissels can free themselves from their shell within a few minutes. The entire brood usually hatches over the course of one or two days. The young usually emerge unaided, but occasionally a female Northern Cardinal will lend assistance. Hatchling cardinalids are sparsely covered with down, generally either grey

The female ***Pyrrhuloxia*** *does most, if not all, of the nest-building. The result is similar to, though smaller and more compact than, the nest of the Northern Cardinal* (Cardinalis cardinalis)*. An oval cup made from thorny twigs, strips of bark and coarse grasses, it is lined with rootlets, spider webs, feathers and other fine fibres. The nest is placed 2·4–4 m up in a mesquite* (Prosopis)*, catclaw* (Acacia greggii) *or similar shrub, and sometimes in a clump of mistletoe. Northern Cardinals and Pyrrhuloxias do not attach the nest to the surrounding branches, but simply wedge it into place. The female Pyrrhuloxia begins to lay her eggs within six days of completing the nest.*

[*Cardinalis sinuatus sinuatus*, Texas, USA. Photo: John Cancalosi/ DRK]





Dead vines, coarse twigs and leaves are among the materials which go into the bulky nest of the ***Buff-throated Saltator****. The nest is usually 0·3–2 m above ground, occasionally higher, in a bush or tree, but sometimes in a dense stand of bracken or compact tuft of tall grass. Having built the nest alone, the female may begin to lay her eggs on the day after completion, or up to four days later; the eggs are laid on consecutive days. The nests of this species are usually well separated, but on one occasion two were found only 2·4 m apart. These two females had different mates but one female was dominant, frequently chasing the other from the nest.*

[*Saltator maximus maximus*, Estação Veracruz, Ribeirão Ronca Água, Santa Cruz de Cabrália, Bahia, Brazil. Photo: Dante Buzzetti]

or white in colour. The colour of the mouth-lining ranges from orange to deep red, with yellow flanges or edging at the gape. Lazuli Bunting hatchlings retain the egg tooth for up to three days. The eyes of hatchlings are initially closed; they may open by three days in Painted Buntings, by five or six days in Varied Buntings, and by as late as eight days in Black-headed Grosbeaks. Black-headed Grosbeaks grow in weight from 3 g to about 35 g during their time in the nest.

With many species, including the Black-faced Grosbeak, only the female broods the nestlings, but males of the Rose-breasted and Black-headed Grosbeaks brood occasionally, the Rose-breasted Grosbeak doing up to 25% of the daytime brooding. Brooding sessions are often short; in 1915, I. N. Gabrielson noted that brooding stints of a nesting Rose-breasted Grosbeak lasted for an average of seven minutes each, stretching to 17 minutes in the last two days, when the female brooded not by sitting, but by standing on the nest with wings slightly spread. Brooding of chicks is most continuous in the first few days after hatching, before the young are able to control their own body temperatures. Northern Cardinals are able to thermoregulate by five days of age, and Dickcissels by six days. A female Dickcissel watched by A. O. Gross brooded her young closely for the first three days, when ambient temperatures rose to above 32°C, but she was less attentive on days three and four and did not brood after day six. A six-day-old nestling left alone in the nest for one hour maintained an internal temperature of 41°C, even though the ambient temperature was only 26·6°C.

Nestlings are usually fed mostly with animal matter, including grasshoppers and caterpillars. Pyrrhuloxias may feed their young with cactus fruit, as well as insects. Rose-breasted Grosbeaks include a small percentage of seeds, which they may shell at the nest before passing the kernels to their young. Female Dickcissels, which tend their young alone, may start feeding as little as 30 minutes after a chick hatches. One was seen to bring grasshoppers to a five-day-old brood of four chicks at the rate of 20 per hour.

Both sexes of *Cardinalis* and of North American species of *Pheucticus* feed young in the nest. Male Northern Cardinals studied in Ohio were, unusually for such a highly dichromatic species, assiduous in tending their young, adjusting their efforts to the size of the brood to an even greater degree than females, and increasing their feeding rates as nestlings aged. T. S. Filliater and Breitwisch explored a number of potential explanations for this, including the possibility that females may threaten their mates with divorce if they do not measure up. A later study of the same population found that, on the basis of reactions to models of predators, males contributed equally with females to nest defence during the middle of the nesting period, although defence seemed to be only a minor factor in nesting success. Males of the Vermilion Cardinal, another highly dimorphic species, are similarly attentive to their young.

Among *Passerina* species, the female normally takes responsibility for most or all of the care of the nestlings, including feeding. Male Lazuli Buntings are highly variable in their contribution to nestling welfare, but in one Montana study males were responsible for 24·6% of feeding visits to the nest. Male Painted Buntings apparently do not feed their nestlings, and Varied Bunting males do so only after the fourth or fifth day. Indigo Bunting males usually do not feed the chicks directly, but may do so to a limited extent nearer the time when the young leave the nest, and may pass food to the female; she then feeds it to the chicks. Monogamous male Indigo Buntings are more likely to feed their young than are polygynous ones.

Although both sexes of the Blue Grosbeaks observed by Alsop in Tennessee fed their young, most feeding and all of the prey capture, involving mostly large mantids (see Food and Feeding), was done by the female. Keyser and Hill found that female Blue Grosbeaks fed their nestlings more than six times more frequently than did males. Male Blue Grosbeaks may feed young from a first brood while the female is building a nest for the second, as male Rose-breasted Grosbeaks will do on the rare occasions when a female renests. Similarly, male Painted Buntings will take over the care of an earlier brood while the female tends to a later one. Blue-black Grosbeak nestlings are fed by both parents, and Black-faced Grosbeak nestlings are provisioned both by parents and by helpers (see above). H. Brackbill recorded a juvenile Northern Cardinal that fed nestlings raised by its presumed parents; the juvenile also begged from the adults, and the male did feed it, though the female attempted to drive it away.

Dickcissel males normally take no part in the feeding of the young. Gross recorded a male that failed to feed his young even



Incubation does not usually begin until the last egg or the penultimate egg is laid, although the ***Rose-breasted Grosbeak*** *may start to sit as early as the second day of laying. The clutch size of this species is 3–5 eggs, usually four. Both sexes sit, although the female spends twice as much time on the nest during the day and sits exclusively at night. Between them, the partners reportedly keep the eggs almost continuously covered. The incubation period for this species is 12–13 days.*

[*Pheucticus ludovicianus*, George W. Mead Wildlife Area, Wisconsin, USA. Photo: Gerard Fuehrer/ DRK]

after the death of the female parent; the brood starved to death. The male's contribution, however, is apparently variable. In a population of Dickcissels studied in east-central Illinois, J. D. Maddox and E. K. Bollinger recorded males feeding young at six out of eight nests during 1997, males accounting for 37% of total visits to all nests. This unusual behaviour may have been prompted by a scarcity of food, although this was not assessed. In the following year, when food was presumably more abundant, no males were recorded as visiting nests.

Except in a few species, such as the Dickcissel, both sexes generally carry away the nestlings' faecal sacs, although in the first days after hatching the adults swallow the droppings, rather than remove them. Lazuli Bunting females have been seen to insert the bill deep into the bottom of the nest and to shake the nest vigorously for 10–15 seconds. The function of this behaviour is unknown, but it may have the effect of shaking ectoparasites lower into the nest.

Although male Indigo Buntings often leave most of the nesting duties to the female, they may help to defend the nest. Black-headed Grosbeaks react to potential threats by flying from branch to branch, uttering loud distress calls. As the young in the nest grow older, and thereby represent a greater cumulative parental investment, the calls begin sooner, and increase in number, at the first approach of a threat. Similarly, Westneat found that Indigo Buntings give many more alarm calls per minute when disturbed during the nestling phase than when a potential threat appears during incubation.

Young cardinalids generally leave the nest at between 9 and 12 days of age. Some exceptions to this are presented by Northern Cardinals, which sometimes depart at only 7 days, especially if disturbed, and Black-faced Grosbeaks, which have been recorded as remaining in the nest for 15 days. Blue-black Grosbeak nestlings are fully feathered by 10 days, and leave the nest after 11 or 12 days, as do most Black-faced Grosbeaks.

In the case of the Painted Bunting, skull pneumatization takes an estimated 46 days to complete. In the Black-faced Grosbeak, skull pneumatization is completed posteriorly, rather than anteriorly, a pattern seen in a number of tropical species.

After having left the nest, the young may move very little for the first few days, up to eleven days in the case of the Northern Cardinal, but they gradually acquire more mobility and independence. Juvenile Pyrrhuloxias start to form flocks as early as July, and young Blue Grosbeaks form flocks that are later joined by parent birds and the offspring from later broods. Male Black-headed Grosbeaks sometimes leave the breeding area before either females or young, and the last young of the year often do not depart until several weeks after the last adults.

Parents continue to feed their young for several weeks after fledging, Lazuli Buntings and some Dickcissels doing so for two weeks and some other species for longer, and the young may continue to associate with their parents for some time after they are able to feed themselves. Rose-breasted Grosbeaks in southern Ontario are dependent on their parents for three weeks after leaving the nest, before they disperse from the natal area. One juvenile Northern Cardinal in Maryland, in the eastern USA, was independent by 50 days, but it associated with its parents for a further 20 days. Dickcissel fledglings studied by K. M. S. Wells and her colleagues in south-western Missouri were independent after two weeks, but they moved little until four weeks after fledging. Some Dickcissel young may be dependent on their parents for four weeks or more after leaving the nest. Indeed, one parent observed by Walk and his colleagues in south-eastern Illinois continued post-fledging care for 43 days. This long period of post-fledging care may be a factor explaining why most Dickcissels are single-brooded. Male Painted Buntings observed by Parmelee attended their young fledglings, but normally did not feed them unless the female was engaged in constructing another nest. One male took over care of his brood six days after they had left the nest, while the female was renesting. Parmelee has suggested that the ability of polygynous male Painted Buntings to care for fledged broods may be the critical factor determining whether a female renests.

Some odd associations between parent Northern Cardinals and other species have been recorded. A pair of cardinals in Maryland shared a nest with a pair of Song Sparrows (*Melospiza melodia*); both species fed the young and cleaned the nest. A Canyon Towhee (*Pyrgisoma fusca*) has been recorded as actively feeding fledged cardinals for a period of three weeks; the true parents were in attendance and accepted the assistance. In contrast, a male Northern Cardinal was observed when feeding a

brood of fledgling American Robins (*Turdus migratorius*) over a period of several days while provisioning his own young, and another male was recorded as tending a nest containing three young Yellow-breasted Chats (*Icteria virens*). In another interesting case, a female cardinal in Iowa shared a nest with an American Robin, the nest containing three robin eggs and two cardinal eggs. The two females, attended by their respective mates, incubated the eggs separately or together, the two sitting side by side on the nest, although only the robin chicks fledged successfully. As the female cardinal became increasingly aggressive to the female robin over time, it may be that this behaviour was the outcome of competition for a suitable nest-site. Finally, there are recent records of fledgling Carolina Wrens (*Thryothorus ludovicianus*) taking refuge in a newly lined cardinal nest during inclement weather, and of a failed cardinal nest being used by a Grey Catbird in the same season, but there was apparently no direct interaction between the two species in either case.

Conspecific brood parasitism is suspected in less than 1% of Indigo Bunting nests in Michigan, but is otherwise rare or absent in this family. There is one recent record of the appearance of three eggs in a Dickcissel nest, already containing four, during a two-day period. As Dickcissels lay only one egg per day, one of the eggs must have been laid by another female.

Every cardinalid species breeding north of Mexico is a known host of the Brown-headed Cowbird. In addition, Bronzed Cowbirds (*Molothrus aeneus*) have been recorded as parasitizing Northern Cardinals, Pyrrhuloxias and Painted Buntings. Shiny Cowbirds (*Molothrus bonariensis*) are known to parasitize Golden-bellied Grosbeaks and some saltators (see below). Cowbirds may be particularly attracted to Northern Cardinals because the latter's bright colours and conspicuous behaviour make their nests easier to find. A high density of cardinals in the area was the most important factor influencing the rate of cowbird parasitism of the Black-capped Vireos (*Vireo atricapilla*) in Texas. Despite this, young cowbirds often do not survive well in cardinal nests. Cardinals studied by D. M. Scott and Lemon at London, in Ontario, produced only about 25% of the number of young cowbirds successfully raised by other host species, particularly in mixed broods, in which the young cowbirds were often underweight and grew poorly. Unlike some other hosts, Northern Cardinals have an incubation period only slightly longer than that of cowbirds, so that parasite eggs laid after incubation has begun are less likely to hatch.

The frequency with which cowbirds parasitize members of this family varies among both species and populations. The Indigo Bunting is one of the 17 most frequent cowbird hosts throughout its range, and one of the seven most heavily parasitized species in the Atlantic coastal plain and Piedmont regions of South Carolina and Georgia. Similarly, as many as 71–100% of Lazuli Bunting nests were parasitized by cowbirds in the Sacramento Valley, in California, as were at least 50% of Blue Grosbeak nests in Grand Canyon National Park, in Arizona. Rose-breasted and Black-headed Grosbeaks are rarely parasitized, usually fewer than 10% of nests being affected. Aggressive behaviour and nest-guarding by these host species may keep parasitism rates low. Nevertheless, 23% of nests were recorded as being parasitized in the zone of range overlap between the two grosbeak species, and one Black-headed Grosbeak population in British Columbia, in south-west Canada, had a parasitism rate of 35%.

Dickcissels and Bell's Vireos (*Vireo bellii*) were the two species most heavily parasitized by Brown-headed Cowbirds at the Konza Prairie Biological Station, in north-east Kansas, between 2002 and 2007. Their rates of parasitism, 69·6% for the Dickcissel and 70·5% for the vireo, were considerably higher than those for the next most heavily parasitized species, the Red-winged Blackbird, for which the rate was 21·9%. Some other species on the station, including the Blue Grosbeak, had 100% of their nests parasitized, but the number of nests involved, only four in the case of the grosbeak, was much smaller. On the Konza Prairie the Dickcissel appeared to be the cowbird's preferred host. A Dickcissel can fledge up to five cowbirds from a single nest, and, unlike the vireo, it rarely abandons a nest with cowbird eggs in it. In terms of the number of young cowbirds that these nests produced, Dickcissels led the way, with 1295 fledged offspring from 619 parasitized nests over the course of the study. These parasitism rates were in fact lower than the figure of 84·7% calculated by Zimmerman for the same site from data collected between 1965 and 1979.



Throughout the first two days after hatching, ***Northern Cardinal*** *chicks are brooded intensively by the female. During this period, the male may feed her, as well as the chicks. The male also feeds the female on or away from the nest during the 11–13 days of incubation, which is done by the female alone. In one study, females fed more often during incubation tended to provision their nestlings less. Unusually for such a highly dichromatic species, male Northern Cardinals are assiduous in tending their young, adjusting their efforts to the size of the brood to a greater degree than females and increasing their feeding rates as nestlings age.*

[*Cardinalis cardinalis cardinalis*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]



A study in Tennessee found that the female Blue Grosbeak feeds her nestlings more than six times more frequently than does the male. Male ***Blue Grosbeaks*** *may feed a first brood while the female is building a nest for the second, and become more involved after the young fledge. In some cardinalids, such as the Northern Cardinal, rates of extra-pair copulation are relatively low. But in Alabama, 53% of Blue Grosbeak nestlings were found to have been sired by another male, and 70% of nests had at least one extra-pair chick. Males with dull plumage coloration were more likely to be cuckolded than those with more brightly coloured plumage, but duller males did not guard their mates more. Instead, males with more brightly coloured neighbours guarded their mates more closely than did males with fewer colourful neighbours. Brighter males tend to be larger and to have larger and higher-quality territories. They are not better at feeding their offspring, but, since this is largely the female's responsibility, the quality of territory may be more important. In fact, female Blue Grosbeaks may choose mates indirectly by assessing territory quality, rather than by assessing the male's quality by his plumage.*

[*Passerina caerulea caerulea*, N Kentucky, USA. Photo: Dave Maslowski/ Maslowski Productions]

Cowbird parasitism rates can range from zero to 100% for one and the same species. In the case of Lazuli Buntings, nests situated close to cowbird roosts may suffer very high parasitism, while more distant ones experience none. Yearling birds may experience higher rates of parasitism than older ones, perhaps because older birds are more likely to occupy territories with greater opportunities for nest concealment. Among Dickcissels, parasitism rates range from non-existent, as in prairie barrens on the Kentucky–Tennessee border, to 100%, with the heaviest rates in the Great Plains. The reasons for this variation are not altogether clear. Rates have been reported to be highest in areas where nest density is low, and vice versa, but this was not the case in the Flint Hills of Kansas and Oklahoma, where cowbird parasitism, in a study by W. E. Jensen and J. F. Cully, varied from zero to 92% along a latitudinal gradient from south to north on ungrazed prairie, with no apparent correlation between parasitism and habitat features. In an earlier study in the same region, however, the Dickcissels experienced their highest levels of brood parasitism in unburnt hay fields, where nest density was about half that on restored prairie grasslands (see Habitat).

Habitat may not always be a factor in determining the risk of cowbird parasitism (but see Habitat). For example, Indigo Buntings in West Virginia were more likely to be parasitized by cowbirds if the vicinity of the nest had lower cover and a greater number of tall snags, but for Indigo Buntings in Michigan the habitat, including the choice of nest-site, seemed to make no difference.

Parasitism rates can vary through the season, making estimates based on short-term studies unreliable as general guides. Parasitism of Indigo Bunting nests decreases through the late spring and summer, because cowbirds stop laying before the buntings embark on late-season clutches. At the Edwin S. George Reserve, in Michigan, the Paynes found that, while parasitism rates were 23% in May and 26% in June, they declined to 9% in July and reached zero in August. At Niles, also in Michigan, more than half of Indigo Bunting clutches were begun after the peak of the cowbird season had passed.

Lazuli and Indigo Buntings will desert a nest if a cowbird lays in it first, whereas a Northern Cardinal in the same situation may not desert. A Blue Grosbeak will reportedly build a new nest on top of its old one if a cowbird has laid eggs in it. In many cases, however, birds will simply accept cowbird eggs, and the reproductive cost of brood parasitism may be slight.

The presence of cowbird chicks seems to have no effect on the ability of Northern Cardinals and Rose-breasted Grosbeaks to raise their own young. K. P. Eckerle and Breitwisch, who studied the effects of parasitism on Northern Cardinals in Ohio, observed adults taking action against cowbirds only at three parasitized nests, 5% of the total. Two abandoned the nest without laying, and a third buried the cowbird egg under new nesting material.

Other species do not fare so well if cowbirds lay in their nests. Cowbirds may remove eggs of the hosts before laying in the nests of Dickcissels, Indigo Buntings and other species. Cowbirds may also break eggs by pecking at them. It has been suggested that an unusual statistical difference in eggshell mass between western and eastern populations of Painted Buntings, western females laying eggs with heavier and presumably less fragile shells, may be a response to the historical presence of egg-pecking cowbirds in the range of the western birds, and their absence, until comparatively recently, among the eastern population (see Status and Conservation). Pyrrhuloxias in Texas fledge very few young if they have been parasitized by cowbirds; in one parasitized brood, two Pyrrhuloxia chicks were found trampled to death in the bottom of the nest. Parasitized Dickcissel nests also reportedly fledge fewer young than unparasitized ones. Cowbird-removal experiments in the Flint Hills nonetheless made no difference to nest productivity, despite a parasitism rate of more than 80%, with multiple cowbird eggs per nest. This may have been because the cost of parasitism was swamped by the much greater effects of nest predation, which was responsible for the overwhelming majority of nest failures.

M. A. Whitehead, S. H. Schweitzer and W. Post monitored nests of Northern Cardinals, Blue Grosbeaks and Indigo and Painted Buntings on James Island, in South Carolina, in order to determine the effect of cowbird parasitism on nesting success. Parasitism reduced the mean clutch size, but not the hatching rate, for all four species, and reduced the fledging rate for Blue Grosbeaks. It had little effect overall on the seasonal fecundity of the hosts, which were still able to raise young successfully.



*The female **Dickcissel** may start feeding a chick as little as 30 minutes after it has hatched. Usually, the female feeds the chicks alone. One was seen to bring grasshoppers (Orthoptera) to a five-day-old brood of four chicks at the rate of 20 per hour. Dickcissel males are polygynous, and the most successful may have up to six mates. Of 150 males in a Kansas study, 14% (mostly yearlings) had no mate, 41% had two and 9% had three or more. Female productivity is not adversely affected by male polygyny. In fact, one study found the reverse to be true: a greater percentage of eggs hatched, and fledging rates were higher, for females mated to polygynous males. This may be related to the quality of the territory.*

[*Spiza americana*, Illinois, USA. Photo: Richard & Susan Day/VIREO]



*The male and female **Buff-throated Saltator** mash food items thoroughly in the bill before offering them to the nestlings. Both parents feed and attend the young. A male was seen feeding a nestling only two hours after it had hatched. At two nests of this species, the nestlings were fed, respectively, 86 and 59 times over a total of 15 hours. The young, usually two, remain in the nest for 13–15 days, but continue to be attended by both parents until they are 50–55 days old. Despite this extended fledgling dependency, Buff-throated Saltators have at least two broods in some areas.*

[*Saltator maximus magnoides*, El Copal Private Reserve, near Tapantí National Park, Costa Rica. Photo: Marco Saborío]

Indigo Bunting nests parasitized by cowbirds may be less likely to fledge young: in a survey of undisturbed nests in which at least one egg was laid, 56·4% of 1310 unparasitized nests were successful in fledging at least some nestlings, but only 19·5% of 411 parasitized nests did so.

Egg removal and loss probably represent the most serious cost of parasitism to Indigo Buntings, but the presence of cowbird young imposes costs of its own. Indigo Bunting nests with only one cowbird egg were more likely to produce young than were those with two or more, 22·1% of 339 nests with one egg being successful, compared with only 6·9% of 72 nests containing two or more cowbird eggs. Young cowbirds hatch a day or two earlier and grow more quickly than young buntings. They outcompete and overcrowd their smaller nestmates, and may even push them out of the nest. In captive mixed broods studied by R. B. Payne, the nestling cowbirds trampled the nestling buntings, climbed on them and pecked them about the head. A nestling cowbird has been videotaped as it ejected an Indigo Bunting chick from the nest, but it is not known how common such behaviour is. Young cowbirds even affect the survival of Indigo Bunting chicks after they have left the nest, presumably by competing for the attention of their foster parents.

The presence of cowbirds can have an adverse effect on general health and fitness of the host's young. D. C. Dearborn and his colleagues found that Indigo Bunting chicks in parasitized nests received less food, begged more, gained mass at a slower rate, and were generally in poorer condition than nestlings from cowbird-free broods. Parasitized nests are more likely to succumb to predators, possibly because adults are forced to make more provisioning visits to the nest and can therefore spend less time in guarding their brood. Only 1·7% of young Indigo Buntings fledged from parasitized nests in Michigan returned in the following year, compared with 9·3% of young raised without cowbirds.

Predation is the single most important reason for nest failure, as it is for most passerine birds. While parasitism on James Island was directly responsible for only 2·9% of nest failures for four cardinalids and two other passerines, predation by other birds and reptiles caused 84·1% of nest losses, with additional failures due to predation by mammals and fire ants (*Solenopsis*). Nest predation by birds, snakes or mammals, including squirrels (Sciuridae) and northern raccoons (*Procyon lotor*), is the primary cause of nest failure among Rose-breasted and Black-headed Grosbeaks. Rose-breasted Grosbeaks reacted to a nest-raiding American red squirrel (*Tamiasciurus hudsonicus*) with a series of screams and threat displays that involved either tilting the head upwards and ruffling the wings or spreading and waving the wings, presumably to expose the colourful underwing-coverts. C. P. Ortega and J. C. Ortega identified the main nest predators in Black-headed Grosbeak habitat in riparian and oak pastures in Colorado as Black-billed Magpies (*Pica hudsonia*), Western Scrub-jays, Steller's Jays, rock squirrels (*Spermophilus variegatus*), chipmunks (*Tamias*), deer mice (*Peromyscus maniculatus*), long-tailed weasels (*Mustela frenata*), striped skunks (*Mephitis mephitis*), northern raccoons, and garter snakes (*Thamnophis*).

Rose-breasted Grosbeaks in southern Ontario woodlots suffered a 63% predation rate, 95 of 151 nests being lost. Black-headed Grosbeak nests studied by the Ortegas in Colorado had a much better success rate, only 37% of 41 nests entirely failing owing to predation. Indeed, the grosbeaks had the highest success rate of passerines in the area, even though their nests, which were sometimes decorated with the purple flowers of lupines (*Lupinus*), appeared conspicuous to human observers. Their high success rate may have been due to aggressiveness in nest defence by both parents.

The eastern racer (*Coluber constrictor*), a non-venomous snake, has been seen to swallow a clutch of Dickcissel eggs in the Flint Hills, in Kansas, and to attempt to seize a nestling Indigo Bunting in Missouri. Blue Jays (*Cyanocitta cristata*) and Common Grackles (*Quiscalus quiscula*) kill young Rose-breasted Grosbeaks. Steller's Jays and Western Scrub-jays are the chief predators of Black-headed Grosbeak nests, but gopher snakes (*Pituophis catenifer*) also take this species' eggs and squirrels take its young. Plush-crested Jays (*Cyanocorax chrysops*) frequently raid the nests of Black-backed Grosbeaks. A Barred Forest-falcon (*Micrastur ruficollis*) has been seen to eat a fledgling Blue-black Grosbeak in Panama, and a Montezuma Oropendola (*Psarocolius montezuma*) was seen to kill a young Black-faced Grosbeak in Costa Rica.



*The male **Rose-breasted Grosbeak** shares in brooding as well as feeding the young. Along with insects, the parents bring a small percentage of seeds, which they may shell at the nest before passing the kernels to the chicks. In the conspecific Black-throated Grosbeak* (Pheucticus melanocephalus), *males and females contribute equally to the feeding of the young throughout the nestling period. The number of feeding trips to the nest was found to remain rather constant throughout that period. As the nestlings grew, however, the adults appeared to bring larger food items, and frequently brought more than one item per trip. In Rose-breasted Grosbeaks, the nestling period is about ten days, but the young are incapable of flight for 2–5 days after leaving the nest, and stay close by.*

[*Pheucticus ludovicianus*, Michigan, USA. Photo: John Gerlach/DRK]

Only an estimated 15% of 121 Northern Cardinal nests monitored in south-western Ohio were ultimately successful. The others were all known or suspected to have been preyed upon. Choice of nest-site appeared to have no effect on the final outcome. Instead, the birds' chief response to a large and varied guild of nest predators, including snakes, squirrels and crows, each with its own micro-habitat preference and search strategy, appears to be the ability to renest rapidly after failure. Cardinals may start a new clutch as little as four days after the loss of an earlier one.

Of 45 Painted Bunting nests found by Parmelee in Oklahoma, only 15 produced fledglings, yielding a total of 37 young. In Kansas, Zimmerman found that nest predation was higher among Dickcissels nesting in old fields than for those in prairie, presumably because predators, especially snakes, are more common in old-field habitats. Predation reached a peak in July, the middle of the nesting season, when nest density was also at its height. Dickcissels that fail in a first nesting attempt may emigrate elsewhere. For example, 62% of Dickcissels studied in south-eastern Illinois relocated more than 10 km away before renesting, in one case moving as much as 32 km. Renesting efforts began 4–15 days after failure, with an average interval of 8·5 days. Although successful Dickcissels generally did not renest, only 2% of those in the study abandoned nesting attempts after a first failure.

The period immediately after fledging, before the young have acquired flight skills, is the most critical for the survival of young. Rose-breasted Grosbeaks are incapable of flight for the first 2–5 days after leaving the nest, and move only short distances from the nest-site. L. C. Moore and his colleagues, in a study of a population of Rose-breasted Grosbeaks in fragmented forests in southern Ontario, found that 86% of total fledgling mortality occurred during the first week after fledging, mostly during the first five days. During this time the young usually remained perfectly still, even when approached closely. They seemed to rely for protection mostly on camouflage and parental defence. Older fledglings, when approached, reacted by moving higher in the vegetation, and tended to stay higher in the canopy, where predators may be less frequent. As the post-fledging period progresses and the young fly better and beg less, their risk of succumbing to a predator decreases and their likelihood of survival improves. Overall fledgling survival in this population was 0·62 for the three-week post-fledging period, a figure comparable to that for other small passerines.

Mortality rates for fledgling Dickcissels in the Missouri Valley were also highest during the first week after departure from the nest. Only 33% survived the first four weeks after fledging. Predation was a major cause of mortality, snakes, including garter snakes and fox snakes (*Elaphe vulpina*), being key predators of both nestlings and fledged young. Most mortality occurred when young birds were within 10 m of the nest-site, and it could be that the density of vegetation cover in the area near the nest is key to fledgling survival. In another studied population in south-eastern Missouri, only 56% of fledglings survived their first two weeks.

Fragmented landscapes frequently expose birds to higher rates of nest predation, as well as brood parasitism (see General Habits). L. A. Smith and her colleagues found that Rose-breasted Grosbeaks in heavily cut woodlots in southern Ontario tended to select lower, better-concealed nest-sites than did birds in lightly logged stands with a less open canopy. Such sites may have exposed the grosbeaks to higher levels of nest predation, and did expose them to higher rates of parasitism.

D. Morris measured the cost to female Indigo Buntings in fragmented forests in Missouri of having to replace a brood lost to a predator. She found that, although renesting could replace lost young, it did so at the expense of females' physical and physiological state. In the fragmented landscape, only 34% of females were able successfully to raise young on their first attempt, compared with 61% in contiguous forest. Birds that lost nests to predators often began another attempt 3–5 days later, perhaps before the females had had time to recover physiologically. Renesting buntings suffered poor body condition and high acute corticosterone levels, and produced young that were themselves in poor condition.

The genera *Parkerthraustes* and *Saltator* are thought not to belong with the true cardinalids (see Systematics), and they are, therefore, treated separately in this section. It appears, however, that nothing is known about the nesting habits of the genus *Parkerthraustes*, the Yellow-shouldered Grosbeak, and, aside



Like the male Northern Cardinal (Cardinalis cardinalis), *the male* ***Vermilion Cardinal*** *is a conscientious parent, contributing as much to the feeding of his offspring as does his mate. In the third member of the genus, the Pyrrhuloxia* (C. sinuatus), *the young are apparently fed more by the female. The diet of nestling Vermilion Cardinals is not known, but is probably largely insects, as with its congeners. Pyrrhuloxias may additionally feed their young with cactus fruit. Northern Cardinals are usually double-brooded, but Vermilion Cardinals and Pyrrhuloxias apparently do not raise a second brood, or, in the case of the Pyrrhuloxia, are rarely successful if they try.*

[*Cardinalis phoeniceus*, Península de Macanao, Isla Margarita, Nueva Esparta, Venezuela. Photo: Roland Seitre]

from Skutch's observations on the Buff-throated and Streaked Saltators in Costa Rica, the breeding biology of *Saltator* has not been studied in detail.

The breeding season of saltators varies with species and geographical location. In central and northern South America, it may extend from March or April to August, although records outside this period exist. In Argentina and Uruguay, the season is primarily from October to January. The Greyish Saltator breeds between March and October in Trinidad, but between October and January in Argentina.

So far as is known, all saltators build an open cup-nest, although the nests of three of the species, the Black-throated Grosbeak and the Black-cowled and Masked Saltators, remain to be described. Nests are constructed variously from twigs, leaves, roots and dry grasses, and lined with finer material. The nests of the Buff-throated and Black-headed Saltators have been described as bulky, and Skutch reported that the Buff-throated Saltator's nest was considerably bulkier than that of the Streaked Saltator.

Saltator nests are normally situated low in a bush or tree, in general not above 4 m, but occasionally they are higher, particularly in the case of the Lesser Antillean and Streaked Saltators. Of 22 Streaked Saltator nests studied by Skutch, 16 were placed between 1·2 m and 2·4 m above the ground, and one was as high as 6 m up in a mango tree (*Mangifera*). Buff-throated Saltators may nest in dense stands of bracken or compact tufts of tall grass in a pasture, and Orinoco Saltators will nest in cane. A Black-winged Saltator nest in north-western Ecuador was supported by pasture grass.

Female Buff-throated Saltators apparently build their nests alone. The male does, however, stay in attendance, bringing food to the female and singing responsively with her during building. Nest-building can take 3–6 days, whereas nests constructed later in the season are usually built in three or four days.

The usual clutch size of saltators is two eggs or, less commonly, three. Egg-laying by Buff-throated Saltators can begin on the day after the completion of the nest or up to four days later. Once laying commences, eggs are laid on consecutive days. The first egg is normally laid in the hour following sunrise, the second one following some 26 hours later. Saltator eggs are blue, bluish-white or bluish-green, generally marked with blackish to brownish spots or streaks. In the case of both Buff-throated and Streaked Saltators, incubation is by the female alone, and is not continuous. Skutch recorded one female Buff-throated Saltator that, during a 12-hour observation period, devoted 66% of her time to sitting on the eggs, which she did in 18 bouts ranging from 6 to 52 minutes in length. Other females spent about the same amount of time in incubating, from 60% to 66%. Streaked Saltators incubate for similar periods, with longer sessions on rainy afternoons. The male Buff-throated Saltator may visit his mate during incubation, while the male Streaked Saltator is more likely to approach the nest when the female is absent. Both species, however, will feed the female at times as she incubates.

The eggs hatch after 13 or 14 days. Newly hatched Buff-throated Saltators have pink skin with a few tufts of long, olive-green down and a red mouth-lining. The young are fully fledged by about 12 days of age, and leave the nest at 13–15 days. For the first few weeks out of the nest, they remain in dense cover. A Streaked Saltator chick was fully fledged by 11 days and left the nest at 13 days.

Both parents, at least of the Buff-throated and Streaked Saltators, feed and attend the young, although apparently only the female broods. Streaked Saltators feed their chicks on a mixed diet of fruit and insects. Skutch observed a male Buff-throated Saltator that fed a nestling only two hours after the latter had hatched. Visiting parent Buff-throated Saltators mashed food items thoroughly in the bill before offering them to their nestlings. At two nests of this species, situated 2·4 m apart in coffee bushes, which Skutch watched over a total of 15 hours, the nestlings were fed 86 and 59 times and brooded for 193 and 226 minutes, respectively. Young Lesser Antillean Saltators are likewise attended by both parents. Apparent helpers at the nest have been recorded for the Black-throated Saltator (see General Habits).

Buff-throated Saltators in Costa Rica raise at least two broods in a season, and replace clutches lost to predation. Skutch recorded that nest predation was high for both Buff-throated and Streaked Saltators. In addition, Black-throated Grosbeaks and Green-winged and Greyish Saltators have been recorded as hosts of the Shiny Cowbird.



*This male **Blue Grosbeak** is delivering a large mantid (Mantidae) to his offspring, but he probably did not catch it. All of the prey capture observed among five pairs of parent birds in Tennessee was done by the female. Mantids more than 75 mm long accounted for 96% of the items delivered to the chicks at these five nests. The females, followed by their mates, plucked the mantids from weedy vegetation while in short or hovering flight, or while hopping on the ground. Before feeding them to the young, the adults removed the head, wings and most or all of the legs.*

[*Passerina caerulea caerulea*, N Kentucky, USA. Photo: Dave Maslowski/ Maslowski Productions]

Movements

Cardinalidae includes not only resident species, but also long-distance, short-distance and altitudinal migrants. Mexican and Neotropical species are largely sedentary, although Crimson-collared Grosbeaks and Blue Buntings have been recorded well outside their normal range, and Rose-bellied and Orange-breasted Buntings are absent seasonally in some parts of Chiapas, in Mexico.

Glaucous-blue and Ultramarine Grosbeaks are partial austral migrants. The Yellow Grosbeak is a summer visitor in the northern part of its range, and has wandered repeatedly to southern Arizona. The Black-backed Grosbeak may be a partial or altitudinal migrant in some parts of its range, but its movements are not well understood. On the Caribbean slope of Costa Rica, the Black-thighed Grosbeak is an altitudinal migrant, moving from higher-lying forest to lower elevations in numbers varying from year to year, probably in response to variations in food abundance.

Although Northern Cardinals and Pyrrhuloxias do not migrate, both species gather in flocks during the winter months, and introduced Northern Cardinals appear to have spread through the Hawaiian Islands at least partly under their own volition (see Relationship with Man). Black-headed Grosbeaks, Blue Grosbeaks and Varied and Painted Buntings are migratory over much of their range, but their breeding and wintering areas overlap, and southern populations may be sedentary. Southern populations of the Black-headed Grosbeak may shift altitudinally. In contrast, Rose-breasted Grosbeaks, Indigo and Lazuli Buntings and Dickcissels are complete migrants, leaving their northern breeding areas in autumn for wintering grounds in Middle America and, for Rose-breasted Grosbeaks and Dickcissels, South America. Indigo Buntings from Michigan may travel 2900–4000 km to reach their winter quarters.

Black-headed and Blue Grosbeaks, Lazuli Buntings and western populations of Painted Buntings are moult migrants (see Morphological Aspects). In the autumn, they largely transfer to staging areas in the south-western USA and north-western Mexico, where they moult before completing the journey southwards to the wintering grounds.

Migratory species breeding in eastern North America, namely the Rose-breasted Grosbeak, eastern populations of the Blue Grosbeak and Indigo Bunting, and Painted Buntings from the Mississippi Valley and Gulf Coast, cross the Gulf of Mexico, although some Rose-breasted Grosbeaks fly around the gulf through north-eastern Mexico. Indigo Buntings flying northwards over the Gulf of Mexico in spring stop to feed along the southern coast of the USA before continuing on to their breeding areas.

Western species and western US populations of more widespread cardinalids migrate over land, though Lazuli Buntings appear on offshore islands in California during passage. Western migrants may still have to cross substantial barriers. As an example, Black-headed Grosbeaks crossing the Mohave Desert in autumn must cross 800–1100 km of desert terrain.

Lazuli and Indigo Buntings migrate along a broad front, rather than following mountain ridges. Indigo Buntings apparently fly downwind during the spring migration, both while crossing the Gulf of Mexico and while flying over land, and wind direction may influence the route that they follow.

Rose-breasted Grosbeaks and Indigo Buntings have broad breeding ranges in North America, and the extent to which eastern and western breeders mix on the wintering grounds is not entirely known. Ringing records suggest that eastern Rose-breasted Grosbeaks winter in Panama and northern South America, while more westerly ones spend the non-breeding season in Mexico and western Central America. Individuals from Ontario and New England have been recovered in western Central America, however, so it is evident that some mixing of populations does occur. The situation is similar for the Indigo Bunting, eastern and mid-western populations of which apparently follow parallel migration tracks and winter in separate areas. Indigo Buntings have been recorded as wintering in good numbers in Jamaica since the 1950s, this possibly representing a recent invasion of the island, as earlier observers failed to record them. One individual recovered in Jamaica had been ringed in Pennsylvania, in the eastern USA.

Eastern populations of the Painted Bunting migrate mostly to Florida and to a limited extent to the Gulf Coast, the Bahamas

and Cuba. More westerly breeders winter in Mexico and western Central America. Eastern Painted Buntings apparently show strong site-tenacity on their wintering grounds, the same individuals being trapped year after year in the same localities.

So far as is known, cardinalids generally migrate by night, although Black-headed Grosbeaks have been recorded moving by day in the Mohave Desert, and Lazuli Buntings may make short-distance movements during the day after arriving on the breeding grounds. Indigo Buntings depart on migration flight at night, but sometimes continue to fly into the daylight hours. In mid-April, ffrench observed groups of up to a hundred Dickcissels as they departed after dark, one after another, from their roosts in Trinidad. Departures continued for several nights until the roosts were empty. At other times during the wintering season, the birds did not leave their roosts at night after settling unless they were threatened by fire.

While migrating, cardinalids travel singly or in mixed-species or single-species flocks. Flocks of more than 50 migrating Rose-breasted Grosbeaks have been recorded in Panama, and J. Van Tyne recorded Indigo Buntings gathering in flocks in Guatemala during the weeks before they left to cross the Gulf of Mexico.

Spring migration is generally less protracted than that in autumn, probably because there is an advantage in securing territories and mates for adults that arrive early on the breeding grounds. There may, nonetheless, be considerable variation in the timing of spring migration among Indigo Buntings. Rose-breasted Grosbeaks have been estimated to migrate at an average rate of 80 km per day in spring and 38 km per day in autumn, including stopovers. The travel speed of migrating Indigo Buntings has been estimated at about 32 km per hour. Spring "overshoots", in which individuals occur far north of their normal breeding range in early spring, have been recorded for Blue Grosbeaks and Painted Buntings.

As is typical for North American passerines, males of migratory species tend to arrive on their breeding grounds ahead of the females, and older males before younger ones. The difference may be a matter of only a few days. Mean passage dates of Rose-breasted Grosbeaks captured on spring migration at Prince Edward Point, in Ontario, were 15th May for adult males and 18th May for yearling males and females. More brightly coloured yearling males tended to arrive earlier than dull-coloured birds.

Adult male Black-headed Grosbeaks arrive on their breeding grounds in New Mexico within 4–5 days of one another, while females start to arrive 5–7 days after the arrival of the first males. Yearling males reach the area some time later, 12–16 days after the first adult males and well after all adult males have settled, thereby avoiding the adults' peak period of aggressiveness. Unlike the Ontario Rose-breasted Grosbeaks, there is no apparent tendency for yearling males with more adult-like plumage to arrive earlier.

Lazuli Bunting males begin arriving in Utah, in the western USA, about four days before females and older birds two or three days before yearlings, although there is considerable overlap. There can be a gap of up to two weeks between the arrival of the first male Indigo Bunting and that of the first female, this apparently resulting from differences in pre-migratory fattening schedules and in times of leaving the wintering area. The average departure date recorded for males of all age-classes wintering in Jamaica was 16th April and that for females was 23rd April, a difference of a week. Arrival dates of Painted Buntings are less precisely known, but males were present in South Carolina one week before females and, in Georgia, adult males arrived 1–2 weeks before the arrival of yearlings.

The timing of autumn departure may also be staggered according to age and sex. Adult male Black-headed Grosbeaks leave the breeding grounds in late July or early August, but females and young of the year remain for several weeks longer, usually departing in mid-August. Adult male Lazuli Buntings leave their breeding grounds slightly before the females, and older birds slightly before younger ones, with juveniles of the year the last to depart. Adult males from the eastern population of Painted Buntings arrive on the wintering grounds in Florida before the females.

Prior to autumn migration, most Indigo Buntings increase their mass by some 50% as they accumulate subdermal and abdominal fat deposits. Those that do not do so may stop to feed en



*The male **Painted Bunting** apparently does not feed the nestlings and only sporadically visits the nest while the young are in it. The female brings them caterpillars, small grasshoppers (Orthoptera) and beetles (Coleoptera), which she gathers both on and off the male's territory. Females frequently brood between feeds, especially when the nestlings are small. The female may begin to construct a new nest for a second brood while still feeding fledglings. One was observed to feed a young bird, pull some material from a branch and place it in the new nest, then fly to fetch more food. But just before she begins egg-laying, the male takes over the feeding of the fledglings. The young begin to catch insects themselves at 26–29 days of age.*

[*Passerina ciris pallidior*, Kickapoo Cavern State Park, Texas, USA. Photo: Sid & Shirley Rucker/ DRK]



For a few cardinalid species, there are instances of more than one female laying in the same nest, and even of nests occupied simultaneously by more than one female. But the ***Northern Cardinal*** *has been known to share with some odder nestfellows, as these remarkable photographs show. This nest, which contained three cardinal chicks and four young* ***American Robins****, was found in Erlanger, in Kentucky, in the mid-1970s. It was not discovered (or not reported) until after the young had hatched, but the nest appears to have been begun by the cardinals and finished by the robins. It is not known how the birds shared incubation. The brood sizes were typical for each species, and all young fledged. The photographer recalls that the species seemed to tolerate each other, but were not enthusiastic friends. When the young first hatched, there seemed to be some cross-feeding between the species, perhaps out of confusion. As the young grew and became more distinct, and the parents became more familiar with the setting, the adults seemed to target their own young, helped by the fact that the interior of a robin's mouth is yellow, while the interior of a cardinal's is red. The same two species shared a nest in Iowa; the two females, attended by their mates, incubated the eggs separately or while sitting side by side on the nest, although only the robin chicks fledged successfully.*

[*Cardinalis cardinalis cardinalis* and *Turdus migratorius*, Erlanger, N Kentucky, USA.
Photos: Dave Maslowski/ Maslowski Productions]

route; in order to cross the Gulf of Mexico, a bunting will need to expend about 30% of its body mass. Indigo Buntings wintering in Jamaica take on fat prior to the northward return migration, but those in the southern part of the wintering range do not; presumably, the latter stop to build up their fat reserves in Mexico before re-crossing the Gulf. As the birds move northwards towards their breeding grounds, they stop to feed, but they arrive leaner than they become later in the season.

Dickcissels gain extra fat prior to autumn migration both by eating more and by increasing their digestive efficiency so that fewer nutrients are lost in their excreta. In late March and April, the birds become hyperphagic on their wintering grounds, "overeating" in order to gain fat reserves. Metabolic adjustments allow them to put on fat more rapidly than those individuals whose gain in mass is due to food intake alone. Dickcissels wintering in Trinidad may increase their weight by 56%. These behavioural

and physiological shifts appear to be controlled by internal mechanisms, and will continue for at least a year even if the birds are kept in controlled environments with constant daylength and temperature.

In the 1960s, Emlen carried out studies of migratory orientation by Indigo Buntings and a single female Rose-breasted Grosbeak that exhibited migratory restlessness ("Zugunruhe"). Both species were able to orient themselves in the appropriate direction when exposed to the night sky. In experiments in a planetarium with captive Indigo Buntings, the birds oriented themselves in the appropriate direction as indicated by the sky projection, but they were unable to orient if no projection was shown. These results supported the hypothesis that the birds steer primarily by the patterns of stars in the night sky. Further experiments revealed that the buntings were able to adjust for stellar rotation as the nights progressed, suggesting that they have an internal clock that allows them to compensate for shifts in time.

Other mechanisms, however, must also be involved in migratory orientation. Emlen and his colleagues demonstrated in further experiments that, even when the night sky was visible, alteration of the magnetic field caused captive Indigo Buntings to shift direction. P. D. Sniegowski and his colleagues captured adults of this species in summer, and in the following spring released them some 1000 km from the capture site. The birds were able to return to their former breeding sites and reclaim their territories, suggesting that experience with familiar landscape cues may be important in informing them that they have arrived at their destination.

A few species have been recorded straying to Europe, for instance the Indigo and Lazuli Buntings and the Dickcissel. Much the most significant is the Rose-breasted Grosbeak, which may be the third commonest transatlantic vagrant among all the passerines.

Finally, with regard to the two probably non-cardinalid genera *Parkerthraustes* and *Saltator*, neither the Yellow-shouldered Grosbeak nor any species of *Saltator* is migratory, although some saltators are known to wander. In Ecuador, the Masked Saltator undertakes non-seasonal movements, perhaps in response to changes in the availability of cones of *Podocarpus oleifolius* (see Food and Feeding).

Relationship with Man

Cardinalids have attracted human attention, and admiration, for centuries. This is reflected in some of their local names. For example, in South America, the Black-backed Grosbeak is known as *rey del bosque*, meaning "king of the woods", while *Cyanocompsa* and *Cyanoloxia* grosbeaks are known as *reinamora*, or "gypsy queen", the Ultramarine Grosbeak being *reinamora grande* while the Glaucous-blue Grosbeak is *reinamora chica*.

Northern Cardinals have become human commensals in many areas. They are common and popular year-round visitors to suburban feeding stations, where, as M. M. Nice put it in 1927, "they rejoice us with their flaming beauty and their splendid song". At the other extreme, Black-backed Grosbeaks are reportedly killed by some fruit-growers, who regard them as a pest.

The Dickcissel has been hunted for food and heavily persecuted as a crop pest in Venezuela, where it is known as *el pájaro arrocero*, "the rice bird" (see Food and Feeding, Movement, and Status and Conservation). Hunters shoot these birds with guns and slingshots, enter their roosts at night and club the birds with sticks and bats, and even drive vehicles rapidly through flocks flying low across farm roads. In 1963, in Mexico, an unusual concentration of millions of Dickcissels near the city of Culiacán, in Sinaloa, wrought havoc on local wheat crops, and the farmers responded with firearms, explosives, slingshots, sticks and huge quantities of pesticides.

Cardinalids were well known to native Americans. A Yanomamo tale mentions that Yellow-green Grosbeaks eat hayi (*Pseudolmedia laevigata*) fruits. In the late sixteenth century, the artist and colonist John White recorded, on a watercolour, the Algonquian name *Meesquouns* for the Northern Cardinal in North Carolina.

Cherokees invoked the Indigo Bunting to control the wind, possibly because of its blue colour, as they called upon the East-



*Both **Northern Cardinal** parents generally carry away the nestlings' faecal sacs, although in the first days after hatching the adults swallow these rather than removing them. Nests can become infested with mites (Acarina) and other invertebrates, which may be one reason why subsequent broods are normally raised in a new nest. During 1960, in Canada, 534 organisms were collected from 32 Northern Cardinal nests in London, Ontario. In order of decreasing numbers they were ants, bark lice (Psocoptera), beetles, mites, sowbugs (Isoptera), springtails (Collembola), spiders, snails, millipedes (Diplopoda), harvestmen (Opiliones), hemipterous nymphs, biting midges (Diptera), a slug, a damsel bug (Nabidae) and a wasp.*

[*Cardinalis cardinalis cardinalis*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]



Saltators typically fledge at around twelve days and leave the nest at 13–15 days, although this may vary. The nestling period for the ***Greyish Saltator*** *in Argentina appears to be 18–19 days, whereas a Streaked Saltator* (Saltator striatipectus) *chick was fully fledged by eleven days and left the nest at 13 days. During the first few weeks out of the nest, young saltators remain in dense cover and continue to be fed by the parents. Fledglings of the Buff-throated Saltator* (S. maximus) *are attended by both parents until they are 50–55 days old.*

[*Saltator coerulescens coerulescens*, Kuryala Lodge, São Felix do Araguaia, Mato Grosso, Brazil. Photo: Edson Endrigo]

ern Bluebird for the same purpose. Cherokee men invoked the Northern Cardinal, the "Redbird", as part of a spell to attract women, as transcribed some time after 1890:

I am dressed as well as the Redbird
I am as handsome as the Redbird
I am as masculine as the Redbird
I can do as much as the Redbird
I can say as much as the Redbird
Dho tsu! Dho tsu hwi!

The Cherokees believed that the Northern Cardinal was the daughter of the sun. According to a Cherokee legend, the cardinal was originally a brown bird, but, after he had helped a wolf to clear mud from his eyes—mud placed there by a trickster raccoon—the wolf rewarded him by painting his feathers red with pigment from a magical rock. In a variant of the story, the bird jumped into a magical pool, being careful not to submerge his mouth, which is why there is no red around the cardinal's beak. By the time his mate arrived, there was enough red paint left only to daub her in a few places, leaving her barely touched with red to this day.

Cardinals have been regarded as omens. Some southern native Americans believed that the sudden flight of a cardinal foretold the arrival of a guest. There is also a superstitious belief that a cardinal flying up is a sign of good luck, but one flying towards the ground is a portent of ill fortune.

The Northern Cardinal has been chosen as the state bird of seven American states, starting with Kentucky, in 1926, and followed by Illinois, after a poll of the state's schoolchildren, and Ohio, North Carolina, West Virginia, Virginia and Indiana. The bird has given its name to a number of sports teams, including the St Louis Cardinals baseball team.

Northern Cardinals have been kept in Europe since the sixteenth century. An account entitled "De Coccothrauste Indica cristata", accompanied by a woodcut apparently drawn from life, was published in 1600 in *Tomus Alter* of the *Ornitologiae* of U. Aldrovandi (1522–1605). Even then the bird was known as *cardinalitus*, presumably, as Aldrovandi notes, because of its red colour, the hue associated with ecclesiastical cardinals. Aldrovandi passes on a report that a living specimen ate almonds and chickweed, became agitated on seeing its reflection in a mirror, plunged itself into water frequently, and imitated the voices of other birds, particularly the Common Nightingale (*Luscinia megarhynchos*). In 1731, M. Catesby noted that the bird was known in England as the "Virginia Nightingale", and was popular in Europe for its "beauty and agreeable singing".

The Painted Bunting has long been known in aviculture as the *Nonpareil*, a word meaning "without equal". According to Audubon, even in the early nineteenth century large numbers were trapped in Louisiana for the cagebird trade. People used a mounted male as a lure to catch the birds; a passing male Painted Bunting "dives towards the stuffed bird, with all the anger its little breast can contain. It alights on the edges of the trap for a moment, and throwing its body against the stuffed bird, brings down the trap, and is made prisoner." The birds were bought by middlemen for sixpence in New Orleans, but on arrival in England they fetched three guineas each in London. Few vessels left New Orleans in the summer months without carrying some Painted Buntings. Painted Buntings continue to be extensively trapped on their wintering grounds (see Status and Conservation).

All except one of the *Passerina* buntings are kept and bred in Europe. The single exception is the Rose-bellied Bunting, which apparently has never been imported into Europe, a rather surprising fact when one considers that the Orange-breasted Bunting, even though it has proven a difficult species to breed, is well known in trade.

Other members of the family commonly kept as cagebirds include the Ultramarine and Glaucous-blue Grosbeaks, the Vermilion Cardinal and the Green-winged Saltator (see Status and Conservation).

Status and Conservation

None of the species presently included in the family Cardinalidae is currently considered to be globally threatened, but four are listed as Near-threatened. These are the Painted Bunting, the Rose-bellied Bunting, the Masked Saltator and the Rufous-bellied Saltator. Although not classified as globally threatened, the Black-throated Saltator, a *cerrado* endemic, is listed as "Vulnerable" in the state of São Paulo, in Brazil. In the 2007 WatchList published



After having left the nest, ***Northern Cardinal*** *fledglings may move very little for up to eleven days. They can fly by 19 days of age. One juvenile Northern Cardinal in Maryland, USA, was independent by 50 days, but associated with its parents for a further 20 days. The juvenile's plumage is similar to the female's, but much duller, although males can have some red on the chest or flanks. The bill is greyish. Early-hatched young of this species often undergo a complete moult, but late-hatched cardinals may retain their first flight-feathers during the winter.*

[*Cardinalis cardinalis cardinalis*, New York, USA. Photo: Marie P. Read]

by the National Audubon Society and the American Bird Conservancy, Varied and Painted Buntings are listed in the "Yellow category", indicating that they are declining or rare.

The Masked Saltator is known from only a few disjunct localities in the central Andes of Colombia, southern Ecuador and north-central Peru, where it is rare and local (see Habitat, and Food and Feeding). L. M. Renjifo has suggested that its low population density in Colombia may be the result of its strong preference for highly localized patches of *Podocarpus oleifolius*, a slow-growing primary-forest tree that has been overcut for its valuable wood. The species' known localities in Colombia and Ecuador are in heavily deforested areas, and in general the montane forests of the north Andes are under intense threat from conversion to agriculture and cattle pasture, mining and logging.

In addition to its global Near-threatened status, the Masked Saltator has been listed as "Vulnerable" in Colombia. Its most viable populations may be in Podocarpus National Park, in southern Ecuador, and in the Alto Quindío Acaime Natural Reserve–Los Nevados National Park–Ucumari Regional Park complex, in Colombia. Deforestation in the south-eastern buffer zone of Podocarpus National Park is expected to eliminate half of the remaining *Podocarpus* in the years to come.



Cowbirds (Molothrus) *may be particularly attracted to the* ***Northern Cardinal*** *because its bright colours and conspicuous behaviour make its nests easier to find. But the presence of young cowbirds in the nest seems to have little effect on the cardinal's young, with no significant differences in weight and size between nestlings in parasitized and unparasitized nests. Other species do not fare so well. Pyrrhuloxias* (Cardinalis sinuatus) *in Texas fledge very few young if they have been parasitized.*

[*Cardinalis cardinalis magnirostris*, New Braunfels, Texas, USA. Photo: Rolf Nussbaumer/naturepl.com]



*Post-breeding flocks of **Dickcissels** move into areas of high food abundance, where they gain weight both by eating more and by increasing their digestive efficiency. Prior to migration, they may accumulate up to 15 g of fat. Travelling mostly at night, they arrive on their core wintering grounds in Venezuela in September or October. In late March and early April, after dark, groups of Dickcissels break away from the huge roosting flocks and begin their return migration together. These departures continue for several nights until the roosts are empty. Dickcissels are erratic and invasive, and numbers in different areas of their breeding and wintering grounds can vary dramatically from year to year.*

[*Spiza americana*, Port Aransas, Texas, USA. Photo: Andy & Gill Swash/ WorldWildlifeImages.com]

The Rufous-bellied Saltator of the Andes of Bolivia and north-west Argentina is thought to have a relatively small, fragmented population containing in excess of 10,000 individuals, and to be in decline owing to loss of its temperate shrubland habitat. It is very local outside the Bolivian province of Cochabamba, where it is common in some areas, but it is common in one area in La Paz, and it has recently been found at several new sites. Native shrub species may be essential to its survival, but shrubland patches, including *Polylepis* and alder (*Alnus*) stands, in its range are being fragmented and converted for agricultural and commercial forest use.

The little-known Rose-bellied Bunting is considered Near-threatened on the basis of its restricted Mexican range. Habitat degradation, including forest fragmentation, has been occurring within its area of distribution, but the effect of this on the species is at present unclear. In Mexico, this bunting is classified as "Threatened".

With a seemingly healthy global population, estimated at 4,500,000 in 2011, the Painted Bunting is still common in some areas. Nonetheless, there is evidence that it declined rapidly throughout its range from the mid-1960s until at least 2004–2005. North American Breeding Bird Survey data showed a significant decline of about 2·5% annually between 1966 and 2002 in the continental USA (including five years of data from north-eastern Mexico), amounting to a total loss of roughly 55% of the original population. National Audubon Society Christmas Count data from 1960 to 2003 also demonstrated a population decline. This decline has been blamed on habitat degradation and loss, cowbird parasitism in the case of the eastern population, and heavy trapping on the wintering grounds for the pet trade. Development of coastal swamp-thickets and woodland edges, loss of stands of shrubby wax myrtle (*Myrica*) and buckthorn (*Rhamnus*) in open-canopied pines and hardwoods, and replacement of native grasses, the seeds of which are an important food source, with sod grass have significantly reduced available habitat in the limited coastal range of the eastern population. Loss of riparian habitat in the south-western USA and in north-western Mexico affects the western population's mid-migratory staging and moulting areas. Brown-headed Cowbirds have only recently expanded into the breeding range of the eastern population, where parasitism rates now reach as high as 80%.

Although protected by law in the USA, Painted Buntings have been trapped legally in Mexico for at least the last 50 years. One probably conservative estimate suggests that, between 1979 and 2002, up to 5800 individuals each year—a minimum total of 100,000 overall—were legally trapped in Mexico for the domestic pet trade alone. In the 1984–1985 harvest season, trappers for the domestic trade were authorized to harvest 23,000 birds in five Mexican states. Painted Buntings have also been reported in local markets in Cuba, Costa Rica, Nicaragua and Guatemala, and illegal trade in the species has been reported in both Mexico and Florida.

In addition to capture for domestic markets, Painted Buntings have been trapped for export to markets in Europe, Asia and South America. The UK, Belgium, the Netherlands, Greece, Italy, Spain, Malaysia, Japan, Argentina and Paraguay have been recorded as major importers of the species. Painted Buntings reportedly fetch US$70 per pair on Asian and European markets. Except during the years 1982–1999, when it banned wildlife exports, Mexico has exported large numbers of the birds. Export figures reached at least 15,000 individuals during the 1974–1975 harvest season, and an estimated 12,000 during 2001–2002. In 2004, Mexico and the USA proposed that the Painted Bunting be included on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), but the proposal was not accepted.

Several other cardinalids are trapped in varying numbers. Ultramarine Grosbeaks are common targets of cagebird-hunters in Brazil, where there is extensive illegal domestic traffic in wild birds. They were among the species most frequently confiscated from bird-traffickers in Rio Grande do Sul, in south-east Brazil, between 1998 and 2000. In Catolé do Rocha, a city in Paraíba, in the *caatinga* region of Brazil where native bird-keeping is particularly common, a 2006–2007 survey of cagebirds in markets and private homes found Ultramarine Grosbeaks to be the sixth-commonest out of 38 species recorded. During 2006, Green-winged Saltators and Ultramarine Grosbeaks were the third and sixth most frequently confiscated bird species, with 2730 and 916 individuals, respectively, in the Brazilian state of São Paulo. Glaucous-blue Grosbeaks have also been popular targets, as have some other saltators. Numbers of Golden-billed Saltators in Córdoba,



*The **Vermilion Cardinal** is a restricted-range species found in the Caribbean Colombia and Venezuela Endemic Bird Area (EBA), in the north of those countries. It is quite common in semi-arid scrub with cacti and spiny leguminous bushes, and is not considered globally threatened. Large areas of suitable habitat remain in both countries, but are almost entirely unprotected. The Vermilion Cardinal is frequently captured illegally for the cagebird trade, and uncontrolled poaching can have a marked negative effect on populations. The species' long-term survival may depend on the protection of sites where poaching is not yet a problem.*

[*Cardinalis phoeniceus*, La Guajira, Colombia. Photo: Pete Morris]

in Argentina, are reportedly dwindling owing to the capture of adults for pets, as well as high nest predation in rural areas.

In northern Venezuela, the Vermilion Cardinal is a target for poachers. Rodríguez-Ferraro found that populations at three of six arid-zone sites studied in 2004–2005 had been reduced as a result of illegal trapping for the cagebird trade. The species' long-term survival may depend on the protection of sites where poaching is not yet a problem.

Although the Varied Bunting is apparently expanding its range in Arizona, and its global population has been estimated at 500,000–5,000,000 individuals, it has become a rarity in southern Texas and is listed as "Threatened" in New Mexico, where it has only recently established itself, breeding having been first recorded in 1972. This species' habitat may be threatened by development along the USA–Mexican border and over much of its Mexican range.

Currently classified as of Least Concern by IUCN, the Dickcissel has been the subject of considerable conservation attention in the past. One observer even predicted in 1979 that the species would be extinct by the year 2000. In some part this concern has been the result of a failure to appreciate the species' opportunistic colonization and breeding strategies. Dickcissels are erratic and invasive, and they can appear for a short time in areas not suitable for long-term colonization. Those that invaded the central Canadian province of Manitoba in 1973, for example, nested in alfalfa fields but, when the fields were cut, any nests with young were presumably destroyed.

During the first half of the nineteenth century the Dickcissel was common along the eastern seaboard of the USA from Cape Cod south to the District of Columbia, but by 1904 it had completely disappeared as a breeding species east of the Allegheny Mountains, in the west-central Appalachians. This disappearance has never been satisfactorily explained, although it is possible that the eastern population represented a recent colonization, sustained by the spread of hay crops in the region. It was suggested at the time that the increased use of mowing machines during the nesting period might have been responsible, but S. N. Rhoads had pointed out in 1903 that these machines were used also in the western part of the species' range. Rhoads suggested that the birds had not disappeared at all, but that the eastern breeders had simply shifted to the west, possibly as a result either of some event on the wintering grounds or of meteorological changes along the spring migration route.

Whatever the true explanation, Dickcissels began to reappear in the east in the 1920s. In 1928 they staged an extensive eastern invasion, turning up in the area from New Jersey south to South Carolina, but the species failed to re-establish itself as more than an occasional straggler and sporadic nester.

Whether these shifts were accompanied by a genuine change in numbers remains unclear. By the mid-1960s, however, Dickcissel populations began to decline in earnest. The North American Breeding Bird Survey recorded a 40% continent-wide drop in numbers between 1966 and 1996, although the population appears to have stabilized to some extent by the mid-1990s.

*The **Masked Saltator** is one of four cardinalids categorized as Near-threatened. Patchily distributed in steep montane forest in Colombia, Ecuador and Peru, this saltator is nowhere common and is thought to be in decline because of habitat loss. Recent studies suggest a strong association with the tree* Podocarpus oleifolius, *which comprises a very small proportion of montane evergreen and elfin forest.* Podocarpus *is slow-growing and heavily logged for its wood.*

[*Saltator cinctus*, above Ibague, Colombia. Photo: Hadoram Shirihai]





*The **Black-cowled Saltator** is a restricted-range species, confined to less than 20,000 km² of humid montane forest and forest edge in the Tumbesian Endemic Bird Area (EBA) of western Ecuador and north-western Peru. During the late 1980s this species was listed as Near-threatened, but, because it is now known to be able to adapt to degraded habitats and regenerating scrubland, it is currently considered of Least Concern. But less than 5% of the primary forest in the Tumbesian EBA remains, and 15 of the more forest-dependent restricted-range species found there are listed as globally threatened.*

[*Saltator nigriceps*, Utuana, Loja, Ecuador. Photo: Doug Wechsler/ VIREO]

Data from this ongoing survey indicate that the overall decline has slowed to insignificant levels in recent years, and in 2007 the species was removed from the National Audubon Society's Watchlist for United States Birds.

Nevertheless, decline is still continuing at regional levels. Dickcissel populations in restored grasslands in Missouri and Iowa are not self-sustaining. R. J. Fletcher and his colleagues found rates of decline in Iowa to be approximately 40% per year, nest predation being the largest contributing factor (see Breeding). Similarly, in a study published in 2008, K. With and her colleagues found that Dickcissel populations in the Flint Hills of Kansas and Oklahoma, an area that preserves the largest intact tall-grass prairie (about 2 million ha) left in the world, are continuing to decline at an estimated annual rate of either 11–21% or 19–29%, depending on the analysis.

Dickcissels adapt better to changes in land use than some other grassland species, such as Henslow's Sparrow (*Ammodramus henslowii*), although they are less productive than Henslow's Sparrows in prairie fragments in south-western Missouri. Studies of nesting success failed to locate evidence connecting their fall in numbers to conversion of original prairie habitat to agricultural land. The primary factor in the Dickcissel's decline in the second half of the twentieth century appears to have been persecution by farmers on the wintering grounds in Venezuela, where the species is perceived to be a serious crop pest (see Food and Feeding).

S. D. Fretwell suggested that the decline may have been related to a skewed sex ratio, brought about because male Dickcissels, which are larger than females, were better able to feed on the large seeds of cultivated rice and sorghum. He predicted that the population would come to be dominated by males, and that this could lead to the collapse of the species. Basili and Temple found a sex ratio on the wintering grounds of 1·53 males to 1 female, much lower than Fretwell had predicted, and they were unable to establish either that this was due to female starvation or that it had changed significantly since the 1960s.

Instead, Basili and Fretwell blamed much of the decline on direct persecution. Most efforts by Venezuelan farmers to prevent crop damage in the weeks preceding the harvest involve noise-making, people either banging pots and pans in the fields or shooting air cannons or bottle-rockets. Some, however, use organophosphates such as parathion and azodrin to poison water-holes, spray feeding areas just prior to morning feeding bouts, and spray nocturnal roosts from the air or the ground. Spraying of nocturnal roosts in particular sometimes kills hundreds of thousands of birds in minutes. One farmer estimated that he had killed more than 1,000,000 birds on his property over the years.

Although the use of lethal control methods appears to have declined in recent years, Dickcissels are still vulnerable on the wintering grounds. A single roost, which could be destroyed in a few nights, can contain up to 3,000,000 million individuals, 30% of the species' entire global population. Alternative, non-lethal control methods, in addition to simply frightening the birds away, could include the use of repellent chemicals such as methiocarb and anthraquinone. Trials of these chemicals on captive Dickcissels reduced the birds' consumption of rice by between 70% and 90%. In 1998, the Venezuela Audubon Society held a



*The forests of the Costa Rica and Panama Highlands Endemic Bird Area (EBA), where the **Black-thighed Grosbeak** is found, have suffered widespread destruction. In Costa Rica, it is predicted that the forests will not long survive outside protected areas, and in Panama only isolated patches are left. The Black-thighed Grosbeak is still fairly common in Costa Rica, but local or uncommon in Panama. As well as being present in many protected areas, however, it can adapt to heavily degraded forest and other modified habitats such as pastures with residual trees. It is not considered globally threatened.*

[*Pheucticus tibialis*, San Gerardo de Dota, Costa Rica. Photo: Marco Saborío]



A restricted-range species present in the High Andes of Bolivia and Argentina Endemic Bird Area (EBA), the ***Rufous-bellied Saltator*** *is largely associated with* Polylepis *forest. In Bolivia, it is still common at some sites in Cochabamba, but is otherwise very local. Several new sites have been discovered, and the total Bolivian population is thought to exceed 10,000. In Argentina its status is uncertain; it seems generally uncommon and has disappeared or declined in areas where it was previously abundant. Although sometimes found in agricultural fields, it may depend on access to patches of native shrubs and trees. It is considered Near-threatened because of its fragmented and declining population.*

[*Saltator rufiventris*, Tunari National Park, Cochabamba, Bolivia. Photo: Daniel Alarcón]

workshop on the matter, and this resulted in the formation of a Ricebird Alliance, led by the society and the region's two most important farmers' groups, intended to find co-operative ways to address the problem.

In contrast to the efforts made to remove species from sensitive areas, there have been several attempts to introduce cardinalids in places outside their natural ranges. European settlers introduced Northern Cardinals into Bermuda, probably from Virginia, perhaps as long ago as 1700, but certainly by the early nineteenth century. Thousands were reportedly trapped there for the cagebird trade during the nineteenth century. J. M. Jones, who apparently thought that the birds arrived in Bermuda naturally, reported in 1859 that a "favourite sport of native boys" was to catch cardinals with traps made from lantana stems and baited with maize. The species is still common in Bermuda, despite a reduction in numbers since the 1950s following increased urbanization, the loss of native cedar (*Juniperus bermudiana*) forest and the introduction of House Sparrows (*Passer domesticus*), Common Starlings (*Sturnus vulgaris*) and Great Kiskadees (*Pitangus sulphuratus*).

Cardinals, including individuals from a mixture of races, have been repeatedly introduced into south-western California since 1880, but have failed to spread. They were introduced in Victoria, in Australia, without success in the 1860s or 1870s. Cardinals were released on Tahiti at some point after 1921 and were common there for a time, but the species had apparently disappeared by 1972. In the Hawaiian Islands, Hui Manu and other acclimatization societies released 300–350 Northern Cardinals on Kauai, Oahu and Hawaii between 1929 and 1931. As part of a "Buy-a-Bird" campaign during 1929–1930, schoolchildren in Hilo, on Hawaii, were encouraged to raise money to bring 163 cardinals to the island from Oahu. The birds were well established in the archipelago by the end of the 1930s, and subsequently spread, apparently unassisted, to Maui by 1943, Niihau by 1947, Molokai by 1951, Lanai by 1957, Kahoolawe before 1980 and, surprisingly, Nihoa, at least 275 km from the nearest source island, by 1983.

Attempts were made in the 1930s and 1940s to introduce *Passerina* buntings in Hawaii. On Oahu, Indigo Buntings were released during 1934–1936 and Painted Buntings before 1937, by Hui Manu, and more than 425 pairs of Orange-breasted Buntings were released in 1941–1950; Orange-breasted Buntings were brought to Maui in the 1940s; and Indigo and Painted Buntings were released on the island of Hawaii in May 1937. Although Orange-breasted Buntings did breed on Oahu in 1950, none of these attempted introductions was successful. Grosbeaks, possibly Black-headed, were released, likewise unsuccessfully, at Pu'u Wa'a Wa'a Ranch, on Hawaii, in 1902.

Although habitat fragmentation can have a highly detrimental effect on nesting cardinalids (see Breeding), the members of this family often appear to adapt well to disturbed habitats and human presence. For example, Black-thighed Grosbeaks are common in human-dominated landscapes in Ecuador. Blue-black Grosbeaks more than doubled their numbers in burnt forest plots 10–15 months after an accidental understorey wildfire swept through the Tapajós–Arapiuns Extractive Reserve in central Brazilian Amazonia in 1997, although the same species disappeared from *terra firme* forest fragments 1 ha in size, though not from larger ones, at the Biological Dynamics of Forest Fragments Project (BDFFP) near Manaus.

The effects of human activity on cardinalids may be more subtle. T. M. Jones and his colleagues have recently demonstrated that the plumage brightness of male Northern Cardinals in Ohio is lowered in areas of increasing urbanization, although the birds can compensate for this in more urban areas by feeding on the carotenoid-rich fruits of ornamental plants such as Amur honeysuckle (*Lonicera maackii*).

A number of species in North America have expanded their ranges following human alteration of the landscape. During the 1980s, after severe frosts killed thousands of acres of citrus groves in central Florida, the abandoned groves became overgrown with weedy vegetation. This converted them into ideal breeding habitat for Blue Grosbeaks and Indigo Buntings, and these species have substantially increased their breeding range in the state. Painted Buntings have undergone a similar but more limited increase.

The Northern Cardinal has achieved a considerable northward range expansion since the nineteenth century, the probable result of warming climate trends, increases in edge habitat created by human alteration of the landscape, and the popularity of winter feeding stations. The cardinals may have followed river valleys as they moved northwards, although they are not confined to riparian habitat in core areas of their range.

Northern Cardinals were first recorded in Ontario in 1849, in South Dakota in 1887, in Michigan in 1884 and in Minnesota in the

late nineteenth century. They invaded Wisconsin in 1900 and again, more successfully, in 1910–1912, 1919–1920, 1927–1928 and 1932–1935, each invasion carrying them farther north in the state. They expanded "spectacularly" in New England during the 1950s. Cardinals expanded their range in Canada throughout the twentieth century, particularly after the late 1930s. They are now abundant residents in southern Ontario, having reached Ottawa, Sudbury and Thunder Bay by 1976. The species has also expanded its range in the south-west USA, spreading through the Colorado River Valley in Arizona and, marginally, south-eastern California.

General Bibliography

Akiko (1996), Aldrich (1948), Aldrovandi (1600), Aliabadian *et al.* (2009), Almeida *et al.* (2006), Alsop (1979), Alves *et al.* (2010), Anderson, A.H. & Anderson (1946), Anderson, B.W. & Daugherty (1974), Anderson, J.F. *et al.* (1986), Anderson, M.E. & Conner (1985), Anon. (2003, 2004, 2007b, 2010b, 2010c, 2010e, 2010f, 2010g, 2010h, 2010i, 2010j, 2010k, 2010m), Antevs (1947), Audubon (1831), Avery *et al.* (2001), Baird (1964), Baker (1991, 1994, 1996), Baker & Baker (1988, 1990), Baker & Boylan (1995, 1999), Baker & Johnson (1998), Ballentine & Hill (2003), Ballentine *et al.* (2003), Bangs & Bradlee (1901), Barber & Martin (1997), Barlow *et al.* (2002), Barreira *et al.* (2007), Basili & Temple (1995, 1998, 1999a, 1999b), Bass (1979), Beddall (1963), Beecher (1953), Belcher & Thompson (1969), Beltzer (1988a), Beltzer, Comini *et al.* (1999), Beltzer, Quiroga *et al.* (2004), Benedikt *et al.* (2009), Berkeley *et al.* (2007), Bernardi De León (2009), Besser *et al.* (1970), Blake, C.H. (1969, 1971), Blake, J.G. & Loiselle (1992), Bock (1964, 1994), Bodrati & Sierra (2008), Borges & Cardoso (1995), Borror (1961), Bosque *et al.* (1999), Brackbill (1944, 1952, 1954, 1967), Bradley (1948), Brandt *et al.* (2009), Braun & Emanuel (1982), Breitwisch *et al.* (1999), Brennan & Schnell (2005), Brower & Calvert (1985), Brown, B.T. (1994), Brown, H.C. (1920), Browning & Robel (1981), Burhans (1997), Burhans *et al.* (2000), Burns, K.J. *et al.* (2003), Burns, R.D. (1963), Butcher *et al.* (2007), Cáceres & Moura (2003), Callaghan (1983), Camp *et al.* (2010), Campbell & Lack (1985), Cannell *et al.* (1983), Cant (1979), Cardiff & Remsen (1981a), Carey (1982), Carey & Nolan (1979), Carling (2008), Carling & Brumfield (2008a, 2008b, 2009), Carling *et al.* (2010), Carrera *et al.* (2008), Catesby (1731), Chapman (1927b), Chesser *et al.* (2009), Christy (1942), Conner *et al.* (1986), Cracraft & Barker (2009), Crowell (1962), Crowell & Rothstein (1981), Dance (1986), Dawson (1948), Deane (1909), Dearborn (1996), Dearborn *et al.* (1998), Dechant *et al.* (2002), Demastes & Remsen (1994), Dickinson (2003), Dittus & Lemon (1969, 1970), Dixon *et al.* (2008), Dow (1969, 1970), Dow & Scott (1971), Downer (1972), Dunham (1965, 1966a, 1966b, 1966c), Eaton (2001), Echeverry-Galvis & Morales-Rozo (2007), Eckerle & Breitwisch (1997), Eguiarte & del Rio (1985), Eitniear (2006b), Eitniear & Tapia (2000), Emlen, S.T. (1967a, 1967b, 1967c, 1971a, 1971b, 1972), Emlen, S.T., Rising & Thompson (1975), Emlen, S.T., Wiltschko *et al.* (1976), Estep *et al.* (2005), Faustino & Machado (2006), Fernández-Juricic *et al.* (2004), Ferreira & Glock (2004), ffrench (1967), Filliater & Breitwisch (1997), Filliater *et al.* (1994), Finck (1984), Fink & Brower (1981), Fisk (1974), Fjeldså & Rahbek (2006), Fletcher, N.H. *et al.* (2006), Fletcher, R.J. *et al.* (2006), Forbes (2010), Foster (2009), Francis & Cooke (1990), Fretwell (1977, 1979, 1986), Fretwell & Shane (1975), Friesen, Cadman & MacKay (1999), Friesen, Wyatt & Cadman (1999), Fuller (2010), Gabrielson (1915), Ganier (1941), Gardali & Nur (2006), Gardali *et al.* (1998), Giocomo *et al.* (2008), Goller & Larsen (1997), Gomes de Almeida (2009), González-Ortega *et al.* (2002), Goodpasture (1972), Gould (1961), Govoni *et al.* (2009), Grapputo *et al.* (2001), Greenberg & Marra (2005), Greene, Lyon *et al.* (2000), Greene, Muehter & Davison (1996), Greeney & Nunnery (2006), Groschupf & Thompson (1998), Gross (1921, 1956), Grubb *et al.* (1991), Halkin (1997), Halkin & Linville (1999), Hallinan (1924), Haney *et al.* (2001), Harmeson (1974), Hartup *et al.* (2000), Harvey (1903), Hatch (1983), Hawksley & McCormack (1951), Hayes & Sewlal (2004), Hays & Conant (2007), Hellack (1976), Hellack & Schnell (1977), Hellmayr (1938), Henriques *et al.* (2003), Hill (1987, 1988b, 1989, 1994), Hill & Kevin (2006), Hinds & Calder (1973), Holmes (1986), Horn *et al.* (2007), Howell (2010), Hudon (1991), Hughes *et al.* (1999), Humbird & Neudorf (2008), Hurley & Franks (1976), Hutto (1994), Hylton & Godard (2001), Ingold (1993), Íñigo-Elías *et al.* (2002), Ivor (1944), Jawor (2007), Jawor & Breitwisch (2003, 2004, 2006), Jawor & Gray (2003), Jawor & MacDougall-Shackleton (2008), Jawor, Gray *et al.* (2004), Jawor, Linville *et al.* (2003), Jenkins (1969), Jensen & Cully (2005), Jensen & Finck (2004), Johnston (1965, 1967, 1970), Johnston & Downer (1968), Jones, J.M. (1859), Jones, T.M. *et al.* (2010), Judd (1962), Kanegae *et al.* (2008), Keyser & Hill (1999,



Currently considered Near-threatened, the ***Painted Bunting*** *is classified as "Declining" in the USA. Breeding Bird Survey data from continental USA indicate a decline of 55% over the 30 years to 1996, with the steepest declines (75%) in the eastern, nominate race. The reasons for its decline are not clear, but are thought to be related to loss of habitat, including the more aggressive control of brush along highway verges and the construction of golf courses. Painted Buntings are also trapped in large numbers on their wintering grounds for the cagebird trade. Declines in both races may be slowing, however, and this species, like other* Passerina *buntings in the USA, is extending its range.*

[*Passerina ciris pallidior*, Sinton, Corpus Christi, Texas, USA. Photo: Bill Draker/ ImageBroker/FLPA]

*The **Rose-bellied Bunting** is still fairly common within the Isthmus of Tehuantepec Endemic Bird Area (EBA), in southern Mexico, but its global range amounts to just 7000 km². Its area of occupancy may be even smaller: in La Sepultura Biosphere Reserve, which covers most of the Chiapas part of the EBA, less than 20% of habitat was found to be suitable for it. The global population, estimated at fewer than 50,000, could be declining because of habitat degradation and fragmentation. Currently listed as Near-threatened, the Rose-bellied Bunting's threat status may be raised if the potential threats to its habitat are judged to be serious. This would make it the first member of its family to be considered globally threatened.*

[*Passerina rositae*, Oaxaca, Mexico. Photo: Manuel Grosselet]



2000), Kilgo & Moorman (2009), Kim *et al.* (2008), Kirmse (1969), Kissling *et al.* (2009), Klicka, Burns & Spellman (2007), Klicka, Fry *et al.* (2001), Klicka, Johnson & Lanyon (2000), Komar & Thurber (2003), Kopachena & Crist (2000a, 2000b), Krech (2009), Kroodsma (1974a, 1974b, 1975), Langley (1976), Lanyon & Thompson (1984, 1986), Larsen & Goller (2002), Laskey (1944, 1969), Lattin & Ritchison (2009), Lebbin *et al.* (2010), Leberman (1984), Lemon (1965, 1966, 1967, 1968a, 1971, 1974), Lemon & Chatfield (1971, 1973), Lemon & Herzog (1969), Lemon & Scott (1966), Leopold & Enyon (1961), Leslie (2009), Leston & Rodewald (2006), Lever (2005), Levey (1987), Levy (2009), Linville & Breitwisch (1997), Linville *et al.* (1998), Lloyd *et al.* (1998), Locke (1965), Lockwood (1995), Logan (1951), Loiselle & Blake (1992), Long, C.A. (1963), Long, C.A. *et al.* (1965), Long, J.L. (1981), Lovette & Bermingham (2002), Lowther & James (2011), Lowther, Lanyon & Thompson (1999), Machado (1999), Maddox & Bollinger (2000), Maney *et al.* (2008), Marchant (1960), Margoliash *et al.* (1991, 1994), Marler & Slabbekoorn (2004), Martin (1993), Martínez-Meyer *et al.* (2004), Mazar Barnett, Clark *et al.* (1998), McAtee (1908), McElroy & Ritchison (1996), McGraw, Hill & Parker (2003), McGraw, Hill, Stradi & Parker (2001), McNair (1990), McNair & Forster (1983), Meanley (1963), Mettler & Spellman (2009), Michener & Michener (1951), Moermond (1981, 1983), Moermond & Denslow (1985), Monson (1997), Moore *et al.* (2010), Morris (2005), Morton (1975), Muehter *et al.* (1997), Mulvihill (1988), Munson & Robinson (1992), Nealen & Breitwisch (1997), Nice (1927), Nolan (1965), Nores & Cerana (1990), Olson & Alvarenga (2006), O'Neill & Schulenberg (1979), Ortega & Hill (2010), Ortega & Ortega (2003), Osborne (1992), Overmire (1962), Parker (1982), Parkes (1985), Parmelee (1959, 1964), Parrish (1997), Payne (1981, 1982, 1983, 1991, 1996, 2006), Payne & Payne (1989, 1990, 1993a, 1993b, 1996, 1998), Payne & Westneat (1988), Payne, Payne & Doehlert (1987, 1988), Payne, Thompson *et al.* (1981), Paynter (1970b), Pearman (1997), Peer (2010), Perdue (1979), Phillips (1994), Piratelli & Pereira (2002), Pitzrick & Pitzrick (1992), Poulin *et al.* (1994), Prum *et al.* (2009), Pyle & Pyle (2009), Quay (1987, 1989), Ragusa-Netto (2001, 2002b), Rahmig *et al.* (2009), Raikow (1978), Reese (1975), Remsen (1997b), Remsen & Parker (1984), Remsen, Cadena *et al.* (2010), Remsen, Schmitt *et al.* (1988), Renjifo (1991), Rhoads (1903), Rice, J.O. & Thompson (1968), Rice, O.O. (1969), Rich *et al.* (2004), Richmond *et al.* (2007), Ricklefs (1976), Ridgely & Tudor (1989), Riede *et al.* (2006), Rios *et al.* (2008), Risch & Robinson (2006), Ritchison (1981b, 1983a, 1983b, 1983c, 1983d, 1985a, 1985b, 1986, 1988, 1997), Ritchison *et al.* (1994), Rivera *et al.* (2008), Rivers *et al.* (2010), Robbins *et al.* (1985), Rodríguez-Ferraro (2008), Rodríguez-Ferraro & Blake (2008), Rodríguez-Ferraro & Trujlllo (2004), Rodríguez-Ferraro *et al.* (2007), Rohwer (1986), Rohwer *et al.* (1980), Rothstein (1973), Russell (1951), Rutter (1958), Salgado *et al.* (2008), Samuelson (1980), Sandercock *et al.* (2008), Sarmiento (2010), Sauer *et al.* (2008), Schartz & Zimmerman (1971), Schifter (1984), Schook *et al.* (2008), Schueller (2000), Scott (1998), Scott & Lemon (1996), Scott *et al.* (1987), Sealy (1976), Seutin *et al.* (1993), Sgueo (2009), Sharpe (1888), Shiovitz (1975), Shiovitz & Thompson (1970), Short (1975), Shuman *et al.* (1989, 1992), Sibley, C.G. (1996), Sibley, C.G. & Ahlquist (1990), Sibley, C.G. & Monroe (1990, 1993), Sibley, C.G. & Short (1959), Sick (1993), da Silva (1990), Skutch (1954, 1972, 1980a), Slud (1964), Smith, A. (1927), Smith, C.E. (1966), Smith, L.A., Burke *et al.* (2006), Smith, L.A., Nol *et al.* (2007), Sniegowski *et al.* (1988), Soriano *et al.* (1999), Sprunt (1968), Stabler (1959), Stanback & Powell (2010), Steadman & McKitrick (1982), Stiles & Skutch (1989), Stoddard & Prum (2008), Stokes (1993), Stone (1927), Stoner (1947), Stotz (1992), Stouffer *et al.* (2009), Strecker (1893), Stutchbury & Morton (2001), Stutchbury *et al.* (2005), Sugiyama (2001), Sutton (1950, 1967), Sweeney *et al.* (2004), Taber (1947), Tamplin *et al.* (1993), Taylor *et al.* (1989), Temple (2002), Thiollay (2002), Thomasset (1915), Thompson, C.F. & Lanyon (1979), Thompson, C.W. (1991a, 1991b), Thompson, C.W. & Leu (1995), Thompson, W.L. (1968, 1969, 1970, 1976), Tobias & Williams (1996), Todd (1923a), Toledo & Hernández (1979), Tordoff (1954), Tubaro & Lijtmaer (2006), Tweit & Thompson (1999), Van Tyne (1932), Vondrasek (2006), Vu Halinh *et al.* (2007), Waide & Hailman (1977), Walk, Kershner *et al.* (2010), Walk, Wentworth *et al.* (2004), Wasser & Sherman (2010), Watada *et al.* (1995), Weldon & Haddad (2005), Wells *et al.* (2008), West (1962), Westneat (1987a, 1987b, 1988b, 1989, 1990), Weston (1947, 1955), Whitehead *et al.* (2000), Whittaker (1998), Wible (1974), Willoughby (1992), Winter (1999b), Winter *et al.* (2000), Wiseman (1977), With *et al.* (2008), Wolf (1971), Wolfenbarger (1999a, 1999b, 1999c), Wyatt & Francis (2002), Yamaguchi (1998a, 1998b, 2001), Yen Chunewei (1989), Young, B.E. (1991), Young, H. *et al.* (1941), Yuri & Mindell (2002), Zhang Luping *et al.* (2004), Zimmerman (1965a, 1965b, 1965c, 1966a, 1966b, 1971, 1982, 1983, 1984), Zimmerman & Finck (1989).


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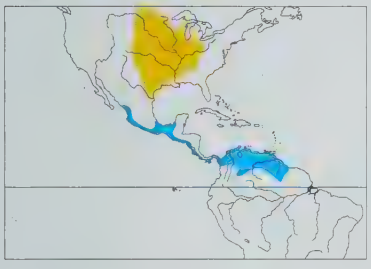
Genus *SPIZA* Bonaparte, 1824

1. Dickcissel

Spiza americana

French: Dickcissel d'Amérique **German**: Dickzissel **Spanish**: Arrocero
Other common names: Black-throated Bunting

Taxonomy. *Emberiza americana* J. F. Gmelin, 1789, New York, USA.
Has in the past been placed in New World blackbird family (Icteridae), and thought by some to be intermediate between that and New World sparrows (Emberizidae). Recent molecular-genetic studies support placement in present family. Monotypic.
Distribution. Breeds extreme S Canada and C & EC USA; migrates to Middle America and N South America.



Descriptive notes. c. 16 cm; male average 28·5 g during breeding, 36 g pre-migratory Apr (Venezuela); female 25 g during breeding, 30 g pre-migratory in Apr (Venezuela). Male breeding has crown greyish, strongly washed yellow in front, nape grey-brown, supercilium from bill to past ear-coverts bright yellowish at front, becoming duller posteriorly and near-whitish at rear; ear-coverts grey, broad submoustachial stripe yellowish at centre, otherwise white; chin and upper throat whitish; upperparts medium-brown to brown-grey, with heavy black streaks on feather centres, rump grey-brown, shoulder chestnut; flight-feathers blackish-grey, narrow brownish edgings on outer webs, carpal area yellow, tertials blackish-grey or blackish with broad buff-brown or chestnut-brown edgings on outer webs; greater upperwing-coverts brown, edged paler; rectrices dull brown, central tail feathers narrow and pointed; lower throat and central foreneck black, chest yellow with variable amount of black central spotting, spots often coalescing into larger, pointed black patch on upper chest; side of chest grey, suffused yellow, centre of upper belly yellow, becoming yellowish-white and then greyish-yellow on flanks; lower belly yellowish-white; iris dark brown; bill pale horn or bluish-grey with small black tip and variable black along culmen; legs flesh-brown to pinkish-buff. Male non-breeding has back suffused with brownish and the yellow less bright. Female is smaller than male, has black on throat reduced to two narrow malar streaks, chin and throat whitish, becoming yellowish on centre of chest; crown greyish-brown, supercilium and submoustachial stripe much less prominent than on male, back brown with broad blackish streaks. Juvenile is similar to female, but underparts buffier, and with two distinct pale wingbars; immature male differs from adult in having little black on chest, narrow submalar stripe, yellow on underparts much reduced, crown feathers brown with black centres and no yellow wash, supercilium much reduced. VOICE. Song onomatopoeic, a dry insect-like series of notes, e.g. "see see dick dick ciss ciss ciss" etc., the whole lasting c. 1·5 seconds. Call note a sharp "click"; flight call a buzzy "bzzrt", used by flock on migration.
Habitat. Grassland areas. Breeding habitats include hay fields, grassy roadsides, lightly grazed pastures and early fallow areas; prior to European settlement, native grassland prairies with good proportion of non-grass species. On wintering grounds various open areas, especially rice fields and grassland; requires secure areas for communal roosting, such as sugar-cane plantations or tall grass. Regular annual burning of grassland generally detrimental.
Food and Feeding. During breeding season omnivorous, stomach contents about two-thirds animal, one third vegetable. Prey includes grasshoppers (Orthoptera), caterpillars, flies (Diptera), spiders (Araneae), beetles (Coleoptera) etc.; vegetable matter largely various seeds. On migration mainly grass seeds; on wintering grounds mostly vegetable matter, including crops of rice and sorghum, also insects and spiders. Nestling diet arthropods, including e.g. beetles, caterpillars, grasshoppers, hymenopterans.
Breeding. Egg-laying begins mid-May in S parts of range (e.g. Texas) and Jun in N; single-brooded, although possible that some, after breeding, move to other areas and breed again. Male generally polygamous, success in attracting multiple partners related to quality of his territory; of 150 males in one Kansas study, 14% (mostly yearlings) had no mate, 36% monogamous, 41% bigamous, 9% had three or more mates, the most successful up to six. Males arrive on territory 5–10 days before females, pairing takes place quickly thereafter; in core areas male shows strong fidelity to nesting territories, presence of suitable nest-sites apparently a criterion of territory quality. Nest built entirely by female, male in attendance throughout early stages of breeding until about hatching time; loose cup of coarse weed and grass stems, with some leaves, lined with finer grasses, hair and rootlets, situated near (but not on) ground in dense vegetation of coarse grasses or low woody bush, height varying with type of supporting plant, usually 20–50 cm, occasionally much higher. Clutch 3–6 eggs, average 4, unmarked pale blue; incubation by female alone, period 12–13 days; chicks brooded and fed generally by female alone, male defends territory, in one Illinois study male played significant role in feeding of young; nestling period 8–10 days; fledglings attended by female for a further two weeks. Nests intensively parasitized by Brown-headed Cowbird (*Molothrus ater*), parasitism rates varying geographically and during course of year; early in season, in some areas, may be 100%, and frequently nests contain more cowbird eggs than host eggs; generally accepts cowbird eggs, but if too numerous (one nest contained 9 cowbird and 3 host eggs) may abandon nest. Nesting success reduced much less than that of smaller hosts; reduction in productivity due mostly to removal of host eggs by female cowbirds, rather than by young being overwhelmed by parasite fledgling(s).
Movements. Migratory. Core wintering range C Venezuela (especially Portuguesa and W Guárico); winters also, in highly erratic manner, from W Mexico (S Sinaloa) S to W Colombia, and in N South America from N Colombia E to Guianas and N Brazil. Forms post-breeding flocks, often in late Jul, these may move into areas of abundant food before undertaking long-distance movements; pre-migratory birds may accumulate up to 15 g of fat. Mostly nocturnal migrant. Migration route probably through Mexico and Central America, as species is rare in occurrence in Caribbean (rare migrant Bahamas, San Andrés I and Providencia I Sept–Nov and Mar, very rare Jamaica and Cuba, apparently absent Hispaniola, vagrant elsewhere in West Indies); arrival in wintering areas in Sept or Oct, in Trinidad in Dec or Jan or not at all (implying movements from other wintering areas on mainland). Wintering areas abandoned in late Mar and early Apr, huge flocks breaking up into smaller groups that then migrate together; peak passage of nocturnal migrants over S Texas in late Apr, arriving on territory in May, earlier in S than in N. Small numbers overwinter in breeding areas in some years. Vagrant to W Palearctic (one record S Norway, one Azores) and to Clipperton I (E Pacific, c. 1000 km SW of Mexico).
Status and Conservation. Not globally threatened. Locally common. Has fluctuated widely, both in total numbers and in geographical distribution, for much of its known history. Core breeding area centred on Midwestern States, from SE South Dakota and E Nebraska E to Illinois, S to N Texas, Oklahoma and Arkansas; outside this core, breeds N to Indiana and Michigan, and from North Dakota S to S Texas, Louisiana and N Alabama. Breeds or has bred, often very irregularly, in a large area peripheral to above, including S Canada (S Saskatchewan, Manitoba, Ontario), E to New York and Maryland, Virginia and Georgia, and W to E Montana, Wyoming and New Mexico. Previous distribution may have been, at least on occasion, still wider, including Atlantic Provinces of Canada and E seaboard of USA S to Florida and, in W, to California, Arizona and NW Mexico (Baja California). In wintering range, varies from being rare to being extraordinarily abundant in rice-growing areas in Costa Rica; in Trinidad, was unknown for extended period of time, abundant at other times. Populations have historically expanded owing to provision of abundant winter food resources in form of rice and sorghum. Major shrinkages in both numbers and range documented since c. 1960, with 30% decline in total numbers between 1966 and 1978, since when population has stabilized somewhat; remaining large grasslands may be insufficient for long-term population stability. Provision (and destruction) of suitable habitat by agriculture has had very significant effects on populations; may prefer modified habitats, such as hay fields, over "natural" prairie grasslands, but early mowing for hay can make these less productive in terms of young raised. On wintering grounds, huge flocks a major agricultural pest, provoking control efforts which may be significant cause of declines. Since wintering birds so highly concentrated (one Venezuelan flock, estimated at almost 3,000,000 individuals, probably comprised c. 30% of global population), control measures, such as aerial spraying with organophosphate pesticides, could have very major impact; one Venezuelan farmer said to have killed estimated over 1,000,000 individuals in this manner. More recently such occurrences have apparently decreased, most farmers relying on acoustic deterrents, but they do still happen.
Bibliography. Aldrich (1948), Anon. (2010g, 2010h), Avery *et al.* (2001), Baicich & Harrison (2005), Basili & Temple (1998, 1999a, 1999b), Berkeley *et al.* (2007), Besser *et al.* (1970), Dechant *et al.* (2002), Dixon *et al.* (2008), ffrench (1967, 1973), Finck (1984), Fretwell (1977, 1979, 1986), Fretwell & Shane (1975), Gross (1921, 1956, 1968), Harmeson (1974), Hatch (1983), Hilty (2003), Hughes *et al.* (1999), Jensen & Cully (2005), Jensen & Finck (2004), Klug *et al.* (2010), Long (1963), Long *et al.* (1965), Maddox & Bollinger (2000), McNair (1990), Meanley (1963), Monson (1997), Mulvihill (1988), Overmire (1962), Peer (2010), Post *et al.* (2009), Powell (2006), Rhoads (1903), Sandercock *et al.* (2008), Schartz & Zimmerman (1971), Schook *et al.* (2008), Sealy (1976), Stiles & Skutch (1989), Sutton (1967), Taber (1947), Temple (2002), de Vries (2011), Walk *et al.* (2004), Winter (1999b), With *et al.* (2008), Zimmerman (1965a, 1965b, 1965c, 1966a, 1966b, 1971, 1982, 1983, 1984), Zimmerman & Finck (1989).

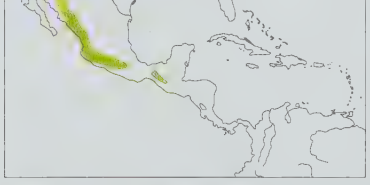
Genus *PHEUCTICUS* Reichenbach, 1850

2. Yellow Grosbeak

Pheucticus chrysopeplus

French: Cardinal jaune **German**: Gelbkopf-Kernknacker **Spanish**: Picogrueso Amarillo
Other common names: Mexican Yellow Grosbeak

Taxonomy. *Coccothraustes chrysopeplus* Vigors, 1832, San Blas, Nayarit, Mexico.
Has been treated as conspecific with *P. tibialis* and *P. chrysogaster*. Has hybridized with *P. melanocephalus* in captivity. Proposed race *rarissimus* (described from Chietla, in Puebla) subsumed in nominate. Three subspecies currently recognized.
Subspecies and Distribution.
P. c. dilutus van Rossem, 1934 – breeds NW Mexico (C Sonora, SW Chihuahua, N Sinaloa); wintering areas not known.
P. c. chrysopeplus (Vigors, 1832) – W Mexico (C Sinaloa and W Durango S on Pacific slope to N Guerrero and SW Puebla).
P. c. aurantiacus Salvin & Godman, 1891 – S Mexico (highlands of S Chiapas) and adjacent Guatemala.



Descriptive notes. 21·5–24 cm; one female 77·6 g. Male nominate race has crown and nape to centre of mantle deep yellow, side of mantle black (fresh feathers having narrow yellow edgings), back and rump bright yellow with some diffuse darker mottling, uppertail-coverts black with broad white tips; shoulder and upperwing black, broad white tips on greater and median secondary coverts and on tips of outer webs of secondaries and tertials; base of primaries white (conspicuous white flash on closed wing); rectrices black, three outermost with extensive white on inner webs; side of face and chest deep yellow, some black spotting on sides (variable, and often concealed), rest of underparts yellow, thigh dull black, undertail-coverts white; iris dark brown; upper mandible blackish, lower mandible pinkish-flesh to bluish-grey with dusky along distal half of cutting edge; legs bluish-grey. Female is much duller than male, crown and nape heavily streaked blackish, shoulder blackish-brown with dull yellowish edgings, white on wing as in male but generally somewhat reduced in extent; white on tail much reduced and tinged with brownish. Juvenile resembles female; immature male similar to adult

On following pages: 3. Black-thighed Grosbeak (*Pheucticus tibialis*); 4. Golden-bellied Grosbeak (*Pheucticus chrysogaster*); 5. Black-backed Grosbeak (*Pheucticus aureoventris*); 6. Rose-breasted Grosbeak (*Pheucticus ludovicianus*); 7. Black-headed Grosbeak (*Pheucticus melanocephalus*); 8. Northern Cardinal (*Cardinalis cardinalis*); 9. Vermilion Cardinal (*Cardinalis phoeniceus*); 10. Pyrrhuloxia (*Cardinalis sinuatus*).

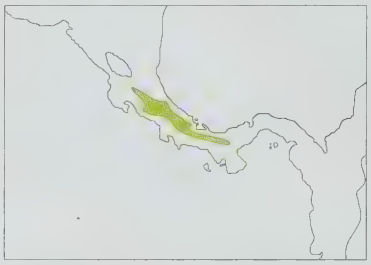
female, but head yellower, conspicuous white flash at base of primaries; takes two years to gain full plumage. Race *dilutus* is similar to nominate, but concealed bases of rump feathers black, mantle predominantly black with yellow flammulations, female much greyer and duller, more heavily streaked above, paler yellow below, flanks streaked dusky; *aurantiacus* is much more orange-yellow, bases of rump feathers black. Voice. Song a series of rich, clear whistles, "chee wee cheer weer weeuh" and so on, similar to that of *P. melanocephalus* but slower and more simple. Calls include sharp metallic "plihk" and a soft whistle, "hoee", given in flight.
Habitat. Tropical deciduous and semi-deciduous forest, well-wooded watercourses, scrubby woodland and thorn-forest; race *aurantiacus* also in clearings in humid evergreen forest. Sea-level to 2500 m in Mexico; 300–2500 m in Guatemala.
Food and Feeding. In Mexico, seen to take fruit of *Ficus pertusa*, *Trichostigma octandrum* (Phytolaccaceae) and, more rarely, *Recchia mexicana* (Surianaceae) in Jalisco, and to take nectar from *Erythrina oliviae* in Puebla. Forages singly and in pairs, often in fruiting trees; only rarely joins mixed flocks.
Breeding. Nesting begins in early Jun, and family parties still together mid-Sept, in N Mexico (Sonora). Nest a cup made from roots, leaves, grass and dry fibres, lined with finer rootlets, placed at low to medium height in thick bush. Eggs 2–5 bluish-green, flecked at blunt end with dark or clear grey-brown. No other information.
Movements. S populations sedentary. In N part of range (Sonora), race *dilutus* a summer visitor, arriving mid-May (rarely late Apr), departing mid-Sept; wintering grounds unknown. Rarely in winter in S Sonora. Vagrant in extreme S USA (S Arizona): about a dozen records in late spring or early summer.
Status and Conservation. Not globally threatened. Locally fairly common; S race *aurantiacus* described variously as rare and very local, and fairly common to common. May be captured for cagebird trade.
Bibliography. Armani (1983), Eguiarte & del Rio (1985), Fischer (1994), Howell & Webb (1995), Land (1970), Mees (1970), Meise (1938a), Pelikan (2004), Russell & Monson (1998), Schönwetter & Meise (1981), Stotz *et al.* (1996), Sibley (2003), Toledo & Hernández (1979), Vaes (2008).

3. Black-thighed Grosbeak

Pheucticus tibialis

French: Cardinal à cuisses noires **Spanish**: Picogrueso Muslinegro
German: Schwarzschenkel-Kernknacker

Taxonomy. *Pheucticus tibialis* Lawrence, 1867, Cervantes, Costa Rica.
Has been treated as conspecific with *P. chrysopeplus* and *P. chrysogaster*. Monotypic.
Distribution. Mountains from N Costa Rica (from Volcán Miravalles, in Guanacaste) S to W Panama (Bocas del Toro, Chiriquí and Veraguas).



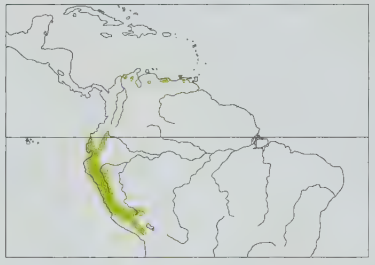
Descriptive notes. 20 cm; average 62·3 g (12 birds, Panama). Male has crown and nape to upper mantle bright yellow, lower mantle black with yellow edgings on central feathers, lower back and rump bright yellow, uppertail-coverts black with yellow tips, rectrices black; shoulder and upperwing black, primaries with broad white bases (conspicuous white flash); lores dull grey-black, ear-coverts and throat yellow with black mottling; chest deep yellow with diffuse darker mottling, rest of underparts yellow, thigh black; iris brown; upper mandible black, lower mandible grey; legs dull lead-grey. Female is less bright yellow than male, especially on head and neck; yellow edgings of back feathers more extensive and extending to scapulars, white flash on closed wing smaller. Juvenile is more olive, less yellow, on head, crown feathers often with fine central streaks, rump feathers streaky, breast with obscure mottling. Voice. Song a cheerful series of rich, varied leisurely musical whistles and phrases, interspersed with the phrase "tweek tseewee", sometimes ending in canary-like trill. Call a sharp "pik".
Habitat. Forest edges, clearings, pastures with residual trees. In Costa Rica from c. 1500 m to at least 2600 m, but down to 1000 m on Caribbean slope; mainly 750–1200 m in Panama, in W Chiriquí higher, mostly above 1800 m.
Food and Feeding. Diet includes seeds and fruits, also invertebrates. Usually forages fairly high up in forest, occasionally descending to middle levels. Gleans items from tips of branches; sometimes takes them in mid-air.
Breeding. Season Mar–May in Costa Rica. Nest a frail cup of rootlets, built on to bulky base of twigs or mosses, 3–9 m up in small tree or vine tangle. Clutch 2 eggs, pale blue with dots or blotches of dull chestnut-brown and purplish-lilac. No other information.
Movements. Resident. Some evidence of altitudinal migration on Caribbean slope of Costa Rica, numbers of migrants varying from year to year.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Fairly common in Costa Rica; local or uncommon in Panama.
Bibliography. Carriker (1910), Garrigues & Dean (2007), Ridgely & Gwynne (1989), Schönwetter & Meise (1981), Stiles & Skutch (1989), Stotz *et al.* (1996).

4. Golden-bellied Grosbeak

Pheucticus chrysogaster

French: Cardinal à tête jaune **Spanish**: Picogrueso Ventriamarillo
German: Gelbbauch-Kernknacker
Other common names: Southern Yellow Grosbeak, Yellow-bellied Grosbeak

Taxonomy. *Pitylus chrysogaster* Lesson, 1832, Chile; error = Quito, Ecuador.
Has been treated as conspecific with *P. chrysopeplus* and *P. tibialis*. Two subspecies recognized.
Subspecies and Distribution.
P. c. laubmanni Hellmayr & Seilern, 1915 – N Colombia (Sierra Nevada de Santa Marta), Sierra de Perijá, and N Venezuela (discontinuously in Lara, Aragua, Distrito Federal and Miranda; also S Sucre and N Monagas).
P. c. chrysogaster (Lesson, 1832) – Andes from SW Colombia (Nariño) to S Peru (Arequipa and Puno); also coastal N & C Peru.
Descriptive notes. 21·5 cm; 54–59·7 g (Peru). Male nominate race has head and nape deep yellow with orange tinge, back black, rump yellow, uppertail-coverts black with white tips; upperwing



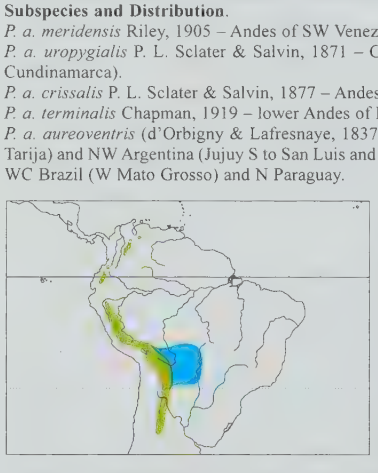
black, primaries with white bases (conspicuous white flash), secondaries with white tips on outer webs, tertials with much larger white tips, median and greater upperwing-coverts with broad white tips (prominent bars on closed wing); sometimes yellow shoulder patch; rectrices black, all except central two pairs with white on inner web and part of outer web; throat and underparts bright yellow, except for black thigh and white undertail-coverts; iris dark brown; upper mandible black, lower mandible bluish-grey; legs bluish-grey. Female has crown dull yellow, heavily streaked black, upperparts greenish-yellow, brightest on rump, with blackish streaks, shoulder dull grey-brown with greenish tinge; primary coverts and greater coverts dull blackish-grey, white tips to median and greater coverts; rectrices dull blackish-brown, small white tips on outermost feathers; chin to lower belly yellow, greenish-yellow on flanks, undertail-coverts dull white; bare parts as for male. Juvenile has crown, nape, ear-coverts, back and rump heavily marked with black streaks, white on tertials largely absent, white flash on primaries reduced, flanks with diffuse dark streaks. Race *laubmanni* is similar to nominate, but male has more extensive yellow fringes on interscapular feathers, scapulars narrowly edged dull olive-yellow on both webs, conspicuous white edgings on distal half of outer five primaries, female with same edgings on primaries, upperparts brighter yellow than nominate. Voice. Song a rich carolling, similar to that of Highland Hepatic-tanager (*Piranga lutea*) but sweeter, shorter phrases with more slurred notes. Call a sharp squeaky "pink".
Habitat. Open woodland, forest edge, areas of scattered trees, brushland; mostly fairly arid habitats, but in Peru also in more humid areas. In Ecuador, common in some human-dominated habitats. Mostly 1500–2500 m in Venezuela and Colombia; to 3500 m in Ecuador and Peru, though down almost to sea-level in arid SW Ecuador.
Food and Feeding. Few published data. Stomach contents "purplish berries" and "insects and seeds". Arthropod prey taken from foliage.
Breeding. Breeds during rainy season, Feb–May, in arid W Ecuador, and birds in breeding condition in Apr–Jul in N Colombia (Santa Marta and Perijá); probably single-brooded in Ecuador. Nest a loose, shallow twiggy cup, lined with fine rootlets and plant fibres, placed 2·8–4·3 m up in bush or smaller tree. Clutch 2–4 eggs, deep blue-green, blotched and marked with brown; incubation mostly by female, occasionally by male, period probably c. 14–16 days; nestling period c. 11 days, young leave nest when barely capable of flight. Nests frequently parasitized by Shiny Cowbird (*Molothrus bonariensis*).
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Fairly common to common in some areas of range.
Bibliography. Brook (1916), Carriker (1910), Clements & Shany (2001), Hilty (2003), Hilty & Brown (1986), Marchant (1960), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sarmiento (2005, 2010), Schönwetter & Meise (1981), Schulenberg *et al.* (2007).

5. Black-backed Grosbeak

Pheucticus aureoventris

French: Cardinal à dos noir **German**: Goldbauch-Kernknacker **Spanish**: Picogrueso Dorsinegro
Other common names: Yellow-rumped Grosbeak (*uropygialis*); Riobamba/Yellow-throated Grosbeak (*crissalis*); Chapman's Grosbeak (*terminalis*)

Taxonomy. *Pitylus aureoventris* d'Orbigny and Lafresnaye, 1837, Yungas, Sicasica, Bolivia.
May hybridize with *P. chrysogaster* in Ecuador. Five subspecies recognized.
Subspecies and Distribution.
P. a. meridensis Riley, 1905 – Andes of SW Venezuela (Mérida).
P. a. uropygialis P. L. Sclater & Salvin, 1871 – Colombia in E Andes (Norte de Santander S to Cundinamarca).
P. a. crissalis P. L. Sclater & Salvin, 1877 – Andes of SW Colombia (Nariño) S to C Ecuador.
P. a. terminalis Chapman, 1919 – lower Andes of Peru (Amazonas and Cuzco).
P. a. aureoventris (d'Orbigny & Lafresnaye, 1837) – S Peru (Puno), S & E Bolivia (La Paz S to Tarija) and NW Argentina (Jujuy S to San Luis and Córdoba); also, probably only in austral winter, WC Brazil (W Mato Grosso) and N Paraguay.



Descriptive notes. 22 cm; 43·8–57·2 g (Bolivia), 55·4–66·2 g (Colombia). Male nominate race has upperparts black, sometimes with narrow yellow fringes on rump feathers and white tips to longest uppertail-coverts; shoulder patch yellow; upperwing black, primaries with broad white flash at base, median and greater coverts with broad white tips (conspicuous bars on closed wing); rectrices blackish, outermost feathers with large white areas on inner webs and some white on outer webs; chin to upper breast black, lower breast and rest of abdomen bright yellow, sometimes with some orange on line down mid-belly, sides and flanks variably flecked black, undertail-coverts much whiter, with small black tips; underwing pale yellow; iris brown; upper mandible black, lower mandible blue-grey; legs blue-grey. Female is similar to male, but browner and more mottled with yellow above, mostly yellow with dusky speckling below, except on belly; less white on rectrices. Immature male has crown dull blackish-brown with yellowish mottling, throat dull yellow, diffusely mottled blackish, flight-feathers dull brownish-black, reduced white markings in wing and tail. Race *meridensis* has upperparts including uppertail-coverts black, back with some concealed yellow feathers, rump golden with a few black spots, belly yellow and always unspotted; *uropygialis* is similar to previous, but less yellow on rump, has black spots on side of abdomen, no concealed yellow feathers on back, female has more black on throat than other races; *crissalis* differs very obviously from other races in having yellow, not black, throat and chest and buffy-white undertail-coverts; *terminalis* is closest to *meridensis*, but few or no black markings on sides and flanks, white tips of greater wing-coverts larger, interscapulars spotted yellow, has large white terminal (or subterminal) rounded spots (instead of small whitish transverse subterminal marks) on uppertail-coverts, thigh yellow. Voice. Song a rich, melodious series of whistled notes, similar to that of *P. chrysogaster* but thinner; call a sharp "keck".

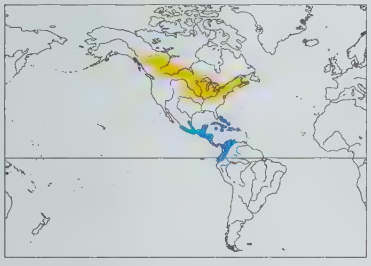
Habitat. Mostly dry to arid scrubby, often open, woodland, well-bushed gardens and similar; generally in more arid locations than those favoured by *P. chrysogaster*, but the two may occur in same habitat locally. In La Rioja, in Argentina, found in humid scrub ravines, forest and Chaco. Mostly 1450–2000 m, occasionally to 3700 m, in Venezuela, 1700–3000 m in Colombia, and mostly 1200–3200 m in Peru; down to 600 m at S end of range.
Food and Feeding. Diet includes berries, seeds, and insects. At Chía, in Colombia, seen to feed extensively on flowers and seeds of *Polymnia pyramidalis* in Apr during flowering period; insects less than 5% of stomach contents of specimens from same location. Usually solitary or in pairs, but several individuals may gather at favoured fruiting trees; does not join mixed-species flocks. Forages mostly high up, but also at all levels of forest, even on ground.
Breeding. Little published information. Birds with enlarged gonads at end of Jan (Cauca) and juvenile in Nov (Nariño) in Colombia; nest with eggs, nest with young and one other pair feeding fledged chick on 18th Dec in Argentina, where nesting continues into Jan. Following details refer to nominate race in Argentina. Nest a cup made from stalks of vines, lined with rootlets and fine fibres, external diameter 10–12 cm, cup diameter 5–7 cm, cup depth 5·5–6 cm, two nests 2·7 m and 3 m above ground in shrub. Clutch 2–3 eggs, greenish or clear blue, with fine brown spots concentrated at blunt end; no information on incubation and fledging periods. Nests frequently preyed on by Plush-crested Jay (*Cyanocorax chrysops*).
Movements. Most populations apparently sedentary; some evidence of movement at geographical ends of range, and possibly some altitudinal movement in NW Argentina and adjacent areas. Occurs in Mato Grosso (Brazil) and N Paraguay, but apparently does not breed; possibly some movements in Venezuela.
Status and Conservation. Not globally threatened. Uncommon or rare in Venezuela; locally common, though in small numbers in Colombia; rare to locally common in Peru. Recently recorded from mouth of R Lluta, in N Chile (Arica), but status there not known. Sometimes trapped for cagebird trade. May cause damage to fruiting crops.
Bibliography. Armani (1983), Clements & Shany (2001), Contreras (1979b), Dinelli (1924), Echeverry-Galvis & Morales-Rozo (2007), Echeverry-Galvis *et al.* (2005), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Johow (2000), Narosky & Yzurieta (2003), Nores & Cerana (1990), de la Peña (2005), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Salinas (2000), Schulenberg *et al.* (2007), Short (1975), Sick (1993, 1997).

6. Rose-breasted Grosbeak

Pheucticus ludovicianus

French: Cardinal à poitrine rose **Spanish**: Picogrueso Pechirrosado
German: Rosenbrust-Kernknacker
Other common names: Common Grosbeak

Taxonomy. *Loxia ludoviciana* Linnaeus, 1766, Louisiana, USA.
In the past, this species and *P. melanocephalus* sometimes placed in a separate genus, *Hedymeles*; the two have been thought to form a superspecies, and frequently considered conspecific; they hybridize in overlap zone E of Rocky Mts. Monotypic.
Distribution. Breeds S Canada from extreme S District of MacKenzie E to Great Slave L and NE British Columbia, and C & N Alberta, E to Ontario (S from N shore of L Superior), S Quebec (S of c. 49°) and SE Newfoundland, S in USA to NE North Dakota, E South Dakota, NE Nebraska, NC Ohio, Pennsylvania and New Jersey, and inland at higher altitudes to extreme N Georgia. Migrates to region from NE & W Mexico (from SW Tamaulipas and Nayarit) S through Central America to Colombia, Ecuador, Peru, rarely E to Guyana; also West Indies (mostly Bahamas, Cuba, Cayman Is) and sparingly Bermuda.



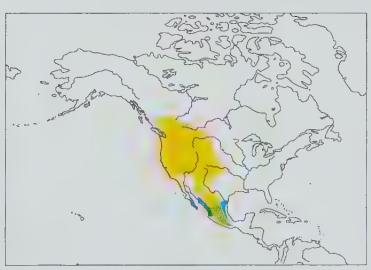
Descriptive notes. 18–20 cm; male 36–63 g, female 34–56 g. Male has head down to upper chest, back and shoulder black, lower back and rump white, uppertail-coverts black with broad white tips; upperwing black, median coverts largely white, greater coverts with large white tips on outer webs, primaries with broad white bases (prominent white patch on closed wing); rectrices black, outer feathers with broad area of inner webs white; chest and centre of lower chest rose-red, upper and lower flanks, belly and vent white with variable amount of black streaking at sides, especially lower down; thigh black; underwing-coverts rose-pink; iris dark brown; bill pinkish-white to slate-grey, darker on tip of culmen; legs greyish-blue to slate-brown. Female has crown medium-brown, with broad central stripe buff-brown, streaked with medium-brown, broad whitish supercilium extending past ear-coverts, which are dark brown, pale off-white crescent under eye; upperparts medium-brown with paler buff-brown and darker brown streaks; primaries grey-brown, narrowly edged paler on outer webs, wing pattern as in male but with white areas reduced in extent and more buffy; rectrices uniformly dull medium-brown; throat whitish-yellow or yellowish-brown, becoming more strongly coloured on chest and belly, with narrow blackish-brown streaks on centre of chest and extending to flanks, where become more diffuse; lower belly and vent brownish-yellow; bill less whitish than male's. Juvenile resembles female, but has cinnamon wingbars and tawny edgings of feathers of upperparts, underwing-coverts pink (male) or orange-yellow (female); second-year male like adult, but with variable amount of brown edgings on black of upperparts, especially head, and primaries duller blackish-brown. Voice. Song, usually from elevated perch, occasionally in flight, a very attractive series of loud warbling notes in rapidly repeated phrases with short gaps in between, continued for 6 seconds or more, in periods of high excitement almost continuous; sometimes likened to song of American Robin (*Turdus migratorius*), but without distinct pauses between phrases. Female also sings (when nest-building, relieving male at nest, incubating or brooding). Some individuals incorporate into song elements of songs of other species, e.g. Red-eyed Vireo (*Vireo olivaceus*), *Cardinalis cardinalis* and Eastern Towhee (*Pipilo erythrophthalmus*). Calls include metallic "chink" and harsh "squawk".
Habitat. Breeds in woodland of various types, including exclusively deciduous stands of maple (*Acer*), cherry (*Prunus*) and the like, mixed deciduous/coniferous woods, second-growth woodland, stream edges, also well-wooded suburban areas; usually partially open, rather than full closed-canopy woodland. Colonizes logged areas c. 15 years after cutting. On migration, also in scrub and woodland, thickets etc., including urban areas. On wintering grounds, various types of semi-open forest, second-growth woodland, pasture with scattered trees, and even urban parks with ornamental trees. Sea-level to 2000 m, usually above 900 m and occasionally to 3800 m.
Food and Feeding. Mixed diet, composition varying during course of year. On summering grounds, about equally split between animal and vegetable material, but during nesting period proportion of animal food rises to almost three-quarters; mostly arthropods, including beetles (Coleoptera), bugs (Hemiptera), caterpillars, bees (Apoidea), ants (Formicidae) and similar; vegetable matter includes fruits of elderberry (*Sambucus*), *Rubus* species, mulberry (*Morus*), also weed seeds such as pigweed and milkweed (*Asclepias*). Nestling diet c. 75% animal matter. On migration almost entirely frugivorous (analysis of faecal samples). Fewer data from wintering grounds, but eats oil-rich arillate seeds and fruits and some animal matter. Frequently visits bird feeders. Animal items gleaned from foliage, mostly in canopy, males gleaning more from twigs and females more from leaves; later in season forages lower down to take advantage of fruit crop, and sometimes on ground. In winter forages high in trees. Feeds also acrobatically, hanging upside-down from ends of twigs; also pursues flying insects on the wing.
Breeding. Season Apr–Aug/Sept, later in N of range; single-brooded, occasionally two broods. Males arrive on breeding grounds several days before females. Male occasionally performs song flight at elevation of 5 m or more. Nest-site may be selected by both sexes; nest built mostly by female, with some help from male, a loose, apparently flimsy, open cup made from small twigs, weed stems, bark strips, straw and similar, external dimensions 10 × 20 cm, cup 7 × 15 cm, placed 0·8–17 m (average c. 6 m) above ground and usually in vertical crotch of sapling or small tree; exceptionally, nest reused in subsequent years. Clutch 3–5 eggs, mostly 4, occasionally 1–2, pale blue, green or green-blue, marked, especially at blunt end, with reddish-brown or purplish-red blotches and speckles; incubation by both sexes, about two-thirds by female during daytime, exclusively by female during night, incubation period 12–13 days; chicks brooded by both sexes, also fed by both sexes, but more by female, nestling period 9–12 days, usually 10 days; fledglings attended for a further three weeks; when female involved in second brood, young tended by male alone. Nests parasitized by Brown-headed Cowbird (*Molothrus ater*), parasitism rates generally low, below 10% in most of range, higher in Great Plains (23% in one study); usually succeeds in raising young despite presence of cowbird chicks.
Movements. Entirely migratory; winters in Middle America and NE South America, a few in S USA (S Texas E to Florida, casually farther N). Leaves breeding grounds by mid-Aug in W Canada (Alberta), by late Sept in NE USA and E Canada, with median migration dates on Gulf Coast mid-Oct; passage in Bermuda mostly in Oct, with some as late as late Nov. Ringing results show that birds in N part of wintering range (Guatemala, Honduras and El Salvador) originate predominantly, but not exclusively, from breeding areas W of 80° W, while the rather fewer recoveries in Panama, Venezuela and Colombia originate from New England (NE USA) and areas around L Erie and L Ontario; no recoveries in winter of individuals ringed in W Canada (NE British Columbia and Alberta E to Manitoba). Return in S USA in mid-Mar to mid-Apr and in S Canada (Ontario) mid-Apr to early May, somewhat later in N & NW parts of range. Numerous extralimital records; after Red-eyed Vireo (*Vireo olivaceus*) and Blackpoll Warbler (*Dendroica striata*) probably the most frequent transatlantic passerine vagrant, with numerous records from Iceland, Britain (at least 22 records up to 2009), Ireland, Norway, Sweden, France, Spain, Malta, former Yugoslavia and Azores, majority involving immatures in autumn, especially in Oct. Recorded also in SW USA (California) and Galapagos Is.
Status and Conservation. Not globally threatened. Common in much of breeding range; more sparsely distributed in NE (Newfoundland). Generally exhibits considerable tolerance of human modification of habitat, although in American Midwest has been identified as a species of management concern. Differing data as to effect of forest fragmentation; one study, in SW Ontario, indicated that productivity little affected by forest-patch size, while a second, in SC Ontario, showed significantly lower productivity in small woodland fragments. One of main causes of poor nesting success in fragmented forest said to be increased cowbird parasitism, which would appear to be less damaging to this species than to smaller ones such as warblers (Parulidae) and vireos (Vireonidae). Effect of trapping for cagebird trade (widespread in Central America) unlikely to be great. More work needed to assess likely results of habitat change on wintering grounds.
Bibliography. Anderson & Daugherty (1974), Baicich & Harrison (2005), Baird (1964), Bancroft (1983), Bent & Austin (1968), Blake & Loiselle (1992), Brewer *et al.* (2000), Cannell *et al.* (1983), Curry & Stoleson (1988), Dunham (1965, 1966a, 1966b, 1966c), Emlen (1967c), ffrench (1973), Fleming (1914), Francis & Cooke (1990), Friesen, Cadman & MacKay (1999), Friesen, Wyatt & Cadman (1999), Gabrielson (1915), Goodpasture (1972), Holmes (1986), Ivor (1944), Keith *et al.* (2003), Kirk *et al.* (1997), Kroodsma (1974a, 1974b), Langley (1976), Leberman (1984), Lemon & Chatfield (1973), McAtee (1908), McCarthy (2006), McNair & Forster (1983), Mettler & Spellman (2009), Moore *et al.* (2010), Mutchler & Mutchler (1987), Parrish (1997), Phillips (1994), Potter (1997), Pyle (1997), Rothstein (1973), Salaman *et al.* (2008), Scott (1998), Smith, C.E. (1966), Smith, L.A., Burke *et al.* (2006), Smith, L.A., Nol *et al.* (2007), Stutchbury *et al.* (2005), West (1962), Wyatt (1997), Wyatt & Francis (2002), Yunick (1996).

7. Black-headed Grosbeak

Pheucticus melanocephalus

French: Cardinal à tête noire **Spanish**: Picogrueso Cabecinegro
German: Schwarzkopf-Kernknacker

Taxonomy. *Guiraca melanocephalus* Swainson, 1827, Tableland, Temascaltepec, Mexico.
In the past, this species and *P. ludovicianus* sometimes placed in a separate genus, *Hedymeles*; the two have been thought to form a superspecies, and frequently considered conspecific; they hybridize in overlap zone E of Rocky Mts. Proposed race *rostratus* (Nuevo León, in NE Mexico) included within nominate. Two subspecies recognized.
Subspecies and Distribution.
P. m. maculatus (Audubon, 1837) – breeds along Pacific coast from SW Canada (SW British Columbia S from c. 53° N, also S Vancouver I) S in W USA to California and to extreme NW Mexico (to c. 30° N in Baja California); winters S Baja California and mainland Mexico.
P. m. melanocephalus (Swainson, 1827) – breeds from SW Canada (SE British Columbia, S Alberta and SW Saskatchewan) and WC USA (NW North Dakota, S through Rocky Mts and W Great Plains) S through Mexican highlands to Oaxaca; winters within Mexican breeding range.



Descriptive notes. 18–20·5 cm; 35–49 g. Male nominate race has head, chin and ear-coverts black, narrow orange-brown band on hindneck sometimes extending onto head as postocular streak; mantle and upper back black with some orange-brown to whitish fringes, lower back and rump orange-brown; upperwing blackish, broad white edgings on median coverts, narrower white edges on greater coverts, primaries with broad white bases (large white flash on wing in flight), outermost primaries narrowly edged whitish on outer web, tertials blackish with some white on outer webs; rectrices black, outer feathers with broad area

of white on inner webs; throat, chest and most of underparts orange-brown, bright yellow centre of upper belly, white centre of lower belly, white undertail-coverts diffusely tinged orange-brown near vent; underwing-coverts bright yellow; iris brown; upper mandible slate-brown or medium-brown, lower mandible bluish-white or creamy, tip brown; legs slate-grey. Female has crown dark brown with inconspicuous narrow medium-brown scaling, broad buffy central band, latter streaked darker brown, long pale supercilium from bill base to side of hindneck; upperparts with buff-brown and darker brown streaks, upperwing dull brown, wing pattern as in male but with white areas reduced in extent (especially at base of primaries) and more buffy, rectrices uniformly dull medium-brown; chin buffy white, throat and underparts brownish-yellow, variable amounts of yellow on centre of lower chest and upper belly, sides and flanks with variable blackish streaking; underwing-coverts bright yellow. Juvenile resembles female, but has cinnamon edgings on upperwing-coverts, feathers of upperparts edged with tawny; second-year male varies in plumage, often like adult, but distinguishable by brown mottling on blackish areas, some retaining a more immature aspect than others. Race *maculatus* is very like nominate, but smaller, with more prominent orange-brown postocular stripe. VOICE. Male song, from perch and in flight, a pleasant series of ascending and descending warbled syllables separated by brief pauses; similar to that of *P. ludovicianus* but faster and higher, with more discrete pauses between phrases. Female song generally, though not invariably, distinguishable from male's by having both syllables and pauses on average shorter; female songs which are indistinguishable from those of male may be used "deliberately" in deceptive manner, as when female requires immediate return of male (e.g. when nest threatened). Calls include sharp "pik", similar to corresponding call of *P. ludovicianus* but less sharp, also a squealing distress or agonistic call.

Habitat. Various types of generally semi-open woodland, including coniferous, deciduous and mixed forest, e.g. oak (*Quercus*), juniper (*Juniperus*), pinyon pine (*Pinus*), willow (*Salix*), cottonwood (*Populus*). Also well-wooded modified habitats such as orchards, suburbs with trees. In Mexico, arid to semi-humid oak, pine–oak and deciduous woodland. Winter habitat more varied, including humid evergreen forest. From sea-level to highlands; in Mexico sea-level to 2500 m in Baja California, 1500–3000 m in mainland.

Food and Feeding. Diet animal and vegetable matter; stomach contents during breeding 66% animal, 34% vegetable. Recorded items include beetles (Coleoptera), bugs (Hemiptera), spiders (Araneae), once a small fish; seeds of various plants, including dock (*Rumex*), oats (*Avena*), pigweed, cranesbill (*Geranium*) etc., also fruits of strawberry (*Fragaria*), poison oak (*Toxicodendron*), cherries (*Prunus*), blackberries (*Rubus*) and others. Those with wintering range in Mexico overlapping that of monarch butterfly (*Danaus plexippus*) feed heavily on torpid adults of this butterfly, which are protected from many predators by toxic cardenolides derived from their foodplant, the milkweed (*Asclepias*); present species apparently selective, targeting male butterflies (which seem to have lower level of toxins than females) in order to avoid or minimize effects of toxins; also, does not eat butterflies continuously but, instead, feeds for periods of about eight days and then moves on to other prey, perhaps to allow ingested toxins to dissipate; in contrast to other bird species, appears immune to emetic effects of cardenolides, although after prolonged ingestion does show signs of malaise. Often feeds with Black-backed Orioles (*Icterus abeillei*) at monarch sites. Otherwise, forages at all levels, mostly by gleaning from foliage and twigs.

Breeding. Egg-laying begins late Apr to late Jun in USA, earlier dates referring to S parts of range and lower altitudes; no data on resident Mexican population. Monogamous. Forms pair-bond rapidly on arrival on territory, often on day of female's appearance. Nest built almost entirely by female, very rarely some assistance from male, a loose, rather untidy open cup made from slender twigs, plant stems, rootlets and similar, lined with finer plant material and hair, sometimes also with green material, located 1–8 m (average 3–4 m) above ground in outer branches of small deciduous tree, or in pinyon or juniper. Clutch 2–5 eggs, usually 3–4, pale blue or greenish-blue, heavily blotched and spotted with reddish-brown or medium-brown; incubation by both sexes during day, by female alone at night, period 12–14 days; small chicks brooded by both parents by day, by female at night, fed by both parents, for first few days fed with mashed prey, later with whole items (e.g. caterpillars), nestling period 10–14 days, shorter if nest disturbed; female may sing after young have left nest, song serving as means of calling fledglings to her. Nests parasitized by Brown-headed Cowbird (*Molothrus ater*) only rarely. A few males breed in second year, these tending to be of brighter, more adult-like plumage type.

Movements. Migratory in most of range; resident in highlands of C Mexico, from Zacatecas S to Oaxaca, where population augmented in winter by N migrants. Winter visitor in S Baja California and both W & E Mexico (S from S Sonora and Tamaulipas). In autumn, adult males depart first, from late Jul to Aug, followed by females and young; in Arizona (S USA), some move to lower altitudes before departing fully. Migrants return on territory from late Mar in N Mexico to second week of May in Canada (British Columbia); subadult males arrive significantly later than full adults. Probably a nocturnal migrant, but data lacking; some diurnal migration observed across Mojave Desert, in SW USA. Numerous vagrancy records throughout E North America, from SE Canada (Ontario E to New Brunswick) and New York E to Maine and New Hampshire, S to Virginia and Georgia; also Cuba, Curaçao and Costa Rica.

Status and Conservation. Not globally threatened. Common or abundant over much of breeding range in North America; common to fairly common in Mexico. In N part of range may benefit from partial clearing of densely wooded areas, e.g. ski-runs and hydro rights of way. Effect of habitat changes on Mexican populations unknown, although the species obviously can tolerate a significant amount of clearance. Predation on monarch butterflies significant during 135-day overwintering period of the insects: in one 2·25-ha study area, this species and Black-backed Oriole took an estimated 15,000 butterflies daily (based on discarded wings), with aggregate of more than 2,000,000, representing c. 9% of the monarch colony.

Bibliography. Anderson & Daugherty (1974), Arellano-Guillermo *et al.* (1993), Beal (1910), Bent & Austin (1968), Brower &Calvert (1985), Callaghan (1983), Calvert *et al.* (1979), Dubke (1994), Dunning, Braile & Knudson (1999), Eckhardt (1994), Fink & Brower (1981), Gardali & Nur (2006), Garrido & Kirkconnell (2008), Haas (2003), Hertzel (1989), Hill (1986, 1987, 1988a, 1988b, 1994, 1995), Howell & Webb (1995), Kinkade (2002), Kroodsma (1974a, 1974b), McAtee (1908), McCarthy (2006), Michener & Michener (1951), Nelson, W. (1989), O'Connor (2003), Ortega & Hill (2010), Ortega & Ortega (2003), Phillips (1994), Ritchison (1981b, 1982, 1983a, 1983b, 1983c, 1983d, 1985a, 1985b), Stoner (1947), Svingen (2001, 2005), West (1962), Western (1954), Weston (1947).

Genus *CARDINALIS* Bonaparte, 1838

8. Northern Cardinal

Cardinalis cardinalis

French: Cardinal rouge **German**: Rotkardinal **Spanish**: Cardenal Norteño

Other common names: (Common) Cardinal, Redbird; Long-crested Cardinal (*carneus*)

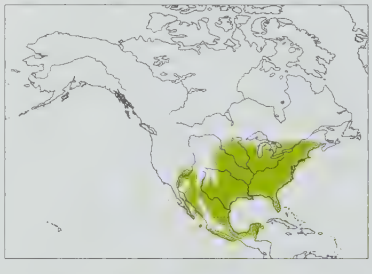
Taxonomy. *Loxia cardinalis* Linnaeus, 1758, South Carolina, USA.

Has in the past been placed in a separate genus, *Richmondena*. Forms a superspecies with *C. phoeniceus*; relationship of these two to *C. sinuatus* the subject of varying opinions. One documented example of a wild-bred hybrid between present species and *C. sinuatus*, and hybridization in captivity reported. In captivity has hybridized also with Red-crested Cardinal (*Paroaria coronata*) and Yellow Cardinal (*Gubernatrix cristata*), to neither of which species is it closely related, both being currently placed in family Emberizidae. Races fall into four groups based largely on colour of face mask of females, namely "*cardinalis* group" (comprising nominate, *floridanus*, *magnirostris* and *canicaudus*), "*coccineus* group" (*coccineus*, *littoralis*, *yucatanicus*, *phillipsi*, *flammiger* and *saturatus*), "*igneus* group" (*igneus*, *superbus*, *townsendi*, *affinis*, *sinaloensis*, *mariae*, *seftoni* and *clintoni*) and single-species "*carneus* group". In E Mexico, race *coccineus* intergrades with *canicaudus* in N coastal Veracruz and *yucatanicus* intergrades with *phillipsi* in S Yucatán Peninsula. Race *carneus* sometimes treated as a full species; conversely, *sinaloensis* treated by many authors as synonym of *affinis*, and *floridanus* sometimes subsumed into nominate. S USA populations in C Oklahoma, S Arkansas, SC Texas, all of Louisiana and SW Mississippi included in *magnirostris*, but some may belong with another race or represent as yet undescribed race(s). Nineteen subspecies currently recognized.

Subspecies and Distribution.

C. c. superbus Ridgway, 1885 – SW USA (extreme SE California E through Arizona to SW New Mexico) S to NW Mexico (N Sonora).
C. c. townsendi (van Rossem, 1932) – Tiburón I and adjacent coastal Sonora, in W Mexico.
C. c. affinis Nelson, 1899 – WC Mexico (SE Sonora, SW Chihuahua, Sinaloa and W Durango).
C. c. sinaloensis Nelson, 1899 – W Mexico (C & S Sinaloa S to Michoacán).
C. c. mariae Nelson, 1898 – Tres Marías Is (María Madre, María Magdalena and María Cleofas), off Nayarit, in W Mexico.
C. c. seftoni (Huey, 1940) – C Baja California (between c. 28° N and 27° N), in NW Mexico.
C. c. igneus S. F. Baird, 1860 – Baja California S of c. 27° N.
C. c. clintoni (Banks, 1963) – Cerralvo I, off SE Baja California.
C. c. carneus (Lesson, 1842) – W coast of Mexico from Colima S to Isthmus of Tehuantepec.
C. c. cardinalis (Linnaeus, 1758) – most of E half of USA and SE Canada from SE South Dakota S to E Oklahoma and C Louisiana, E to Atlantic coast (except SE Georgia and peninsular Florida).
C. c. floridanus Ridgway, 1896 – SE Georgia and peninsular Florida (SE USA).
C. c. magnirostris Bangs, 1903 – S USA from S Texas and C Oklahoma E to S Arkansas, Louisiana and SW Mississippi.
C. c. canicaudus Chapman, 1891 – W Oklahoma and C & W Texas S to C & E Mexico (from Coahuila S to E Jalisco, Guanajuato, C San Luis Potosí and Hidalgo).
C. c. coccineus Ridgway, 1873 – Atlantic slope of E Mexico in E San Luis Potosí, Veracruz, (except extreme S), NE Puebla and N Oaxaca.
C. c. littoralis Nelson, 1897 – lowlands of S Veracruz and Tabasco (SE Mexico).
C. c. yucatanicus Ridgway, 1887 – base of Yucatán Peninsula, in SE Mexico.
C. c. phillipsi Parkes, 1997 – coastal scrub of Yucatán.
C. c. flammiger J. L. Peters, 1913 – SE Mexico (C & S Quintana Roo), NE Belize and N Guatemala (Petén).
C. c. saturatus Ridgway, 1885 – Cozumel I (off NE Quintana Roo).

Introduced to Bermuda (probably nominate) and Hawaii (*canicaudus*); also Los Angeles, on coast of S California (probably *superbus* or *canicaudus*).



Descriptive notes. Male 22–23·5 cm, 37–52 g; female 21–21·6 cm, 36–51·5 g (nominate). Male nominate race has crown, elongated crest feathers, side of face and entire underparts bright red; nape, back and rump darker red, feathers lightly tipped with greyish; lores, lower forehead, area around bill and most of throat black; flight-feathers pinkish-grey on inner webs, outer webs reddish (giving overall red appearance to closed wing), with darker, duller red wing-coverts and alula; rectrices duller, darker red; iris deep brown; bill orange-red; legs medium-brown. Female is medium-brown above, underparts more buffy brown, elongated crest feathers strongly tinted with pinkish-red, some pinkish feathers in face; mask similar in extent to that of male, but dull greyish-black; primaries and outer secondaries dull brownish on inner webs, pinkish on outer webs (pinkish-brown appearance of closed wing), inner secondaries, tertials and wing-coverts brownish with pinkish feather centres, lesser and median coverts only narrowly edged brownish; underwing-coverts bright pink; rectrices brownish-grey with pinkish centres, duskier on inner webs; bare parts much as for male. Juvenile is similar to female, but overall much duller, with little or no red on crest, bill blackish or dusky grey, iris greyish; juvenile male can have some red on chest or flanks. Race *floridanus* is smaller and darker than nominate; *magnirostris* is much like previous, but bill larger and heavier, face mask more extensive, wing longer and tail shorter, red of male lighter (but more intense than nominate), female more whitish on central belly than nominate; *canicaudus* male is more intense red than nominate, with shorter wing and larger bill, black band above bill narrower, female greyer above and paler below than nominate and with less distinct mask; *coccineus* male is more intensely coloured than nominate, with larger bill and no greyish or brownish edgings on back feathers, female browner than nominate; *littoralis* is closest to previous, but male plumage more purple; *yucatanicus* is similar to *coccineus*, but smaller, and male lighter red; *phillipsi* is similar to last, but male paler red below, greyer on back, remiges paler and more orange-red, little or no red wash on tertials, female paler below, crest more orange-red, cheek greenish-buff; *flammiger* male is brighter than *yucatanicus*, purplish tinge on back, female heavily and more extensively washed with red below; *saturatus* is smaller than nominate, males almost inseparable from male *yucatanicus*, but feet larger, female less red on breast than either *yucatanicus* or previous; *superbus* is largest race, with bill stouter than nominate, black of face mask does not extend fully above bill, female duller above, with no black on face, throat whitish; *affinis* male is indistinguishable from last, female darker than last; *townsendi* is closest to previous, but male lighter red, paler and greyer on back, female paler, duller and more greyish-tinged; *igneus* is like *superbus*, but smaller, with shorter and thicker bill; *sinaloensis* is similar to *igneus* but smaller, with narrower and longer bill, male more pure and intense red, female darker; *mariae* is similar in size to *igneus*, but wing longer, tail shorter, feet larger and bill more bulging; *seftoni* is intermediate in size between *superbus* and *igneus*, with smaller bill than either; *clintoni* is similar in size to *igneus*, wing on average shorter, bill equal or longer, male with paler and less intense red underparts, female greyer dorsally; *carneus* is most distinctive race, bill with less sinuated tomia, crest feathers longer and stiffer and more distinctly outlined, face mask of female black. VOICE.

Vocalizations intensively studied. Both sexes sing, with broadly similar song types. Song typically a series of loud, cheerful monosyllabic whistles, "wheet- wheet-wit-wit-wit-wit" and so on, a dozen or so notes at a time, or disyllabic whistles, "wheata-wheata-wheata" etc.; or more complex whistles with up to four components. Considerable geographical variation in song (in North America; little work done in Mexico and Central America); e.g. songs in S Ontario, Texas and S Wisconsin frequently have two syllables, while in S Minnesota three syllables fairly common; nevertheless, some syllable and song types occur throughout North America. Male sings for much of year, female somewhat less. Song heard during much of day, and among males more tendency to switch song types during dawn chorus than later in day. Female often sings when incubating, which may result in visit to nest by food-carrying male (varies with female's song type). Usual contact call a liquid "chip", but at least 16 different calls recorded, including, among others, agonistic calls ("chuck, pee-too"), aggressive calls at feeder stations, pre-copulatory call of female ("see"), food-begging calls of nestlings.

Habitat. Semi-open areas with bushes, shrubs and small trees, forest edge, abandoned farmland with bushy growth, shrubby areas recovering from logging, and suburban gardens; race *phillipsi* confined to coastal scrub. Requires dense bushes for nesting and conspicuous songposts. In Ontario, where species reaches N limit of range, significantly higher densities in areas with extensive suburbs (e.g. in Ottawa region). In Mexico, from sea-level up to 2000 m (in Baja California); in USA, mostly below 1100 m, occasionally breeds up to 1500 m, in Colorado exceptional records up to 2597 m; introduced birds in Hawaii sparsely up to 2300 m, with a couple of occurrences on summit of Mauna Kea (4055 m).

Food and Feeding. Mostly vegetable matter (c. 70% over year), but young fed almost exclusively (95%) with animal matter. One analysis of stomach contents from 20 US states and Ontario showed seeds as major component (36% by weight), followed by wild fruit (24%) and other vegetable matter; invertebrate prey includes beetles (Coleoptera), grasshoppers (Orthoptera), butterflies and moths (Lepidoptera), homopteran bugs, hymenopterans and flies (Diptera); occasional slugs and snails (Gastropoda). In Florida, seen to eat nectar-containing parts of blossoms, especially in winter; in Hawaii, where introduced, has been seen to catch winged termites (Isoptera) in air. Observed to visit freshly excavated pits of sapsuckers (*Sphyrapicus*) in maple tree (*Acer*) bark, presumably for sweet sap; on one occasion, a male observed feeding on corpse of a dead field-mouse (Cricetidae), though was not seen to have killed it. In many parts of its range, a substantial proportion of its diet comes from artificial feeding stations, doubtless explaining the high population densities in suburbs. Forages singly and in pairs; also small loose flocks in non-breeding season.

Breeding. Virtually all studies have been conducted on North American populations. Start of nest-building varies according to location, from Feb in S to Apr in N; in Iowa, can begin while ground still snow-covered; in Belize, one nest with eggs on 17th Jun (race *flammiger*); up to 4 broods annually, and nesting as late as Oct recorded in West Virginia. Usually monogamous, some instances of bigamy by male recorded. Some birds remain paired throughout year; in other cases associate in small loose flocks in winter, males then returning to territory before females; or pair-members may quit flock together. Females do not show any significant preference for males with redder plumage over paler ones; apparently, other factors such as desirability of territory more important. Extra-pair fertilizations, as determined by DNA studies, seem to be less common than in some other passerines; in one study, 13·5% of young had genetic material from sources other than nesting pair. One instance of a juvenile assisting adults in feeding young, but not known if juvenile blood-related. Nest-site selected by both sexes; construction almost entirely by female, male occasionally bringing in material, work takes 3–9 days; an open bowl, with layers of rough outer material, leafy mat, grapevine bark and grassy lining, external diameter c. 11 cm, diameter of cup c. 7 cm, depth c. 3·6 cm, placed 0·25–12 m (most commonly 1–2 m) above ground, usually concealed by foliage or tangles, usually in deciduous bush such as multiflora rose (*Rosa multiflora*), honeysuckle (*Lonicera*), hawthorn (*Crataegus*) or similar, less commonly in conifer. Clutch 1–5 eggs, average 2–3, ground colour varies from greyish-white to buffy white or greenish-white, with spots or speckles of pale grey, medium-brown or rarely reddish-brown all over, but heaviest at blunt end (last egg always more lightly marked); incubation by female alone, starting with third egg, often fed on or away from nest by male, period c. 11–13 days; for first two days chicks brooded extensively by female, she may be fed by male at this time, young fed by both parents, nestling period 9–11 days; young can fly well at 19 days, become independent at 38–45 days. Some instances of two females sharing a nest, both feeding young. Common host of Brown-headed Cowbird (*Molothrus ater*) in most of range and Bronzed Cowbird (*Molothrus aeneus*) in SW USA, Mexico and farther S; in some areas parasitism rates very high, but presence of young cowbirds in nest seemed to have little effect on host's young, with no significant differences in weights and sizes (as measured by tarsus length) between nestlings in parasitized nests and those in unparasitized ones.

Movements. Generally sedentary. Occasional long-distance movements of irregular nature. Of 11,340 recoveries of individuals ringed in Canada and USA up to Aug 2010, 11,273 (more than 99%) showed zero or trivial movement; 66 moved more than 100 km from point of ringing, and of these almost half (30) moved less than 200 km, a further 27 moved 200–500 km, five between 500 km and 1000 km, and only four more than 1000 km. The most distant recoveries involved movements from Illinois SE to North Carolina, New Jersey E to Kansas, Arkansas N to Ontario and South Carolina N to Quebec. As revealed by one study covering ringing data up to 1962, those recovered at significant distances from ringing site were largely first-years; no difference in mobility between sexes. Directions of dispersal relatively random, with no predominant heading. Occurrences of individuals at locations well removed from recorded breeding range also indicate mobility; for example, one on shores of James Bay (Ontario) was 750 km N of current breeding range, while one in NE Newfoundland was more than 1200 km outside range, including not fewer than 110 km of open ocean. In Hawaiian group, race *canicaudus*, introduced on Kauai, Oahu and Hawaii, has subsequently colonized many other islands, apparently without further human intervention; three records on Nihoa, which would involve over-water movement of 275 km from nearest population.

Status and Conservation. Not globally threatened. Abundant over much of range in E & C North America; listed as Species of Special Concern in SE California. Population densities in ideal habitat can be very high; in S Texas in winter, estimated at 167 birds/km². Has expanded range dramatically over last 100 years, moving from Pennsylvania and New Jersey into New England. First nest recorded in Canada in 1901, and now an abundant breeding species in S Ontario N to Ottawa Valley; range in Ontario has expanded further during 1980–2005. Fewer data at S end of range; recently (1998) colonized Swan Is, 200 km N of Honduras, although this may have involved artificial introduction.

Bibliography. Anderson, D.L. *et al.* (1998), Anderson, M.E. & Conner (1985), Antevs (1947), Bain (1993), Baumgartner (1986), Beddall (1963), Bent & Austin (1968), Blake (1971), Brackbill (1944, 1952, 1954, 1967), Breitwisch *et al.* (1999), Brewer *et al.* (2000), Brooks (1934), Brown (1920), Browning & Robel (1981), Burns (1963), Cadman *et al.* (2007), Christy (1942), Conner *et al.* (1986), Dance (1986), David & Gosselin (2002a), Dittus & Lemon (1969, 1970), Dow (1969, 1970), Dow & Scott (1971), Eckerle & Breitwisch (1997), Emlen, J.T. (1972), Filliater & Breitwisch (1997), Filliater *et al.* (1994), Ganier (1941), Gould (1961), Govoni *et al.* (2009), Grubb *et al.* (1991), Halkin (1997), Halkin & Linville (1999), Harvey (1903), Hawksley & McCormack (1951), Horn *et al.* (2007), Howell & Webb (1995), Humbird & Neudorf (2008), Jawor (2007), Jawor & Breitwisch (2003, 2004, 2006), Jawor & Gray (2003), Jawor & MacDougall-Shackleton (2008), Jawor, Gray *et al.* (2004), Jawor, Linville *et al.* (2003), Jones *et al.* (2010), Judd (1962), Laskey (1944, 1969), Lemon (1965, 1966, 1967, 1968a, 1968b, 1971, 1974), Lemon & Chatfield (1971), Lemon & Herzog (1969), Lemon & Scott (1966), Leslie (2009), Leston & Rodewald (2006), Linville & Breitwisch (1997), Linville *et al.* (1998), Logan (1951), Maney *et al.* (2008), McCarthy (2006), McElroy & Ritchison (1996), McGraw, Hill & Parker (2003), McGraw, Hill, Stradi & Parker (2001), Nealen & Breitwisch (1997), Nice (1927), Nolan (1965), Osborne (1992), Perdue (1979), Pitzrick & Pitzrick (1992), Pyle & Pyle (2009), Reese (1975), Reiner (1989), Rice (1969), Ritchison (1986, 1988, 1997), Ritchison *et al.* (1994), Russell, P.S. (1951), Russell, S.M. (1964), Rutter (1958), Samuelson (1980), Scott & Lemon (1996), Scott *et al.* (1987), Sgueo (2009), Shaver & Roberts (1930), Shuman *et al.* (1992), Stanback & Powell (2010), Vondrasek (2006), Wible (1974), Wiseman (1977), Wolfenbarger (1999a, 1999b, 1999c), Yamaguchi (1998a), Yen Chunewei (1989), Young *et al.* (1941).

9. Vermilion Cardinal

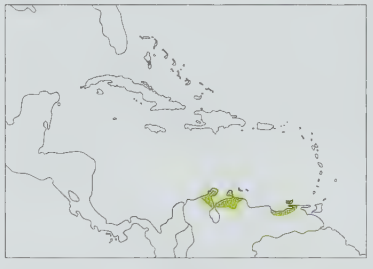
Cardinalis phoeniceus

French: Cardinal vermillon **German**: Purpurkardinal **Spanish**: Cardenal de La Guajira
Other common names: Venezuelan (Scarlet) Cardinal

Taxonomy. *Cardinalis phoeniceus* Bonaparte, 1838, "the country south of the Bay of Honduras"; error = north Venezuela.

Has in the past been placed in separate genus, variously *Richmondena* and *Pyrrhuloxia*. Forms a superspecies with *C. cardinalis*; relationship of these two to *C. sinuatus* the subject of varying opinions. Race *robinsoni* was proposed for birds of Margarita I, but all claimed differences fall within range of variation of mainland birds, except perhaps the normally shorter crest. Monotypic.

Distribution. Extreme N Colombia (Guajira Peninsula) and N Venezuela (NW Zulia E through Falcón to SE Lara; NE Anzoátegui E to Sucre, including Margarita I).



Descriptive notes. 19 cm. Male has crown bright red, elongated crown feathers bright red at base with slightly darker tips; face and ear-coverts bright red, with narrow black band around bill base, often broader on chin and usually turning into an ill-defined dusky area over most of lores; upperparts duller red, becoming brighter red on rump; upperwing-coverts reddish-brown, edged with red, primaries brownish, outer webs broadly edged with red, rectrices dull red; throat and underparts bright red; iris brown; bill pale horn to pale bluish-grey, becoming dusky on tip and most of cutting edge; legs pale horn. Female has crown grey, elongated crown feathers bright red with dark shafts and grey-brown tips, side of head brownish, with whitish areas on side of forehead and below cheek, sometimes also some white around eye, loral area dusky, becoming blackish on a band of feathers around lower mandible, usually broader on chin; upperparts greyish-brown, becoming warmer brown on rump; remiges grey-brown, rosy tint towards base of primaries and on inner webs of secondaries and tertials; rectrices dull reddish-brown, fringed grey-brown; underparts cinnamon-buff; bill bluish-white, black tip of upper mandible, legs dusky horn. Juvenile similar to adult female but the brown is richer and more extensive. Voice. Song a pleasant series of loud whistled notes, "cheer o-weet-toweet toweet toweet" and so on, similar to that of *C. cardinalis* but slower and sweeter. Call note "chip".

Habitat. Inhabits semi-arid scrub with various cacti and spiny leguminous bushes. Absent from better-watered areas. Occurs from sea-level up to 300 m, occasionally up to 700 m in Lara (W Venezuela).

Food and Feeding. Few data recorded; of 80 emetic samples from Sucre (Venezuela), 83% contained invertebrate remains (six species identified), 48% fleshy fruits (ten species) and 84% seeds (six species). Forages singly and in pairs; occasionally in small groups. Searches in low vegetation, generally out of sight; frequently calls while foraging.

Breeding. Only six nests so far described, all on Margarita I. Season Jun to early Aug, with completed nests by mid-Jun and nestlings late Jul to early Aug; probably single-brooded. Nest a cup of vegetable matter, diameter 7–7·5 cm, located 0·5–1·4 m up in bush or prickly pear cactus (*Opuntia*). Clutch 3 eggs (four nests), once 4, eggs white with evenly distributed brown spotting; female alone incubates, no information on duration of period; small chicks brooded by female, young fed by both sexes, nestling period 12–13 days.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Restricted-range species: present in Caribbean Colombia and Venezuela EBA. Quite common in suitable habitat in some parts of range. Frequently captured for use as cagebird, at least in some areas; this poaching, where uncontrolled, undoubtedly has significant negative effect on populations.

Bibliography. Hilty (2003), Hilty & Brown (1986), Poulin *et al.* (1994), Ridgely & Tudor (1989), Rodríguez-Ferraro & Blake (2008), Rodríguez-Ferraro & Trujillo (2004), Salaman *et al.* (2008).

10. Pyrrhuloxia

Cardinalis sinuatus

French: Cardinal pyrrhuloxia **German**: Schmalschnabelkardinal **Spanish**: Cardenal Pardo

Taxonomy. *Cardinalis sinuatus* Bonaparte, 1838, western part of Mexico (Zacatecas).

Formerly placed in a monotypic genus, *Pyrrhuloxia*, mainly on account of its unique bill shape, very different from that of *C. cardinalis*; intermediate bill of *C. phoeniceus*, however, as well as other arguments, has resulted in its return to present genus. Three subspecies recognized.

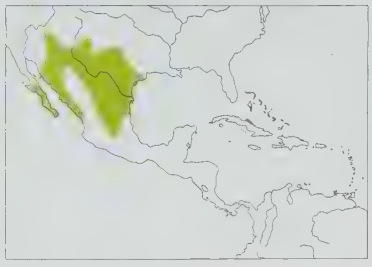
Subspecies and Distribution.

C. s. fulvescens (van Rossem, 1934) – S USA (S Arizona) and NW Mexico (Sonora, Sinaloa and W Durango S to N Nayarit).

C. s. peninsulae (Ridgway, 1887) – extreme NW Mexico (Baja California S from c. 27° N).

C. s. sinuatus Bonaparte, 1838 – S USA (S New Mexico E to SE & C Texas) and S in C highlands and E lowlands of Mexico to NE Jalisco, Michoacán, Querétaro, San Luis Potosí and Tamaulipas.

Descriptive notes. 19–21·5 cm; male 30·1–44·2 g, females 24·4–43·2 g (Arizona). Has distinctive bill, with upper mandible short, thick and deep, with strongly curved culmen and strongly notched tomium, remarkably like that of a parrot (Psittacidae). Male nominate race has forehead, lores and area around eye deep rose-red, duskier red on narrow band around bill base, usually extending below eye and along a variably developed narrow malar line, crown grey, with a crest of deep rose-red feathers, ear-coverts grey; upperparts grey, rump greyish; primaries grey with broad pinkish-



rose edgings on outer webs (broad pinkish-rose patch on closed wing), secondaries greyish with diffuse pinkish on inner webs, shoulder pinkish-rose, carpal area bright rose; rectrices greyish-black with deep rose-red at base, especially at sides; chin and throat pinkish-red, chest pinkish-red in centre, becoming grey at side, pinkish-red broadens on belly, narrows on lower belly and becomes greyish-pink on vent; thigh bright pinkish-yellow; iris dark brown; bill yellow to orange in summer, horn-coloured or brownish with paler lower mandible in winter; legs dull light brown. Female is similar to male, but pink much reduced, being confined to forehead, lores and area around eye, and in crest; chin and throat indistinctly paler and pinkish, underparts greyish-buff, greyer at sides, with variable amount of pink in centre of lower chest; thigh pale pinkish-grey; pinkish area on closed wing much reduced and colour less strong, rectrices dull blackish-brown with dark rosy suffusions, especially at sides; bill as on male in summer, greyish-brown in winter. Juvenile usually lacks red in crest, has pale tips on wing-coverts (giving diffuse wingbar), bill dark grey, almost black. Race *fulvescens* is smaller-billed and longer-tailed than nominate, red areas paler and less deep in colour, little or no dusky on face, upperparts more brown in tone; *peninsulae* is slightly paler than previous, with shorter wing and tail. Voice. Song a series of whistles, usually of one syllable, sometimes more, "cheewee, cheewee" and so on, remarkably similar to, and sometimes indistinguishable from, that of *C. cardinalis*, but phrases tend to be shorter in length and less full and rich; in contrast to *C. cardinalis*, female sings only rarely, with more subdued song. The two species frequently have overlapping territories, but apparently do not defend them against each other; presence of nearby singing *C. cardinalis* may cause present species to sing with longer phrases. Calls include sharp metallic "chip" and high chattering "tic-tic-tic-tic". Food-begging young have longer "seep" call.

Habitat. Arid brushland, including mesquite (*Prosopis*) savanna, riparian woodland, various types of arid and semi-arid scrub; other favoured plant species are prickly pear (*Opuntia*), catclaw (*Acacia*) and whitebrush (*Aloysia gratissima*). High densities of hackberry (*Celtis*) and dense shrubs and vines not favourable for this species; suburban areas where habitat has been extensively modified have lower population densities (in contrast to situation with *C. cardinalis*). In winter months may wander into other areas not used for breeding, including open suburbs. Up to 1500 m In Arizona; sea-level to 2000 m in S Baja California.

Food and Feeding. In one study in Texas (USA) involving stomach contents, food c. 70% vegetable matter, 30% animal matter. Much of vegetable matter was seeds of grasses, nightshade (*Solanum*), spurge (*Euphorbia*) and similar, as well as cactus fruits. Animal items taken include grasshoppers (Orthoptera), caterpillars, beetles (Coleoptera), bugs (Hemiptera) and cicadas (Cicadidae). Visits saguaro cacti (*Carnegiea*) in bloom for nectar and pollen. Visits feeders, where seems to be subordinate to *C. cardinalis*. Will drink water when available, but much of water needs apparently supplied by food. In winter forms loose flocks with other species, including *C. cardinalis*. Forages on ground and in vegetation.

Breeding. Eggs Mar–Aug in Texas and to Sept in Arizona, in both cases majority in May; apparently predominantly single-brooded, but some cases of double-brooding (as opposed to replacement of failed clutches) in Arizona. Territory size may vary, 0·6–8 ha (average c. 1·5 ha) in one Texas study. Nest built mainly or entirely by female, a small compact oval cup made from thorny twigs, strips of bark and coarse grass, lined with rootlets, spider webs, feathers and fine fibres, external dimensions c. 9–11 × 6–9 cm, cup c. 7·5 × 4–6 cm (usually somewhat smaller than nest of *C. cardinalis*), placed in brush or hedgerow, in mesquite or in one of numerous other species, in studies in Arizona and Texas average height above ground 2·4 m and 3–4 m, respectively. Clutch 2–4 eggs, rarely 5, average 3·2 in Arizona and 3·4 in Texas, greyish-white to greenish-white, with quite heavy brownish markings overlaid on grey; incubation by female alone, sometimes fed on nest by male, period 14 days; small chicks brooded by female, young fed by both sexes, apparently more by female, nestling period 10–13 days; on leaving nest young fly very poorly, cared for by both parents for several days further; thereafter, young join flocks and may be more mobile. Nests sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*) and Bronzed Cowbird (*Molothrus aeneus*), e.g. in one Texas study 13% of nests had cowbird eggs or young. Cowbirds apparently have significant effect on nest success of this species, perhaps more than on that of *C. cardinalis*.

Movements. Resident; may wander locally outside breeding season, but no ringing recoveries of more than 20 km. Several extralimital records in USA in Colorado, SW Kansas and W Oklahoma; reports from Nevada disputed.

Status and Conservation. Not globally threatened. Quite common in suitable habitat in USA; uncommon to fairly common in Mexico. Densities in Texas 10–80 individuals/40 ha, in Arizona, 6–8/40 ha. Densities in suburbs, even when much native vegetation remains, much lower. May have benefited from colonization of former grass rangeland by mesquite.

Bibliography. Anderson & Anderson (1946), Baicich & Harrison (2005), Bent & Austin (1968), Bock (1964), Dobbs & Martin (2000), Gould (1961), Grzybowski (1990), Harrison (1979), Hinds & Calder (1973), Howell & Webb (1995), Janos (1991), Kingery (1997), Lemon & Herzog (1969), Lloyd *et al.* (1998), Locke (1965), McCarthy (2006), Patrikeev (2006b), Patten (2006), Patti (1992), Phillips *et al.* (1964), Pyle (1997), Russell & Monson (1998), Tweit & Thompson (1999), Wilbur (1987).

PLATE 36 ➤



Genus *CARYOTHRAUSTES* Reichenbach, 1850

11. Black-faced Grosbeak

Caryothraustes poliogaster

French: Cardinal à ventre blanc **German**: Graubauchkardinal **Spanish**: Picogrueso Carinegro
Other common names: Bishop Grosbeak

Taxonomy. *Pitylus poligaster* du Bus de Gisignies, 1847, Guatemala.
May form a superspecies, and has been treated as conspecific, with *C. canadensis*. Race *simulans* of latter sometimes included in present species. Two subspecies recognized.
Subspecies and Distribution.
C. p. poliogaster (du Bus de Gisignies, 1847) – Caribbean lowlands of Mexico (from C Veracruz, NE Oaxaca and N Chiapas E to S Quintana Roo), N Guatemala, Belize and N Honduras.
C. p. scapularis (Ridgway, 1888) – Caribbean lowlands from E Honduras and Nicaragua S to Panama (Bocas del Toro, Veraguas and Coclé; formerly, or casually, farther E).
Descriptive notes. 18–19 cm; 34·9–46·7 g (nominate). Nominate race has forehead yellow, becoming yellow-green on crown and nape, duller dark greenish-yellow on mantle and back, variable



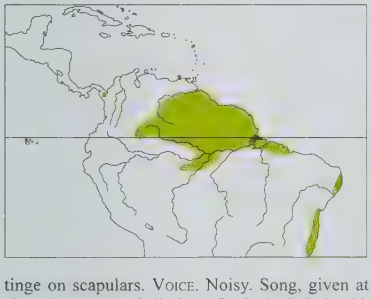
amount of grey on scapulars, and greyish-green lower back and rump; shoulder and upperwing-coverts dull dark greenish-yellow, primaries and secondaries dull blackish-grey with broad greenish edgings on outer webs (giving greenish appearance to closed wing); rectrices dull dark greenish; lowermost forehead, lores, area around eye, chin and upper throat black, ear-coverts and chest deep yellow, rest of underparts medium-grey; carpal area and underwing-coverts bright yellowish-green; iris dark brown; bill blackish, grey base; legs blue-grey. Sexes similar. Juvenile has facial mask much less clearly defined and grey-black, is generally duller than adult. Race *scapularis* is similar to nominate, but smaller, with scapulars and lower back yellowish olive-green. Voice. Noisy. Song consists of 3–6 mellow but sharp whistles, "cher-che weet, cher-che weet"; also alternating with shorter version, sometimes followed by sharp, downwardly inflected whistles. Female sings, but songs shorter. Calls include buzzy "zzzrt" and a quiet "pit" in flight.
Habitat. Humid lowland evergreen forest and forest edge; sea-level to 1200 m in Mexico, to 900 m in Costa Rica.
Food and Feeding. Food items both vegetable and animal: fruits of Mexican rubber tree (*Castilla*), berries of *Hamelia*, *Bactris*, seeds and pulp of *Stemmadenia*, the epiphytic cactus *Rhipsalis*, *Ficus pertusa*, small arillate seeds; arthropods, including caterpillars and occasionally flying insects. Gregarious; often found in noisy flocks of up to 20 individuals, often mixed with other species, moving through upper and middle levels of forest.
Breeding. Season mainly Apr–Jun; birds in breeding condition early Mar to late May in Belize. From limited observations appears to be co-operative nester, up to four birds in adult-type plumage attending nest and defending young, although several more may be involved peripherally; relationship of helpers to breeding pair not known. Nest a slight shallow bowl c. 7·5 cm in diameter, outer layer of fern rhizomes with green leaves still attached, middle layer of dead leaves, and lining of long leaves of epiphytic bromeliad *Tillandsia* coiled down into bowl while fresh and pliant, placed 3–6 m above ground in small tree or palm. Clutch 3 eggs, dull white, mottled and spotted all over, especially at blunt end, with bright shades of brown (reports that eggs are unmarked yellow-green seem to be erroneous); incubation probably by female alone, sitting female occasionally sings from nest, incubation period 13–13·5 days; chicks fed by both parents, also by one or more helpers if present (sex of helpers not known; in some studies sometimes additional birds attended, but did not feed young), nestling period 11–12 days.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Quite common to common in suitable habitat in much of range. Prefers undisturbed habitat.
Bibliography. Cant (1979), Howell & Webb (1995), Moermond (1981), Ridgely & Gwynne (1989), Ridgway (1888), Russell (1964), Schönwetter & Meise (1981), Skutch (1972, 1989a), Vu Halinh *et al.* (2007).

12. **Yellow-green Grosbeak**

Caryothraustes canadensis

French: Cardinal flavert **German**: Gelbbauchkardinal **Spanish**: Picogrueso Verdiamarillo
Other common names: Green Grosbeak

Taxonomy. *Loxia canadensis* Linnaeus, 1766, Canada; error = Cayenne, French Guiana.
May form a superspecies, and has been treated as conspecific, with *C. poliogaster*. Race *simulans* sometimes included in latter species. Four subspecies recognized.
Subspecies and Distribution.
C. c. simulans Nelson, 1912 – Cerro Pirré (E Darién), in E Panama.
C. c. canadensis (Linnaeus, 1766) – SE Colombia (Vaupés), S Venezuela (Amazonas, Bolívar, Delta Amacuro), the Guianas and N Brazil (E Amazonas and N Pará E to N Maranhão).
C. c. frontalis (Hellmayr, 1905) – NE Brazil (Paraíba, Pernambuco and Alagoas).
C. c. brasiliensis Cabanis, 1851 – EC Brazil (E Bahia, E Minas Gerais, Espírito Santo and Rio de Janeiro).



Descriptive notes. 17–18·5 cm; 31–36 g; 15 cm (*simulans*). Nominate race has top of head and entire upperparts, including rectrices and remiges, yellowish-green, remiges with yellow edgings on inner webs; lores down to cheek and throat black; underparts bright yellow, chest and flanks slightly greenish-tinged yellow; iris brown; bill black, base blusih-grey; legs grey. Sexes similar. Juvenile undescribed. Race *frontalis* is similar to nominate, but has black frontal band on mask; *brasiliensis* is larger than nominate, with brighter yellow forecrown; *simulans* is paler above than nominate, with variable greyish tinge on scapulars. Voice. Noisy. Song, given at dawn, a lively, continuous, monotonous "chap chap cheeweep". Calls from flocks include loud buzzy "dzzeet", repeated "chew-chew-chew" and others.
Habitat. Lowland humid forest and forest borders, especially in areas of high rainfall; sea-level to 1000 m on tepui foothills in Venezuela, mostly below 250 m in Colombia. Race *simulans* occurs in humid forest at 250–1250 m.
Food and Feeding. Diet mixed animal and vegetable; in Suriname, stomach contents included beetles (Coleoptera), cockroaches (Blattodea) and their oothecae, and berries. Occurs in flocks of a dozen or more individuals; commonly joins mixed-species foraging flocks. Forages in canopy and down to middle levels of wet forest.
Breeding. Young being fed at nest in late Mar and late Nov in French Guiana, nest in Jan in Brazil (near Manaus), and pair building nest in Feb in Colombia; birds in breeding condition in Feb–Apr in Venezuela and Brazil. One nest described (near Manaus), an untidy cup built from bark strips, located 7 m up in tree; nest being built in Colombia was 7–8 m up in base of palm frond. Clutch 2 eggs, cream-coloured with scattered brown spots, especially around blunt end (also unverified report of 2–3 eggs, bluish-white with brown markings). No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Fairly common in suitable habitat in much of range. Race *simulans* has very restricted geographical distribution in Darién, in E Panama; was thought to be restricted to Cerro Pirre, but recent records from Serrania de Jungurundú, farther S in Darién.
Bibliography. Angehr *et al.* (2004), Borges & Cardoso (1995), Haverschmidt (1968), Hilty (2003), Hilty & Brown (1986), Nelson (1912), Ridgely & Gwynne (1989), Robbins *et al.* (1985), Salaman *et al.* (2008), Sick (1993), Tostain *et al.* (1992).

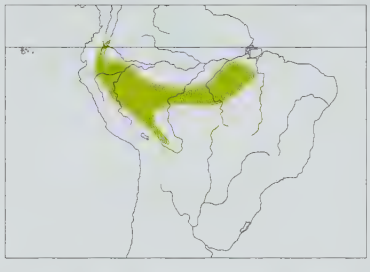
Genus *PARKERTHRAUSTES* Remsen, 1997

13. **Yellow-shouldered Grosbeak**

Parkerthraustes humeralis

French: Cardinal à épaulettes **German**: Gelbschulterkardinal **Spanish**: Picogrueso Humeral

Taxonomy. *Pitylus (Caryothraustes) humeralis* Lawrence, 1867, "Bogotá, Colombia" (trade skins of unknown provenance).
Relationships uncertain; has been suggested as belonging in tanager family (Thraupidae), but true taxonomic position not known. Formerly placed in genus *Caryothraustes*, but differs significantly in morphology (e.g. bill shape, notched tail), plumage (including sexual dimorphism) and behaviour (quiet, inconspicuous, and solitary or in pairs), as well as genetically; subsequently placed in its own monotypic genus. Taxonomic status of undescribed form from Ecuador as yet unclear. Monotypic.
Distribution. Extreme S Colombia (E slope of Andes in Caquetá and Putumayo), E Ecuador (E slope from W Sucumbíos and W Napo S to Morona-Santiago), E Peru (Amazonas and Loreto S to Madre de Dios and N Puno), SW & C Brazil (S Amazonas and Rondônia E to S Pará and NW Mato Grosso) and N Bolivia (La Paz and Cochabamba).



Descriptive notes. 16 cm; one female 37 g (Brazil). Distinctive, with relatively narrow bill thick-based and with strongly curved culmen. Male has crown to nape grey, lores, area below eye and ear-coverts blackish; upperparts greenish-yellow, flight-feathers blackish, broadly edged greenish-yellow on outer webs, tertials blackish on inner webs; yellow on shoulder and carpal area; rectrices are mainly dull greenish-yellow with dark inner webs; submoustachial area to chin and throat scalloped whitish and dull black, with blackish malar stripe; chest grey, becoming paler on belly, vent bright yellow; iris red; upper mandible black, lower mandible grey; legs grey. Birds of undescribed form from Ecuador are more robust, with thicker bill, broader black mask and extensive black on throat, as well as showing somewhat more yellow on bend of wing. Female has crown and nape dull grey, contrasting with greenish-yellow back, lower rump yellow, rectrices dull greenish-yellow, darker on inner webs; shoulder patch and carpal area bright yellow, flight-feathers dull blackish with yellow-green outer webs, primary coverts and alula grey-black; lores and ear-coverts grey-brown; chin and throat scalloped grey and greyish-black, narrow black malar stripe; chest and belly greyish, belly with greenish tinge, vent and thigh bright yellow; bare parts as for male. Juvenile is similar to adult, but duller. Voice. Rather silent. Song a repetitive, high lisping "seet tseer-tseer"; call a loud, clear inflected "suweet". Dependent young have high-pitched begging call.
Habitat. Interior of lowland humid forest, at 200–1000 m; usually below 750 m.
Food and Feeding. No published data; stomach contents (Ecuador) insect parts and seeds. Solitary and in pairs, often in mixed-species foraging flocks with tanagers. Forages in canopy; gleans insects from foliage, especially near ends of branches.
Breeding. Juveniles seen when foraging with adults in Jun in NE Peru. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Not well known. Evidently rather uncommon and in low numbers through much of range; possibly overlooked owing to its inconspicuous behaviour. May be more common than it appears, at least locally; apparent scarcity likely due to some extent to lack of observations.
Bibliography. Demastes & Remsen (1994), Hilty & Brown (1986), Parker (1982), Remsen (1997b), Remsen & Ridgely (1980), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Schulenberg & Remsen (1982), Schulenberg *et al.* (2007), Tamplin *et al.* (1993).

Genus *RHODOTHRAUPIS* Ridgway, 1898

14. **Crimson-collared Grosbeak**

Rhodothraupis celaeno

French: Cardinal à collier **German**: Halsbandkardinal **Spanish**: Picogrueso Acollarado

Taxonomy. *Tanagra Celaeno* W. Deppe, 1830, Papantla, Veracruz, Mexico.
Closely affiliated with *Periporphyrus*. Monotypic.

On following pages: 15. Red-and-black Grosbeak (*Periporphyrus erythromelas*); 16. Slate-colored Grosbeak (*Saltator grossus*); 17. Black-throated Grosbeak (*Saltator fuliginosus*); 18. Black-headed Saltator (*Saltator atriceps*); 19. Buff-throated Saltator (*Saltator maximus*); 20. Black-winged Saltator (*Saltator atripennis*).

Distribution. Atlantic slope of NE Mexico from C Nuevo León, S Tamaulipas and E San Luis Potosí, S to Querétaro, Hidalgo, NE Puebla and N Veracruz.



Descriptive notes. 21–22 cm; one female 60 g. Male has crown, face, ear-coverts, chin, throat and upper chest black, nape dark crimson, mantle deep dull crimson, back and rump black with dull crimson feather edges; upperwing blackish, wing-coverts with very fine dark crimson edges; rectrices dull black; underparts dark crimson, some black mottling in centre of chest; iris brown; upper mandible pale blue-grey with blackish tip and on cutting edge, lower mandible blackish with pale blue-grey base; legs grey. Female is essentially similar to male, but all crimson areas replaced by olive on upperparts and by olive-yellow on underparts, and wing and tail olive-green; bill blackish, with blue-grey base of lower mandible. Immature male has dark crimson of adult replaced by dull olive-yellow, belly with extensive black mottling; immature female has face and throat black, but chest sooty grey. Voice. Song a rich to slightly burry warble, often upslurred at end; somewhat similar to that of *Pheucticus ludovicianus*, but with fewer curved or warbled notes. Calls include high, clear, penetrating slurred "sseeuu" or "sseeeur", also a piercing "seeip seeeiyu".
Habitat. Humid to semi-arid brushy woodland and edge, second growth; also citrus groves and sweet gums (*Liquidambar*). Sea-level to c. 1200 m.
Food and Feeding. Frequently folivorous; stomach contents (Tamaulipas) chewed-up leaves of nightshade (*Solanum verbascifolium*), also some insects, but no seeds. Opportunistically feeds on fruit in citrus groves; also various other fruits such as mangos (*Mangifera*), loquat (*Eriobotrya japonica*), chinaberry (*Melia azedarach*) etc. Vagrants in Texas (S USA) seen to eat various fruits, including apple and citrus, and leaves of several plants, including potato tree (*Solanum erianthum*). Found singly and in pairs; joins mixed-species flocks. Forages at all levels in forest, sometimes descending to ground.
Breeding. Nest found in May. Apparently only one nest so far described, a loosely constructed cup of twigs, thinly lined and not deep, located 2 m up in tangle of vines and shrubbery. Clutch 2–3 eggs, pale bluish-grey with light brown spots all over; young apparently tended by female alone; no other information.
Movements. Apparently sedentary. Some movement or wandering; numerous records in S Texas (S USA), 200 km and more N of normal range; some of these vagrants established territories.
Status and Conservation. Not globally threatened. Restricted-range species: present in North-east Mexican Gulf Slope EBA. Fairly common to uncommon over much of range. Appears able to adapt to some habitat modification.
Bibliography. Braun & Emanuel (1982), Eitniear (2006b), Eitniear & Tapia (2000), González-García *et al.* (2009), Howell & Webb (1995), Sutton (1950), Sutton *et al.* (1950), Webster (1974).

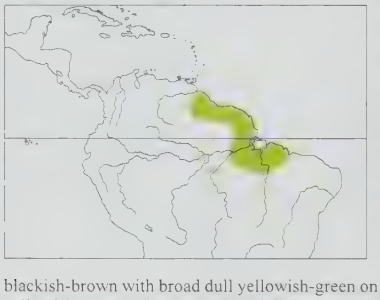
Genus *PERIPORPHYRUS* Reichenbach, 1850

15. **Red-and-black Grosbeak**

Periporphyrus erythromelas

French: Cardinal érythromèle **German**: Schwarzkopfkardinal **Spanish**: Picogrueso Rojinegro

Taxonomy. *Loxia erythromelas* J. F. Gmelin, 1789, Cayenne, French Guiana.
Closely affiliated with *Rhodothraupis*. Monotypic.
Distribution. Extreme E Venezuela (E Bolívar, E Delta Amacuro), N & C Guyana, Suriname (except extreme SW), French Guiana, and N Brazil (Amapá S to E Pará and N & W Maranhão; also isolated in NE Amazonas and W Pará).



Descriptive notes. 20·5 cm; one male 48 g. Male has entire head, chin and throat black; red nape collar separating black of head from deep reddish of upperparts; wing-feathers blackish-brown with reddish-brown outer webs; rectrices dull reddish; chest and belly bright red, becoming slightly duller on vent; iris dark brown, black or blue-black; bill black, lower mandible silver-grey or pale blue-grey with black on distal portion and along cutting edge; legs dark greyish-black or pinkish-grey. Female has crown and face to throat dull black; upperparts dark greenish-yellow, fine darker streaks on nape; primaries and secondaries blackish-brown with broad dull yellowish-green on outer webs (giving closed wing an overall dark yellowish-green colour); rectrices dull dark greenish-brown; underparts yellowish-green, diffusely mottled darker, some females (presumably older ones) having large orange-red flecks on underparts; bare parts similar to those of male. Immature male is generally duller than adult, with head dull black, underparts orange-red, borders of black on throat less clear-cut. Voice. Song an exceptionally sweet series of halting phrases that slide up and down, given slowly with pauses; typically consists of variations built around 2–3 standard phrases. Both sexes sing. Call a high-pitched, sharp "spink".
Habitat. Mature lowland humid forest, *terra firme*, also seasonally flooded forest; sea-level to 1000 m.
Food and Feeding. Little published information; stomach contents of one specimen described as arthropods, of another insects 40% and seeds 60%. In pairs and family groups; does not, apparently, join mixed-species flocks. Forages in shady lower levels of forest, occasionally into subcanopy; often wary.
Breeding. No information.
Movements. Apparently sedentary; ranges widely within its territory.
Status and Conservation. Not globally threatened. Almost always rare and at low density and in small numbers throughout its range. Rare in French Guiana. Not recorded in Suriname until 1972, although now regular in Brownsberg Reserve. Appears not to adapt to man-modified habitats.
Bibliography. Davis (1979), Fernandes (2007), Henriques *et al.* (2003), Hilty (2003), Mees (1974), Ridgely & Tudor (1989, 2009), Stotz *et al.* (1996), Thiollay (2002), Tostain *et al.* (1992).

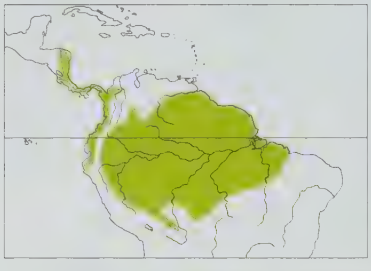
Genus *SALTATOR* Vieillot, 1816

16. **Slate-colored Grosbeak**

Saltator grossus

French: Saltator ardoisé **German**: Rotschnabelsaltator **Spanish**: Pepitero Pizarroso
Other common names: White-throated/Slaty Grosbeak

Taxonomy. *Loxia grossa* Linnaeus, 1766, Cayenne, French Guiana.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species and *S. fuliginosus* sometimes treated as conspecific, and both sometimes placed in a separate genus, *Pitylus*. Two subspecies recognized.
Subspecies and Distribution.
S. g. saturatus (Todd, 1922) – E Honduras, Nicaragua, Caribbean slope of Costa Rica, Panama (Caribbean slope, and E from Veraguas on Pacific slope), NW Colombia (W of Andes) and W Ecuador (S to W Loja and El Oro).
S. g. grossus (Linnaeus, 1766) – SE Colombia E of Andes (S from Vichada), S Venezuela (Amazonas, Bolívar), the Guianas, N Brazil (S to N Mato Grosso and Maranhão), E Ecuador (Sucumbíos S to Zamora-Chinchipe), E Peru and N Bolivia (Beni and NW Santa Cruz).



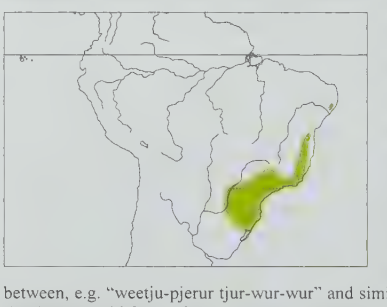
Descriptive notes. 19–20·5 cm; 41–53 g (Venezuela and Suriname). Male nominate race is mostly uniformly slaty blue above and below; lores, area below eye, anterior ear-coverts and malar region, side of throat and chestband black, chin and centre of throat white; upperwing and tail blackish, secondaries with slate-blue edgings on outer webs, wing-coverts broadly edged slate-blue; underwing-coverts white; iris deep brown; bill bright orange-red or red; legs dark horn or brownish-grey or black. Female is generally duller than male, more greenish-slate below, black around throat duller or absent, centre of throat grey-white with less contrast. Immature is generally much duller than adult, with chin–throat patch dull greyish-white and reduced in extent. Race *saturatus* is very like nominate, but slightly darker overall. Voice. Song an arresting series of 3–7 loud, rich whistles, e.g. "twee-tee-wee-teewee-chee-cher" , often likened to that of Rufous-browed Peppershrike (*Cyclarhis gujanensis*); individuals sing several variants of each song type, also a softer, quicker version. Calls include *Cardinalis*-like "peet" and nasal whine.
Habitat. Humid forest, forest borders, and mature secondary woodland; in South America both *várzea* and *terra firme*. Sea-level to 1200 m, occasionally to 1700 m.
Food and Feeding. Recorded food items seeds and arthropods; insects including beetles (Coleoptera). Usually in pairs, sometimes with other species in mixed foraging flocks. Forages in canopy and middle to upper levels of forest.
Breeding. Recently fledged young in mid-May in Costa Rica; in Colombia, birds in breeding condition in Mar–Apr (Chocó), May (S Córdoba) and Sept (Santander). Nest cup-shaped, made from grasses, roots, dry leaves and similar, lined with finer vegetation and rootlets. Clutch 2–3 eggs, bluish-white marked with brown. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Fairly common in suitable undisturbed habitat.
Bibliography. Demastes & Remsen (1994), Haverschmidt (1968), Hilty (2003), Hilty & Brown (1986), Ridgely & Greenfield (2001a), Tamplin *et al.* (1993).

17. **Black-throated Grosbeak**

Saltator fuliginosus

French: Saltator fuligineux **German**: Papageischnabelsaltator **Spanish**: Pepitero Fuliginoso

Taxonomy. *Loxia fuliginosa* Daudin, 1800, Rio de Janeiro, Brazil.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species and *S. grossus* sometimes treated as conspecific, and both sometimes placed in a separate genus, *Pitylus*. Monotypic.
Distribution. E Brazil (Alagoas; S Bahia and E Minas Gerais S to N Rio Grande do Sul) and NE Argentina (Misiones); possibly also SE Paraguay (no recent records).



Descriptive notes. 22 cm. Male has crown and upperparts deep slate-blue, wing-feathers dull black with deep slate-blue edges, tail more uniform dull black; lores, face, ear-coverts, throat and mid-breast black, lower breast, belly and flanks deep slate-blue; underwing-coverts white; iris dark brown; bill bright coral-red; legs dark grey. Female is generally duller than male, with less of a blue tinge on upperparts, less contrast between chest and belly. Juvenile is generally duller, and rather less blue, than adult, may have darker ridge of the culmen. Voice. Song is a loud series of whistles, often delivered in two parts with long interval in between, e.g. "weetju-pjerur tjur-wur-wur" and similar.
Habitat. Humid forest, from sea-level to 1200 m; largely montane in N part of range.
Food and Feeding. No published data available on diet. Forages in middle and upper levels of forest; occasionally lower.

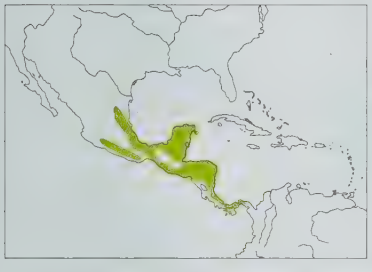
Breeding. Nest undescribed; eggs stated to be uniformly clear greenish-blue; frequently parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Uncommon. Not well known. In E Paraguay recorded in early decades of 20th century in Alto Paraná, but no records since then. Much of this species' original habitat has been destroyed for agriculture or development.
Bibliography. van Perlo (2009), Ridgely & Tudor (1989, 2009), Schönwetter & Meise (1981), Sick (1993), Steullet & Deautier (1940).

18. Black-headed Saltator

Saltator atriceps

French: Saltator à tête noire **German**: Schwarzkappensaltator **Spanish**: Pepitero Cabecinegro

Taxonomy. *Tanagra (Saltator) atriceps* Lesson, 1832, Veracruz, Mexico.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Six subspecies recognized.
Subspecies and Distribution.
S. a. atriceps (Lesson, 1832) – Caribbean slope of Mexico from S Tamaulipas S (except SE Veracruz and N & C Yucatán Peninsula) to E Costa Rica.
S. a. suffuscus Wetmore, 1942 – Sierra de Tuxtla, in SE Veracruz (E Mexico).
S. a. raptor (S. Cabot, 1845) – SE Mexico (Campeche, Yucatán and Quintana Roo).
S. a. flavicrissus Griscom, 1937 – Guerrero E to C Oaxaca, in SW Mexico.
S. a. peeti Brodkorb, 1940 – Pacific slope of E Oaxaca and Chiapas, in S Mexico.
S. a. lacertosus Bangs, 1900 – E Costa Rica (Talamanca) and Panama (E to Canal Zone; one record in Darién).



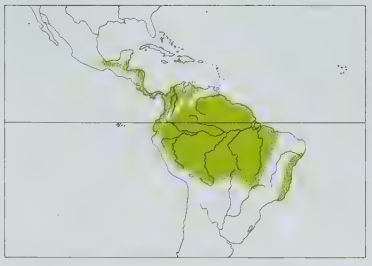
Descriptive notes. 24 cm; 63–116 g (El Salvador), 68·2–91·2 g (Yucatán). Nominate race has crown black, face blackish, white supercilium and greyish submoustachial area; upperparts, including upperwing-coverts and tail, copper-green, rectrices brighter on outer webs; primaries darker grey-black with copper-green edgings; chin black, large white throat patch bordered with black on all sides, including broad black breastband; lower breast and belly grey, flanks tinged olive, vent and undertail-coverts cinnamon; iris deep reddish-brown; bill black; legs slate-grey. Sexes alike. Juvenile is similar to adult, but black areas more sooty, throat patch dull whitish and less contrasting. Race *suffuscus* has throat patch cinnamon, not white; *flavicrissus* is similar to nominate, but pectoral band broader, white throat patch smaller, flanks less brown or olive, vent more ochraceous; *peeti* is similar to nominate, but larger; *raptor* is similar to previous, but still larger; *lacertosus* is similar to nominate, but greyer on side of head, breastband narrow or absent. Voice. Song a loud series of cackling, scratchy squawks, ending in prolonged upwardly inflected whistle; both sexes sing, often in duet. Also a high, thin dawn song, "tseety-tseety-tseety". Calls loud and raucous.
Habitat. Second growth, regenerating pastures, well-vegetated gardens, thickets. Sea-level to 1800 m in Mexico, to 1200 m in Costa Rica.
Food and Feeding. Recorded food items include small fruits and seeds, flowers and tender buds; also insects. On one occasion seen to take a hummingbird (Trochilidae) captured in a net, eating part of head. Usually found in flocks, sometimes in association with other species.
Breeding. Breeding recorded end of May in Mexico, and season Apr–Jul in Costa Rica. Nest a bulky, shallow cup of grass, strips of banana leaves and the like, on loose foundation of twigs, lined with finer vegetable matter, placed 1·5–3 m up in bush. Clutch 2 eggs, pale blue, marked with heavy black scrawls around blunt end. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Quite common in suitable habitat over much of its range. Takes advantage of second growth and abandoned farmland.
Bibliography. Armani (1983), Brodkorb (1940), Clark (1913b), Howell & Webb (1995), Komar & Thurber (2003), Ridgely & Gwynne (1989), Stiles & Skutch (1989), Sutton *et al.* (1950), Wetmore (1942, 1943).

19. Buff-throated Saltator

Saltator maximus

French: Saltator des grands-bois **German**: Buntkehlsaltator **Spanish**: Pepitero Gorjicanelo

Taxonomy. *Tanagra maxima* Statius Müller, 1776, Cayenne, French Guiana.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Some races have been considered perhaps to merit treatment as separate species, but an orderly geographical sequence of characters across the species' range is apparent. Five subspecies recognized.
Subspecies and Distribution.
S. m. gigantodes Cabanis, 1851 – Caribbean slope of Mexico from Veracruz S to N Oaxaca and Tabasco.
S. m. magnoides Lafresnaye, 1844 – S Mexico (Chiapas, S Campeche, S Quintana Roo) N Guatemala and Belize S on Caribbean slope to Nicaragua, Costa Rica and NW Panama.
S. m. intermedius Lawrence, 1864 – SW Costa Rica E to Canal Zone of Panama.
S. m. iungens Griscom, 1929 – E Panama and NW Colombia (E to lower R Cauca).
S. m. maximus (Statius Müller, 1776) – Colombia and Venezuela E to the Guianas, S to W & E Ecuador, E Peru, Brazil (Amazonia S to S Mato Grosso; also E coast from Pernambuco S to Rio de Janeiro) and NE Bolivia (Beni and Santa Cruz).
Descriptive notes. 20·5–21 cm; male average 46·2 g, female average 49·1 g (Panama). Nominate race has crown greenish-grey, becoming more bright greenish on nape and upperparts, including upperwing and tail; supercilium greyish-white, ear-coverts grey, broad black malar stripe; chin white, becoming buffy on throat and grey on chest; belly more tinged cinnamon; iris dark brown; bill greyish-horn or blackish-horn; legs leaden grey. Sexes alike. Juvenile has facial markings less sharply defined, malar stripe duller, upperparts tinged brownish, and paler bill. Race *gigantodes* differs clearly from nominate,



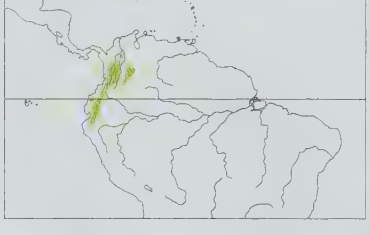
with malar stripe extending into broad black chestband, crown mostly blackish; *magnoides* similar to previous but crown less black, intermediate in colour between previous and nominate; *intermedius* is similar to previous, but brighter grey on crown, buff throat patch paler and broader, black chestband narrower or entirely absent; *iungens* is similar to nominate, but generally duller and less golden-green on upperparts, with yellower crissum. Voice. Song varies throughout range: in Costa Rica, a loud series of melodious, soft lilting notes, e.g. "cheery-cheery" etc.; in Venezuela, a pleasing if repetitive carolling, reminiscent of *Turdus* thrushes. Also has softer, quieter song. Female sings (including when incubating) with shorter and quieter song than that of male. Call a quiet, high sibilant "tsii".
Habitat. Semi-humid and humid forest edge, second growth, sometimes well-bushed suburbs, shade coffee plantations, regenerating farmland and similar; sea-level to 1800 m.
Food and Feeding. Predominantly vegetarian: fruit, blossoms, catkins, berries, fresh leaves, etc.; comes to eat bananas at feeding stations. Some insects, mainly hymenopterans; has been seen to feed systematically on the army ant *Eciton burchelli*. Found singly and in pairs; regularly associates with mixed-species feeding flocks, including those with *S. atripennis*. Forages at all levels, mostly high up in trees.
Breeding. Season Mar–Aug in Costa Rica, one nest in Apr in Panama, nest under construction in early Dec in French Guiana, and nests found in Jun and Aug and birds in breeding condition Jan–Jun in Colombia; at least two broods in some areas. Nest apparently built by female alone, a bulky open cup made from coarse twigs and leaves, leaf vanes, dead vines and the like, lined with finer material, placed at 0·3–2 m, rarely as high as 10 m, in bush or tree. Clutch usually 2 eggs, 3 recorded in Guyana, bright pale blue, with dots, splotches and scrawls of black around blunt end; incubation apparently by female alone, sometimes fed on nest by male, period 13–14 days, occasionally longer; small chicks brooded by female alone, fed by both parents, nestling period c. 13–15 days; fledglings attended by both parents until 50–55 days old.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Generally common over much of its range. In NE Brazil, one record in Piauí. Tolerates modified habitats well.
Bibliography. Hallinan (1924), Haverschmidt (1968), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Kirmse (1969), Novaes (1992), Ridgely & Greenfield (2001a), Russell (1964), Sealy *et al.* (1997), Skutch (1954), Stiles & Skutch (1989), Stotz (1992), Tostain *et al.* (1992).

20. Black-winged Saltator

Saltator atripennis

French: Saltator à ailes noires **German**: Schwarzschwingensaltator **Spanish**: Pepitero Alinegro

Taxonomy. *Saltator atripennis* P. L. Sclater, 1857, Popayán, Colombia.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Races of present species weakly differentiated and differences possibly not constant; species perhaps better treated as monotypic. Two subspecies tentatively recognized.
Subspecies and Distribution.
S. a. atripennis P. L. Sclater, 1857 – Colombia (both sides of W Andes and W slope of C Andes from Antioquia S to Nariño) and extreme NW Ecuador (W Esmeraldas).
S. a. caniceps Chapman, 1914 – disjunctly on W slope of E Andes of Colombia (Boyacá, Cundinamarca) and W Ecuador.



Descriptive notes. 20·5 cm; 44–60 g (Colombia). Nominate race has crown, ear-coverts and malar region black (crown sometimes grey), broad white supercilium, patch at rear of ear-coverts white; upperparts bright olive-green, upperwing and tail contrastingly dull black, tertials (often also greater coverts) diffusely edged with greenish; chin and throat white, often with buff wash over lower throat and central chest, breast dove-grey, belly grey-white, lower areas tinged greenish at side, vent orange-buff; iris orange or brown; bill blackish; legs grey or brown. Sexes alike. Juvenile is generally duller than adult, back less bright green, facial markings less clear-cut, chest diffusely mottled grey and whitish, bill grey, iris brown. Race *caniceps* is similar to nominate, but crown largely grey (instead of black), exposed portion of tertials wholly olive-green, no buffy wash on throat or breast, undertail-coverts paler, bill heavier. Voice. Song in Ecuador a leisurely series of slurred notes with long pauses, rising and falling in pitch, somewhat like that of a New World oriole (*Icterus*), "twee, twaa, too-u, toweer, tweeear" and so on, followed by a jumble of spluttered notes; in SW Colombia (W Nariño), a descending note and then quavering and rising one, "cheeeear, tre-e-e".
Habitat. Humid or wet forest and forest borders, also mature second growth, generally rather wet. Mostly 500–1500 m, locally down to 50 m and up to 1700 m, in Ecuador; in Colombia mostly 800–2200 m, on Pacific slope down to 400 m.
Food and Feeding. No published details of diet; apparently fruit. Often in mixed-species feeding flocks with other species, including *S. maximus*. Forages in upper levels and canopy.
Breeding. Nest-building observed in mid-Apr in Colombia; in Ecuador, nest with young in mid-Dec and adults carrying nesting material in Feb. Nest a deep cup made from roots, mosses, leaves and similar, lined with grasses and finer fibres; one under construction in Colombia was low down in pasture bush. Clutch 2–3 eggs, blue or greenish with brownish-black markings. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common in suitable habitat in Colombia; uncommon to locally fairly common in Ecuador.
Bibliography. Armani (1983), Chapman (1914b), Greeney & Nunnery (2006), Hilty & Brown (1986), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989).

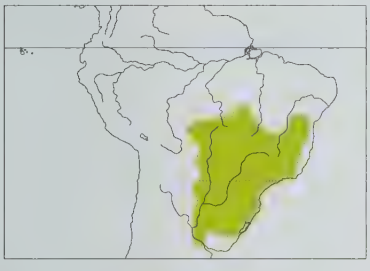

ssp coerulescens
ssp plumbiceps
21
22
23
ssp similis
ssp ochraceiventris
ssp azarae
ssp rufescens
ssp hesperis
ssp orenocensis
♂
24
♀
25
♀
ssp aurantiirostris
♂
ssp iteratus
26
♂
ssp albociliaris
29
PLATE 37
inches 3
cm 8
27
28
ssp striatipectus
ssp peruvianus
31
30
ssp flavidicollis
ssp immaculatus

21. Green-winged Saltator

Saltator similis

French: Saltator olive **German**: Grünschwingensaltator **Spanish**: Pepitero Verdoso
Other common names: Allied Saltator

Taxonomy. *Saltator similis* d'Orbigny & Lafresnaye, 1837, Corrientes, Argentina.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Two subspecies recognized.
Subspecies and Distribution.
S. s. similis d'Orbigny & Lafresnaye, 1837 – E Bolivia (Santa Cruz; one record Beni), C & E Brazil (N Mato Grosso and Bahia S to Mato Grosso do Sul and C & NE São Paulo), E Paraguay, NE Argentina (E Formosa and Misiones S to Santa Fe, Entre Ríos and NE Buenos Aires) and N Uruguay.
S. s. ochraceiventris Berlepsch, 1912 – SE Brazil (Paraná and SE São Paulo S to Rio Grande do Sul).



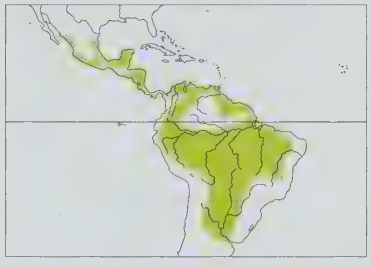
Descriptive notes. 20·5–21 cm; 36–54 g (Brazil). Nominate race has crown dull greyish with greenish tinge, whitish supercilium, grey lores and ear-coverts; upperparts greenish-grey, rump grey, rectrices dull dark grey; remiges dull greyish-black, broadly edged bright greenish-yellow (giving greenish-yellow appearance to closed wing); chin and throat white, malar stripe blackish; chest buffy with diffuse darker streaks, flanks buffy grey, belly more buff, vent brownish-buff; iris dark brown; bill grey; legs dull leaden grey. Sexes alike. Juvenile is like adult, but has black streaks on abdomen and breast. Race *ochraceiventris* differs from nominate in having underparts darker, more ochraceous, especially on abdomen and crissum. Voice. Song a short series of loud whistled notes, "chew-chew-cho-chewee". Also gives series of hurried twitterings.
Habitat. Woodland, including gallery forest and forest borders, and clearings. Lowlands to c. 1200 m.
Food and Feeding. In study of faecal samples in Mato Grosso do Sul (S Brazil), insects the predominant item, supplemented by fruit and berries. Will take swarming termites (Isoptera); also eats leaves of canema (*Solanum*) and seeds of *Pereskia* cactus, and seen to take sugary secretions of aphids (Aphidoidea) feeding on leguminous plant bracatinga (*Mimosa scabrella*). Forages mostly in pairs; sometimes joins mixed-species foraging flocks. Forages in several layers of forest, from medium levels of understorey up to subcanopy.
Breeding. In Brazil, eggs being incubated in early Nov and recently fledged young seen early Dec to early Jan in Rio Grande do Sul, and adult carrying food late Sept in Rio de Janeiro; nests in Oct–Dec in Uruguay. Nest a cup made from leaves and small twigs, lined with soft fine roots, external diameter 8 cm, cup 4·4 cm, placed 1–3 m up in tree. Clutch 2 eggs, rarely 3, pale blue or shiny blue-grey, marked at blunt end with black streaks or dots; no information on incubation and fledging periods, nor on parental involvement. Nests sometimes parasitized by Shiny Cowbird (*Molothrus bonariensis*).
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Fairly common in much of its range. Apparent expansion of range S in NE Argentina: first records in NE Buenos Aires during late 1980s, and species now appears to be established at various localities. Frequently taken as a cagebird.
Bibliography. Armani (1983), Bodrati & Sierra (2008), Faustino & Machado (2006), Fernández (1991), Ferreira & Glock (2004), Frisch & Frisch (1964), Hartert & Venturi (1909), Hellmayr (1908), Machado (1999), Mitchell (1957), van Perlo (2009), Piratelli & Pereira (2002), Ridgely & Tudor (1989, 2009), Rocha (2006), Sick (1993).

22. Greyish Saltator

Saltator coerulescens

French: Saltator gris **German**: Grausaltator **Spanish**: Pepitero Grisáceo
Other common names: Grey Saltator; Middle American Saltator ("*grandis* group")

Taxonomy. *Saltator coerulescens* Vieillot, 1817, Paraguay.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Taxonomy of present species somewhat confused: Middle American races ("*grandis* group": *vigorsii*, *plumbiceps*, *grandis*, *yucatanensis*, *hesperis*, *brevicaudus*) possibly represent a separate species, and populations divided by Andes in N South America may perhaps be further differentiated. Further study warranted. Race *yucatanensis* intergrades with *grandis* in Belize. Proposed race *richardsoni* (described from Colima, in W Mexico) is a junior synonym of *plumbiceps*. Thirteen subspecies currently recognized.
Subspecies and Distribution.
S. c. vigorsii G. R. Gray, 1844 – W Mexico (S Sonora, Sinaloa, W Durango, Nayarit and N coastal Jalisco).
S. c. plumbiceps S. F. Baird, 1867 – W Mexico from C coastal Jalisco S to W Oaxaca.
S. c. grandis (W. Deppe, 1830) – E Mexico (from S Tamaulipas and E San Luis Potosí) S on Caribbean slope (except Yucatán) to N Guatemala, Belize, Honduras, Nicaragua, Costa Rica and W Panama.
S. c. yucatanensis Berlepsch, 1912 – Yucatán Peninsula (except extreme S Quintana Roo) and S Mexico (E Tabasco and NE Chiapas).
S. c. hesperis Griscom, 1930 – Pacific slope from S Mexico (E Oaxaca and Chiapas) and C & S Guatemala S to W Nicaragua.
S. c. brevicaudus van Rossem, 1931 – vicinity of Golfo de Nicoya, in Costa Rica.
S. c. plumbeus Bonaparte, 1853 – Caribbean coast of Colombia from R Sinú E to lower Magdalena Valley.
S. c. brewsteri Bangs & T. E. Penard, 1918 – NE Colombia (Norte de Santander and Arauca), Venezuela (except extreme SE) and Trinidad.
S. c. olivascens Cabanis, 1848 – SE Venezuela (Mt Roraima, in SE Bolívar), the Guianas and adjacent extreme N Brazil.
S. c. azarae d'Orbigny, 1839 – W Amazon Basin from E Colombia and W Brazil (E probably to R Negro region and, S of Amazon, to R Madeira) S to E Ecuador, E Peru and NE Bolivia (Beni).
S. c. mutus P. L. Sclater, 1856 – N Brazil from lower R Solimões E on both banks of R Amazon to Amapá and Mexiana I, S to N Maranhão.
S. c. superciliaris (Spix, 1825) – NE Brazil (S Piauí and N & W Bahia to N Minas Gerais).
S. c. coerulescens Vieillot, 1817 – E Bolivia (Santa Cruz and Tarija), SW Brazil (Mato Grosso), N Argentina (except Misiones; S to La Rioja, Córdoba, Santa Fe and N Buenos Aires), Paraguay and W Uruguay.



Descriptive notes. 20·5–21 cm; 49–67 g (Venezuela). Nominate race has crown greyish, supercilium from bill to above ear-coverts off-white, lores, face and ear-coverts mottled grey-brown; upperparts greyish, fine white edgings (in fresh plumage), rump dull grey-brown, rectrices dull blackish-grey; primaries and secondaries blackish-grey, paler edgings on outer webs; malar stripe blackish, throat off-white, chest and belly grey, lower belly and vent dull cinnamon; underwing-coverts dull cinnamon and blackish-grey; iris brown; bill blackish; legs leaden. Sexes alike. Juvenile is more olivaceous than adult, especially on head, with green edgings of flight-feathers, supercilium pale lemon-yellow, chest tinged with ochraceous yellow, vent pale cinnamon. Race *vigorsii* has head grey with short white supercilium, dark lores and blackish malar stripe; *grandis* resembles previous, but darker, head and upperparts dark olive-greyish, more extensive black on side of throat, only a narrow white chin stripe; *plumbiceps* is brownish, with black lores; *yucatanensis* is paler below than *grandis*, much lighter grey on breast, becoming buffy on flanks and undertail-coverts; *hesperis* is larger and darker than *grandis*, dark area on chest and breast more extensive and darker, white gular area smaller, upperparts slightly more slaty or bluish, supercilium narrower and shorter; *brevicaudus* is similar to previous, but smaller, with proportionately shorter tail, upperparts darker, less of an olivaceous tinge on rump and tail-coverts; *olivascens* is generally more olivaceous than adjacent races; *plumbeus* is generally similar to last, but upperparts and side of head decidedly paler olive-grey, white supercilium reduced or absent, malar stripe reduced, flanks and undertail-coverts paler buffy; *brewsteri* is like previous, but with more prominent white supercilium; *azarae* has upperparts leaden grey, breast clear grey; *mutus* resembles last, but much paler, with buffy (not ochraceous) undertail-coverts; *superciliaris* is similar to nominate, but smaller, less olivaceous on upperparts, side of head slate-grey (not olive-grey), throat pure white (not off-white), buff on abdomen paler and less extensive. Voice. Song varies much throughout range. For example, in Mexico, a rich, upslurred drawn-out "ch-kweet", often with varied, short, jerky preamble; in Costa Rica, described as a jerky series of mellow warbles, whistles and short sputtery notes, usually ending with upwardly or downwardly inflected whistle; in N Venezuela, a loud musical "wee chop cheeéeer", middle note dropping, while in WC Venezuela a halting or jerky series of emphatic phrases, somewhat musical; in Trinidad, verbalized as "pitch-oil, pitch-oil" (the local name for paraffin); in Peru, a variable series of rich, slurred whistles with rising or falling terminal note; in Brazil, consists of beautiful and very varied phrases of c. 4–8 strong clear notes. Calls are single-syllable "chin", squeaky "tseet" and similar.
Habitat. Occupies forest edge and second growth, including, in various parts of range, dry scrub, humid forest borders and gallery forest, but not usually unbroken forest interior. From sea-level up to 1500 m in Mexico, and up to 1850 m in Costa Rica; in South America up to 1500 m, but in many areas lower.
Food and Feeding. Apparently varied in different parts of range. In one lowland study in Venezuela, diet predominantly vegetable, including fruits and flower buds and leaves (captive birds fed exclusively on leaves lost weight); in lowland study in Argentina species was more omnivorous, taking both seeds, especially those of *Solanum amygdalifolium*, and insects, including leaf-cutter ants (*Acromyrmex*), though beetles (Coleoptera) and other insects featured prominently. In Venezuela largely vegetarian, but more insects fed to young. In dry tropical forest in Mexico, proportion of diet derived from animal sources increases in rainy season. Will come to gardens to eat cultivated beans and tomatoes. Feeds singly or in small groups; sometimes in mixed-species foraging flocks. Forages mostly in upper levels of vegetation.
Breeding. Season Apr–Jul in Costa Rica, May–Oct in Venezuela, Mar–Oct (mainly May and Jun) in Trinidad, Apr–Jun in Colombia, and late Oct to early Jan in Argentina. Possibly sometimes co-operative breeder, with helpers. Nest a bulky cup with twig foundation, middle layer of small leaves and thick lining of fine fibres and rootlets, external diameter 11–16 cm, cup 8–9 cm across and 3–5 cm deep, usually located c. 1·7–4 m up in large bush or shrubbery. Clutch usually 2 eggs, rarely 3, blue-green with black spots and scrawls, especially at blunt end; incubation period 13–14 days, in Honduras reported as 15 days; nestling period 18–19 days (Argentina). Nest parasitism by Shiny Cowbird (*Molothrus bonariensis*) recorded in Argentina.
Movements. Apparently sedentary; race *brewsteri* has occurred as vagrant in Tobago.
Status and Conservation. Not globally threatened. Common in much of its range. W Mexican race *vigorsii* has recently extended range N to colonize S Sonora. Adapts well to man-modified habitats. In Argentina, may cause damage to leguminous crops.
Bibliography. Beltzer (1988a), Beltzer *et al.* (2004), Bosque *et al.* (1999), Chatellenaz (2008), Dinelli (1924), Echeverry-Galvis & Córdoba-Córdoba (2006), ffrench (1973, 1984), Hellmayr (1929), Herklots (1969), Herrera *et al.* (2006), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Junge & Mees (1958), Ludwig (1998), Monroe (1968), de la Peña (2005), van Perlo (2009), Retter (2010), Ridgely & Tudor (1989, 2009), Rodríguez-Ferraro *et al.* (2007), Short (1975), Skutch (1945), Stiles & Skutch (1989).

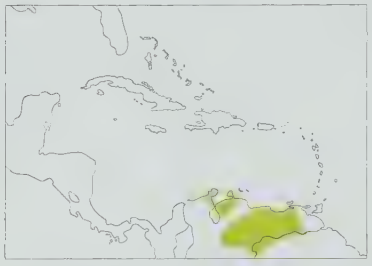
23. Orinocan Saltator

Saltator orenocensis

French: Saltator de l'Orénoque **German**: Zimtflankensaltator **Spanish**: Pepitero del Orinoco

On following pages: 24. Thick-billed Saltator (*Saltator maxillosus*); 25. Black-cowled Saltator (*Saltator nigriceps*); 26. Golden-billed Saltator (*Saltator aurantiirostris*); 27. Masked Saltator (*Saltator cinctus*); 28. Black-throated Saltator (*Saltator atricollis*); 29. Rufous-bellied Saltator (*Saltator rufiventris*); 30. Lesser Antillean Saltator (*Saltator albicollis*); 31. Streaked Saltator (*Saltator striatipectus*).

Taxonomy. *Saltator orenocensis* Lafresnaye, 1846, mouth of the Orinoco, Venezuela.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Two subspecies recognized.
Subspecies and Distribution.
S. o. rufescens Todd, 1912 – NE Colombia (Guajira Peninsula E from Santa Marta) and W Venezuela (N & SE Zulia E to N Lara and C Falcón).
S. o. orenocensis Lafresnaye, 1846 – Venezuela E of Andes from Cojedes and W Apure E to W Sucre and S Monagas, to S bank of R Orinoco in N Bolívar and S Delta Amacuro) and NE Colombia (Arauca, probably also N Vichada).



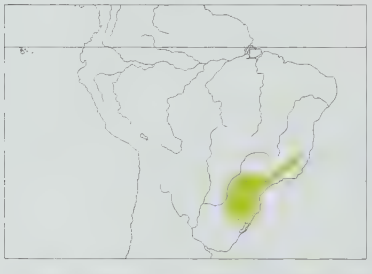
Descriptive notes. 18·5–19 cm; average 33·7 g (six birds from Venezuela). Nominate has lores, face, ear-coverts and malar region black, long white supercilium extending past ear-coverts; crown and upperparts slate-grey, feathers of upperwing blackish, edged slate-grey, broadest on coverts and tertials; rectrices dull black, primaries brownish with narrow pale edgings on outer webs; small area at base of lower mandible, chin, throat and breast white, becoming strongly buff on belly, especially at side; vent and undertail-coverts buffy-brown; iris brown; upper mandible black, lower mandible blackish with pale leaden base; legs blackish. Sexes alike. Juvenile apparently undescribed. Race *rufescens* is larger than nominate, with bill stouter, forehead and side of crown (bordering broad white supercilia) black, underparts strongly shaded with buffy-clay colour. Voice. Song a loud, rollicking series of notes, often given by more than one bird, perhaps antiphonally, "cheeyir-cheeyir-cheeyir", ending in musical jumble of notes; song reportedly varies within species' range, but no published details available.
Habitat. Inhabits dry deciduous woodland and brush, including well-vegetated suburban areas, mesic vegetation along dry washes in arid areas; also borders of gallery forest. Occurs from sea-level up to 600 m.
Food and Feeding. Diet predominantly vegetable, with some insects. Recorded items include flowers, fruits (in the wild, fruits of *Annona jahni* and *Momordica charantia*; in captivity, readily takes papaya and guava), and seeds; also a significant proportion of leaves, although captive individuals offered a choice prefer fruit. Forages in twos and threes, generally not joining mixed-species flocks. Searches at high levels in trees, occasionally a little lower.
Breeding. Few data. In Venezuela, single nests found in May and mid-Jun in Orinoco region and birds in breeding condition in May in Guárico. Nest described as a loose grassy cup, placed 2–5 m up, one in cane and the other in low bush. Clutch 2 eggs, greenish-blue with black lines and spots around blunt end. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Fairly common in suitable habitat in parts of range. Reports of presence in Trinidad erroneous.
Bibliography. Armani (1983), Berlepsch & Hartert (1902), Bosque *et al.* (1999), Cherrie (1916), Hilty (2003), Hilty & Brown (1986), Ridgely & Tudor (1989, 2009), Schönwetter & Meise (1981), Todd (1912).

24. Thick-billed Saltator

Saltator maxillosus

French: Saltator à bec épais **German**: Dickschnabelsaltator **Spanish**: Pepitero Picudo

Taxonomy. *Saltator maxillosus* Cabanis, 1851, Montevideo; error = southern Brazil.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species closely allied to *S. nigriceps* and *S. aurantiirostris*; interbreeding with latter has been reported, but recent studies state that there is little or no interbreeding. Monotypic.
Distribution. SE Brazil (extreme SE Bahia and extreme E Minas Gerais S to Paraná and Rio Grande do Sul) and extreme NE Argentina (Misiones).



Descriptive notes. 21 cm; 48–54 g (four birds Brazil). Male has lores, area around eye and face dark brownish-grey, long white supercilium; crown and upperparts dark brownish-grey, upperwing-coverts with mostly concealed dusky areas; primaries blackish-grey with narrow pale grey edgings on outer webs; rectrices dull blackish-grey; chin and throat off-white with variable orange-buff to clay-coloured tinge, diffuse blackish malar stripe; underparts buffy grey, vent and undertail-coverts clay-coloured; iris dark brown; bill heavy, dark, some orange at base; legs greyish. Female is olive above, including ear-coverts, with white supercilium, blackish malar stripe, throat buffy; otherwise much as for male but with mostly blackish bill. Juvenile has green upperparts, all-dark bill. Voice. Song a simple series of 4 loud notes, the third higher in pitch, "teeu-teeu-tew-tcheeuw"; call a high, clear "wicwic".
Habitat. Mostly canopy of montane humid forest and woodland borders; to 2200 m, rarely down to sea-level.
Food and Feeding. Unusually for a passerine, seems to be an obligate folivore, at least during dry season when fruit less available. Diet, based on dry-season observations, includes leaves of several families of trees (Melastomataceae, Solanaceae, Rubiaceae and Asteraceae, among others), as well as fruits of various species. No observations during breeding season, when other members of genus tend to eat more animal matter. Usually in pairs; often joins mixed-species flocks. Forages at all levels, mostly at higher ones.
Breeding. Nest a cup made from roots, dry leaves and other vegetation, lined with fine fibres, rootlets and similar fine material, situated at low to medium height in tree or bush. Clutch 2–3 eggs, pale blue with brown or black markings. No other information.
Movements. Probably largely sedentary; tends to occur more frequently at lower altitudes during austral winter.
Status and Conservation. Not globally threatened. Uncommon. Formerly occurred also in E Paraguay (Alto Paraná), but no records since early decades of 20th century. Much of this species' habitat has been destroyed during last century. Occurs in some protected areas, including Itatiaia National Park, in Brazil.
Bibliography. Armani (1983), Honkala & Niiranen (2010), Munson & Robinson (1992), van Perlo (2009), Ridgely & Tudor (1989, 2009), da Silva (1990), Sick (1993).

25. Black-cowled Saltator

Saltator nigriceps

French: Saltator à capuchon **German**: Schwarzgesichtsaltator **Spanish**: Pepitero Capuchinegro

Taxonomy. *Pitylus nigriceps* Chapman, 1914, Loja, 7000 feet [c. 2130 m], Ecuador.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species sometimes treated as conspecific with *S. aurantiirostris*, but appears to differ vocally; closely allied also with *S.maxillosus*. Monotypic.
Distribution. S Ecuador (El Oro and Loja) and NW Peru (Piura, extreme E Lambayeque and Cajamarca).



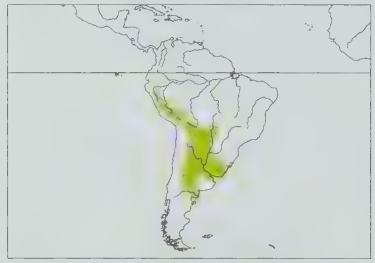
Descriptive notes. 22 cm. Has head to upper chest black, occasionally with a few white feathers on chin and behind eye; upperparts, including wing and tail, are dark bluish-grey, greyish-black on concealed parts of remiges and rectrices, outer rectrices tipped white; underparts clear grey, becoming buff on lower belly and thigh, and cinnamon-buff on undertail-coverts; iris brown; bill orange or salmon-red; legs grey or horn-blue. Sexes alike. Juvenile undescribed. Voice. Song is simple and short, comprising a ringing explosive "keert, swee-it"; call is a metallic ringing "chee" and a high "tsee".
Habitat. Humid montane forest and forest edge, and regenerating scrubland. Mostly 1700–2900 m, occasionally down to 1550 m, in Ecuador; 1200–2500 m in Peru.
Food and Feeding. No published data on diet. Usually in pairs; sometimes joins mixed-species foraging flocks. Largely arboreal.
Breeding. No information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Rather uncommon to locally fairly common. Has been proposed for listing as Near-threatened, but in view of its ability to adapt to degraded habitat this is probably not justified.
Bibliography. Best *et al.* (1993), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007).

26. Golden-billed Saltator

Saltator aurantiirostris

French: Saltator à bec orange **German**: Goldschnabelsaltator **Spanish**: Pepitero Piquigualdo

Taxonomy. *Saltator aurantiirostris* Vieillot, 1817, "Paraguay"; probably Corrientes, Argentina.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species sometimes treated as conspecific with *S. nigriceps*, but appears to differ vocally. Also closely allied to *S. maxillosus*; interbreeding with latter has been reported, but recent studies state that there is little or no interbreeding. Race *parkesi* intergrades with nominate in Argentina. Six subspecies recognized.
Subspecies and Distribution.
S. a. iteratus Chapman, 1927 – N Peru (temperate zones of Cajamarca, Amazones, Libertad and Ancash).
S. a. albociliaris (R. A. Philippi [Krumwiede] & Landbeck, 1861) – C & S Peru (subtropical and temperate zones from Ancash and Huánuco S to Puno and Tacna) and extreme N Chile (Arica).
S. a. hellmayri J. Bond & Meyer de Schauensee, 1939 – Bolivia from La Paz and Cochabamba S to SE Potosí and N Tarija.
S. a. aurantiirostris Vieillot, 1817 – Bolivia (S Tarija), N Argentina (S to Catamarca, Córdoba and Buenos Aires), E Paraguay and S Brazil (S Mato Grosso and N Rio Grande do Sul).
S. a. parkesi da Silva, 1990 – E Argentina (Entre Ríos), extreme SE Brazil (S Rio Grande do Sul) and Uruguay.
S. a. nasica Wetmore & J. L. Peters, 1922 – CW Argentina (La Rioja, San Juan, Mendoza and W La Pampa).



Descriptive notes. 19–20·5 cm; male 33·1–44·8 g, female 38–54·3 g (Bolivia). Male nominate race has forehead blackish, becoming grey on crown and nape; chin and throat white, lores, face, ear-coverts and border of throat (upper chest) black; white supercilium behind eye extending into white crescent behind ear-coverts; upperparts, including upperwing and tail, grey, outer rectrices without white tips or outermost with only very narrow white edging; underparts below black breastband clear grey, becoming buffy on upper abdomen and warmer buff on vent; iris medium to dark brown; bill orange; legs dark brown or leaden grey. Female has bill suffused with dusky, black of head and face replaced by dull brownish-black, supercilium and chin whitish yellow-buff, little or no pectoral band. Juvenile resembles female, but head plumage much as for male, lacks pectoral band, bill dusky with dull yellowish tip on both mandibles. Races differ mainly in plumage details, Andean races with less distinction between the sexes: *iteratus* has pectoral band well developed, gular area buffy white, outer two rectrices with narrower white tips, bill small; *albociliaris* is similar to previous, but gular white restricted to a central line down chin and throat; *hellmayri* is like nominate, but darker grey with very faint olive cast above, crown feathers tipped black when fresh, supercilium pure white, ear-coverts of female darker, breast and belly paler and greyer, outer rectrices with white tips; *parkesi* is similar to nominate, but supercilium warm buff, not white; *nasica* has rectrices without white tips, bill larger than

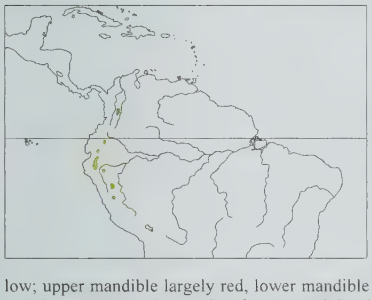
in nominate. Voice. Song a loud, explosive series of musical whistled phrases, e.g. "twi-chéw tew-swéé?", final syllable emphasized. Calls include metallic "chip" or "zak"; alarm "rrr".
Habitat. Montane scrub, field edges, gardens, *chaco* woodland etc. Down almost to sea-level in S Brazil, Argentina and Uruguay; Andean populations mostly 1500–3800 m.
Food and Feeding. Only quantified study was in lowland habitat in Santa Fe, in Argentina: diet included large numbers of seeds, especially of *Solanum amygdalifolium*, along with various insects, e.g. leaf-cutter ants (*Acromyrmex*), beetles (Coleoptera), true bugs (Hemiptera), flies (Diptera). Usually in pairs.
Breeding. Season Nov–Jan, rarely Oct, in Argentina and Oct–Jan in Uruguay; fledglings in Jun in Peru and Feb–Mar in Bolivia. Almost all data from Argentine studies. Nest a cup of straw, stems and lichens, lined with rootlets and leaves, external diameter 10–15 cm, cup diameter 7–9 cm, overall depth 7–12 cm, sited 1·2–3·7 cm up in shrub or bush, commonly in tala (*Celtis spinosa*), chañar (*Geoffroea decorticans*) or similar, often half-hidden by creepers. Clutch 2–3 eggs, blue-green with black spots, streaks and lines, especially around blunt end, where sometimes forming ring; incubation period 14 days; nestling period 17–18 days.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Quite common in suitable habitat over much of its range. In agricultural areas, may sometimes cause damage to pulses at the budding stage.
Bibliography. Armani (1983), Beltzer (1988a), Beltzer *et al.* (1999), Bond & Meyer de Schauensee (1939, 1942), Carriker (1933), Chapman (1927b), Dinelli (1924), Fjeldså & Krabbe (1990), Grilli *et al.* (2006), Mezquida (2003), de la Peña (1987, 1996a, 2005), Ridgely & Tudor (1989, 2009), Rocha (2006), Schulenberg *et al.* (2007), da Silva (1990).

27. **Masked Saltator**

Saltator cinctus

French: Saltator masqué **German**: Maskensaltator **Spanish**: Pepitero Enmascarado

Taxonomy. *Saltator cinctus* J. T. Zimmer, 1943, Cutucú, 2000 m, near Macas, Zamora, Ecuador.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Colombian populations of present species seem to exhibit constant differences in plumage and bill colour from those in rest of range, and may represent a separate taxon; further study required. Currently treated as monotypic.
Distribution. Several, apparently disjunct populations: in Colombia on both slopes of C Andes in Caldas, Risaralda, Quindío and Tolima, in Valle de Cauca, Parques Regionales Ucumán and La Vereda Canoas and Reserve Patasola; in Ecuador at scattered locations in W Napo, W Morona-Santiago, Zamora-Chinchipe and S Loja; and in Peru in E Piura, Cajamarca, San Martín and Huánuco.



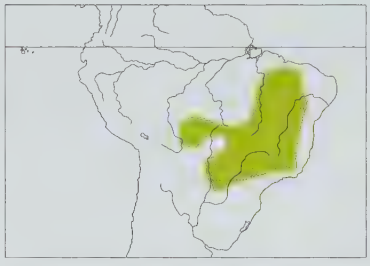
Descriptive notes. 21·5 cm; 43–53 g (Ecuador and Peru). Has crown and upperparts slate-grey, flight-feathers and upperwing-coverts black, broadly edged with clear dark grey, rectrices black, outer four with broad white tips, inner two narrowly tipped white; lores back to ear-coverts and down to chin and throat black (in Colombia, narrow pale streak separating black mask from the grey of rear head); upper chest white, broad black band across chest, rest of underparts white (in Colombia belly creamy white, not pure white), flanks grey, vent broadly barred black and white; iris orange or golden, inner ring yellow; upper mandible largely red, lower mandible black mixed with red (in Colombia bill wholly red); legs slate-grey. Sexes alike, female possibly with red of upper mandible more extensive. Juvenile is duller than adult, black mask less extensive, bill pale yellow. Voice. Song, in Ecuador, a rich, mellow whistled phrase, "tu-chew-chew-chew-wuri?". Calls "tzip" or "tseeyk", a soft "tiu-tiu", "chu" and similar.
Habitat. Subtropical steep montane forest. In Colombia, mixed woodland of average height of 15 m with higher trees to 20 m, including Melastomaceae, Cunoniaceae and Lamiaceae, with ferns and palms; farther S, frequently in *Podocarpus oleifolius*. Despite earlier reports, probably not strongly associated with *Chusquea* bamboo, although recorded in such habitat. From at least 2500 m to 3080 m in Colombia; 2000–2700 m In Ecuador and 1700–3000 m in Peru.
Food and Feeding. Recorded items include various fruits, especially *Podocarpus*, also arillate seeds of *Clusia* and other trees and vines; once seen to eat young leaves. Associates to variable degree with other species, including conebills and various other tanagers (Thraupidae) and woodcreepers (Dendrocolaptidae). Forages mostly in canopy.
Breeding. Apparent breeding behaviour and juvenile being attended by an adult at end Apr in Colombia. Observations of agitated birds suggest that nest probably situated fairly low down in dense vegetation. Only one egg described (laid in a bag by captured female on 25th Feb in Risaralda, at 2680 m in Colombia), clear blue, marked at blunt end with very dark brown blotches. No other information.
Movements. Resident; appears to be somewhat nomadic, possibly in response to variation in abundance of fruiting trees (sometimes absent from locations where previously observed).
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Generally rare and local; apparently nowhere common. Possibly declining as a result of habitat loss. Seems to be strongly associated with *Podocarpus*, a species under great pressure, even in some officially protected areas. Present in a number of protected areas in all three countries of its range.
Bibliography. Anon. (2010b), Butchart & Stattersfield (2004), Collar *et al.* (1994), Echeverry-Galvis & Córdoba-Córdoba (2006), O'Neill & Schulenberg (1979), Renjifo (1991, 2002), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Tobias & Williams (1996), Zimmer (1943d).

28. **Black-throated Saltator**

Saltator atricollis

French: Saltator à gorge noire **German**: Schwarzhalssaltator **Spanish**: Pepitero Gorjinegro

Taxonomy. *Saltator atricollis* Vieillot, 1817, Paraguay.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). This species has been thought to be not closely related to other members of genus, but closer to monotypic emberizid genus *Saltatricula*; recent molecular-genetic studies, however, indicate that it does belong in present genus, and that *Saltatricula* perhaps better moved to present family. Monotypic.
Distribution. E & C Brazil (from N Ceará and Maranhão, also recently Pernambuco, S in interior to Mato Grosso, N São Paulo and S Minas Gerais), E Bolivia (NE Beni and E Santa Cruz) and NE Paraguay.



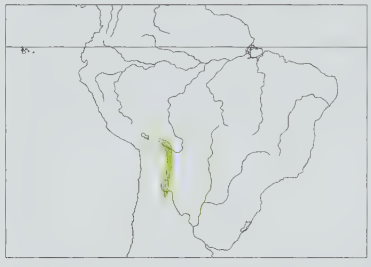
Descriptive notes. 20–20·5 cm; one male 53·8 g. Forehead is dark brown, crown and upperparts, including upperwing-coverts and remiges, dull dark brown with lighter brown feather edges; tail dark brown with diffuse darker transverse bars; face, chin and throat black, merging into brownish-grey on posterior ear-coverts; chest pale buffy grey, becoming warmer buff on belly, flanks and vent; iris chocolate-brown; bill orange, blackish culmen; legs light brown. Sexes alike. Juvenile has buff edgings on black throat feathers, dark bill. Voice. Song a fast and musical jumbled warbling, e.g. "weet-jewir-p-weetjeweer", lasting c. 3 three seconds, unlike that of any other member of genus; several individuals may sing together antiphonally. Call a high "wheek-wheek" or "bits", like sound of pebbles clicking together; alarm call at nest a loud penetrating "squeeeuw".
Habitat. Dry *caatinga* and *cerrado* scrub, mostly at 500–1300 m, locally to 1800 m in E Brazil.
Food and Feeding. Diet in Minas Gerais (Brazil) mostly seeds and flower buds, followed by fruit and small numbers of invertebrates. Occurs in mixed-species foraging flocks, typically being found alone only when breeding; often acts as a nucleus to other flocking species and frequently performs sentry duty, sitting on exposed perch and giving universally recognized alarm call on approach of predator. Forages frequently on ground.
Breeding. Few data available, all from Minas Gerais (Brazil). Birds carrying food to young in Mar–Apr, nest with well-feathered young on 17th Mar and another with two well-feathered young in late Oct, and adult carrying nesting material on 10th Oct; spread of dates suggests that species possibly at least double-brooded. Evidence of additional birds other than parents helping at some nests. One nest a cup of coarse grasses and twigs, external diameter 15·5 × 13·5 cm, cup diameter 8·8 cm, situated 0·9 m up in bush; second nest, at 1250 m, was a grass cup c. 9 cm in internal diameter and 18 cm in external diameter, built on ground into side of tussock of coarse grass, some very small bushes giving sparse concealment from above. Clutch 2 eggs, blue or greenish-white, marked with dull brown or black. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Quite common in parts of its range. First recorded in Beni, in NE Bolivia, in 2004, since when there have been several further observations. This species' habitat is under threat in many parts of its range; some areas of habitat protected by national parks.
Bibliography. Armani (1983), Buzzetti & Silva (2005), Gomes de Almeida (2009), Herrera & Vidoz (2009), Levy (2009), Parker & Rocha (1991), van Perlo (2009), Ragusa-Netto (2001, 2002b), Ridgely & Tudor (1989, 2009), Sick (1993), Telino *et al.* (2008).

29. **Rufous-bellied Saltator**

Saltator rufiventris

French: Saltator à ventre roux **German**: Rotbauchsaltator **Spanish**: Pepitero Colorado

Taxonomy. *Saltator rufiventris* d'Orbigny and Lafresnaye, 1837, Sicasica, Bolivia.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Recent molecular-genetic analyses indicate that this species is closer to thraupid genera *Delothraupis* and *Dubusia* and may merit placement in a separate genus, for which a new name would be needed; further study required. Monotypic.
Distribution. C Andes from C Bolivia (La Paz, Cochabamba and Chuquisaca) S, probably discontinuously, to NW Argentina (Jujuy and Salta).



Descriptive notes. 22 cm; male 68–80·5 g, female 67·8–79·8 g. Male has top of head and upperparts, including upperwing-coverts, uniformly blue-grey, rectrices greyish-black with bluish tinge on outer webs; long, narrow white supercilium extending back to side of nape; face down to chin and chest blue-grey, contrasting sharply with bright reddish-buff lower chest, abdomen and vent; iris red; bill dusky brown, cream-coloured base of lower mandible; legs brownish-horn. Female is similar to male, but, generally less bluish on upperparts, more faded below, iris amber. Juvenile is like adult, but bill paler. Voice. Song a short, fast subdued "cheree-cheree-cheree-chew" on even pitch; calls a soft "phueet-phueet", an unmusical, irregular "rrhe-rrhe", and a louder "whueet-whueet".
Habitat. Usually associated with *Polylepis* woodland; also occurs in shrubby thickets and agricultural fields. In Argentina, usually found in dry shrubbery on high slopes or in *quebradas* (ravines). Mostly in rather dry regions, but in E Bolivia in humid montane forest. Mostly 2500–3500 m, sometimes to 4000 m.
Food and Feeding. Few published data. Seen to eat fruits of *Berberis* and *Heteromelas* and berries of mistletoe (of genus *Tristerix*); said also to eat seeds and insects; individual in Argentina fed mostly on *Brachyotum* berries, also on young leaves of introduced willow (*Salix*), and took grass shoots from ground. Stomach contents in May and Aug were vegetable matter, including plant fibres and fruit seeds. Mistletoe berries may be important food source; whereas mistletoe berries in *Polylepis* occur throughout year, those growing on alder (*Alnus*) are more seasonal. Mostly in loose pairs; associates with *S. aurantiirostris* and White-tipped Plantcutters (*Phytotoma rutila*). Forages mainly in trees and other vegetation, sometimes on ground; has been seen to forage on ground in ploughed field.
Breeding. Birds in juvenile plumage in Aug and Sept, pair in Apr and female on 9th May in intermediate breeding condition, and others in May and Aug with undeveloped gonads; season likely in Dec and Jan. Nest a cup made from roots, dry leaves and similar material, lined with vegetable fibres and fine grasses, situated at medium height in scrub, thickly leaved bush or tree. Clutch 3 eggs, bluish with dull brown or black markings. No other information.
Movements. Apparently resident.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in High Andes of Bolivia and Argentina EBA. Locally common to uncommon in Bolivia; current status in Argentina uncertain, seems generally rare or uncommon, and has disappeared or declined greatly in some areas where previously abundant. In Bolivia, common at some sites in Cochabamba and in one area in La Paz, but very local outside Cochabamba; several new sites discovered as a result of increased fieldwork; total Bolivian population thought to exceed 10,000 individuals. Largely, but not exclusively, associated with *Polylepis* forest, a habitat under much pressure for its timber. Greatest threats appear to be uncontrolled burning of woodland and removal of *Polylepis*; if, owing to seasonality of mistletoe berries, *Polylepis* is essential at certain times of year, the situation could be more serious than it currently appears. Occurs in some protected areas, e.g. Tunari National Park, in Bolivia, and Calilegua National Park, in Argentina.
Bibliography. Anon. (2010b), Armani (1983), Butchart & Stattersfield (2004), Collar *et al.* (1992), Fjeldsá & Krabbe (1990), Mazar Barnett, Clark *et al.* (1998), Pearman (1997), Remsen *et al.* (1988), Ridgely & Tudor (1989, 2009), Stattersfield & Capper (2000).

30. **Lesser Antillean Saltator**

Saltator albicollis

French: Saltator gros-bec **German**: Antillensaltator **Spanish**: Pepitero Antillano

Taxonomy. *Saltator albicollis* Vieillot, 1817, Cayenne; error = Martinique.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species formerly treated as conspecific with *S. striatipectus*, but analyses of mitochondrial DNA clearly indicate that genetic differentiation sufficient to support treatment as two separate species. Race *guadelupensis* not always distinguishable from nominate. Two subspecies tentatively recognized.
Subspecies and Distribution.
S. a. guadelupensis Lafresnaye, 1844 – Guadeloupe and Dominica, in NC Lesser Antilles.
S. a. albicollis Vieillot, 1817 – Martinique and St Lucia, in C Lesser Antilles.



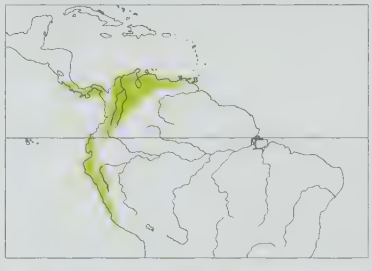
Descriptive notes. 22 cm; 39·8–51·6 g (St Lucia). Nominate race has crown and neck to back, including upperwing-coverts, deep olive-green, lower back and rump greyish; flight-feathers blackish-grey with olive-green edgings on outer webs, olive-green on outer webs of tertials (giving olive-green appearance to closed wing), carpal region yellow-green; rectrices uniformly dull grey-brown; narrow greenish-white supercilium; lores, face and ear-coverts mottled greyish; throat pale greenish-white, flanked by diffuse darker submoustachial streak; chest dull olive with obscure darker streaking, flanks greyish, vent buffy; underwing-coverts pale buff; iris dark brown; bill blackish, yellow tip and gape; legs brown. Sexes alike. Juvenile resembles adult, but facial pattern duller and streaking below more diffuse. Race *guadelupensis* usually has darker, more tawny or yellowish, underparts than nominate, but some apparently inseparable from latter. Voice. Song a series of rather loud, harsh, rising and falling notes.
Habitat. Wide variety of habitats, e.g. mangroves, forests of several types, including dry, marshy and humid; most common in dry forest and copses. From sea-level to 500 m.
Food and Feeding. Food vegetable matter, including fruits, buds, some flowers and petals; also some insects. Nestling diet fruits, petals, stamens of plants such as *Calliandra purpurea*, seeds, rarely insects. Forages generally in pairs.
Breeding. Season Feb–Aug, peak in May–Jun; height of song period Feb–Jun, some song persisting from Sept onwards. Nest a deep cup made from twigs and leaves, external diameter c. 18·5 cm, cup diameter c. 9 cm and depth c. 5 cm, located c. 2·5–4·5 m up in bush or tree. Clutch 2–3 eggs, light greenish-blue with black lines concentrated around blunt end; no information on incubation and nestling periods; chicks fed by both parents; fledglings attended by both parents for some time after leaving nest.
Movements. Sedentary. Presumed vagrant (assuming no captive origin) recorded on Nevis, c. 120 km over water from nearest breeding range (Guadeloupe).
Status and Conservation. Not globally threatened. Fairly common to common in suitable habitat. Small global range, restricted to four islands in E Caribbean region.
Bibliography. Bénito-Espinal & Hautcastel (2003, 2007), Bond (1985), Evans (1990), Raffaele *et al.* (1998), Seutin *et al.* (1993).

31. **Streaked Saltator**

Saltator striatipectus

French: Saltator strié **German**: Strichelsaltator **Spanish**: Pepitero Listado

Taxonomy. *Saltator striatipictus* (sic) Lafresnaye, 1847, Cali, Valle de Cauca, Colombia.
Affiliations of genus uncertain; recent molecular-genetic analyses indicate that it does not belong with present family, and may be better placed with tanagers (Thraupidae). Present species formerly treated as conspecific with *S. albicollis*, but analyses of mitochondrial DNA clearly indicate that genetic differentiation sufficient to support treatment as two separate species. In addition, has been suggested that races may involve more than one species; further study needed. Also, in SW Ecuador, adults on Puná I, which lies within range of race *flavidicollis*, are streaked below (unlike *flavidicollis*) and greyish above (like nominate); may be worthy of taxonomic differentiation. Ten subspecies currently recognized.
Subspecies and Distribution.
S. s. furax Bangs & T. E. Penard, 1919 – SW Costa Rica and W Panama (W Chiriquí).
S. s. isthmicus P. L. Sclater, 1861 – mainland Panama, (except extreme W & E).
S. s. scotinus Wetmore, 1957 – Coiba I and Coibita I, off S Veraguas (SW Panama).
S. s. melicus Wetmore, 1952 – Taboga I, off S Panamá (C Panama).
S. s. speratus Bangs & T. E. Penard, 1919 – Pearl Is (San Miguel, Saboga and Viveros), off S Panama.
S. s. striatipectus Lafresnaye, 1847 – E Panama (Darién), and W Colombia S, W of Andes, to N Ecuador.
S. s. perstriatus Parkes, 1959 – NE Colombia (Magdalena, NE Bolívar and Norte de Santander) E through mountains of N Venezuela to Sucre and Monagas; Trinidad.
S. s. flavidicollis P. L. Sclater, 1860 – lowland W Ecuador and NW Peru.
S. s. immaculatus Berlepsch & Stolzmann, 1892 – arid coast of W Peru (Lambayeque S to Ica).
S. s. peruvianus Cory, 1916 – Marañón drainage of SE Ecuador (Zamora-Chinchipe) and NE Peru (upper Marañón Valley in Cajamarca and La Libertad).



Descriptive notes. 19–20·5 cm; 30–44 g (Trinidad), one bird from Colombia 41·5 g, one from Peru 36·5 g. Nominate race has crown greyish-green, becoming more green on back and upperwing-coverts; rump greyish; flight-feathers blackish, broad olive-green edgings on outer webs, tertials with entire outer web greenish (giving olive-green appearance to closed wing), rectrices dull grey-brown; narrow supercilium in front of eye buffy white, area above eye whitish, lores and ear-coverts brownish-grey, dusky malar line slightly highlighted by some narrow off-white feathers separating it from plain lower face; throat whitish, chest off-white with diffuse darker streaks, belly buff-white with diffuse grey-black streaks at side, vent and undertail-coverts buffy-white; iris brown; bill blackish with yellow gape and sometimes yellow tip; legs grey-black to black. Sexes alike. Juvenile is similar to adult, but colour of back duller and less green. Race *furax* is smaller and much darker below than nominate, streaking below wider, heavier and more extensive; *isthmicus* is smaller than nominate, underparts more greenish or yellowish, stripes rather heavier and more olive-green, less greyish; *scotinus* is darkest race, closest to previous, but darker, greyer green above, with side of head and streaks below darker, edge of wing brighter yellow, undertail-coverts deeper buff; *melicus* is generally similar to *isthmicus*, but bill larger and heavier, side of head greyer, lateral throat streak greyer, flanks darker, and uppertail-coverts and uppertail darker grey; *speratus* is smaller than nominate, more yellowish or greenish below, less heavily streaked than *isthmicus*; *perstriatus* is similar to nominate, but clear green, less greyish, above, more heavily streaked below, streaks extending onto abdomen, and bill almost always tipped yellow; *flavidicollis* has supercilium longer and more prominent than nominate, upperparts olive, underparts whitish, sometimes tinged yellow, and streaks largely lacking (juvenile streaked), on Puná I (SW Ecuador) adult grey above and streaked below; *immaculatus* has supercilium inconspicuous, head greyish, upperparts mainly dull greyish, and chest pale greyish with little streaking, whiter throat and belly; *peruvianus* is very olive on upperparts, streaking on underparts heavy, supercilium inconspicuous, more black on bill. Voice. Song, mostly from cover 2–3 m up, sometimes (especially at dusk) in flight, a series of 4–5 whistled syllables, each lasting c. 0·2 seconds, with slightly shorter gap between notes, followed by two falling, harsher notes, "chu-chu-chu-chu-ch'ree-rerr-chip"; at dawn, often only harsher notes in a series. Flight contact call "qua-qua-qua"; also a loud "quik".
Habitat. Second growth, regenerating farmland, timbered gardens, forest edge; not in interior forest. In Venezuela not found in arid regions, but in Ecuador and Peru occurs in dry forest. Generally sea-level to 1500 m, more rarely to 2500 m.
Food and Feeding. Diet mixed animal and vegetable: prey items include ants (Formicidae), beetles (Coleoptera); vegetable items seeds, flowers, buds, various fruits, including (in Venezuela) fruits of columnar cacti. In Costa Rica, young fed with fruits of targuná tree (*Croton draco*). Normally in pairs, occasionally in small groups at fruiting trees. Not shy.
Breeding. Most nests in Apr or May, more rarely Mar and Jun, in Costa Rica, and two nests in Panama in Apr and May; mostly May in Trinidad; breeding apparently more protracted, with nests or breeding-condition birds from Jan–Sept, in Colombia. Sings mostly from cover, sometimes (mainly at dusk) during aerial display at up to 30 m above ground. Nest an open cup of slender dead vines, weed stems and similar material, with middle layer of dried grass stems, lined with finer grasses, tendrils and the like, external diameter c. 12–13 cm, cup c. 6–7 cm across, placed usually 1–3 m (more rarely up to 6 m) above ground in shrub or small tree. Clutch 2 eggs (Costa Rica; sometimes 3 in Trinidad), clear blue with variable amount of black or blackish spots or fine scrawls, markings concentrated around blunt end; incubation by female alone, sometimes fed on nest by male, period probably 13–14 days; chicks fed by both parents, nestling period c. 13 days; fledglings attended by both parents for several more days.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Over much of its range quite common. May benefit from forest clearance and subsequent recolonization by scrubland.
Bibliography. Brawn *et al.* (1996), ffrench (1973), Hallinan (1924), Herklots (1969), Hilty (2003), Hilty & Brown (1986), Kienzle & Erkert (1980), Parkes (1959b), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989, 2009), Schulenberg *et al.* (2007), Seutin *et al.* (1993), Skutch (1954), Soriano *et al.* (1999), Stiles & Skutch (1989), Tubaro & Lijtmaer (2006), Wetmore (1952).

PLATE 38 ➤


inches 2
cm 5
PLATE 38
ssp cyanoides
ssp argentina
34
32
ssp concreta
33
ssp brissonii
ssp indigotica
ssp rothschildii
35
36
ssp lazula
ssp parellina
ssp caerulea
ssp eurhyncha
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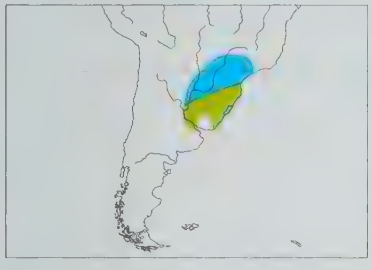
Genus *CYANOLOXIA* Bonaparte, 1850

32. Glaucous-blue Grosbeak

Cyanoloxia glaucocaerulea

French: Évêque indigo **German**: Türkisbischof **Spanish**: Picogrueso Índigo
Other common names: Indigo/Glaucous Grosbeak

Taxonomy. *Pyrrhula glauco-caerulea* d'Orbigny and Lafresnaye, 1837, Maldonado, Uruguay.
Genus sometimes subsumed in *Passerina*. Apparent hybrids between this species and an unspecified *Oryzoborus* seed-finch (Emberizidae) reported from Brazil. Monotypic.
Distribution. Breeds NE Argentina (Misiones, Corrientes, Entre Ríos and NE Buenos Aires), SE Brazil (S São Paulo, Santa Catarina, Rio Grande do Sul) and N, E & W Uruguay; in austral winter, some move N as far Mato Grosso do Sul (S Brazil).



Descriptive notes. 14 cm; three birds 16–19·5 g. Male is deep dark sky-blue above (each feather having very narrow blackish terminal edging), brightest on forehead and rump; remiges blackish with some bluish edging, especially on tertials; rectrices blackish, edged blue on outer web; face deep sky-blue, area in front of eye more blackish; underparts deep sky-blue, becoming more greyish on lower belly; iris dark brown; upper mandible dusky with some grey around cutting edge, lower mandible greyish or dirty white; legs dark brown. Female is generally warm dark brown above, paler, more orange-brown, below. Immature male is mostly dark orangey-brown above, pale orange-brown below, with lower belly brighter, also bluish on forehead and cheek; blue feathers moult in to chest as bird increases in age.
Voice. Song, usually from concealed perch in dense cover, a fast, high, hurried jumbled warbling; call "psit" or "jit".
Habitat. Edges of low forest, bushes on humid river islands, marshes, second growth; from near sea-level to 1700 m in Brazil.
Food and Feeding. No published data on diet. Usually in pairs; generally rather shy.
Breeding. Nests Oct–Dec in Uruguay. Nest a cup of small twigs, placed at low or medium height in dense vegetation. Clutch 2–4 eggs, pale sky-blue with reddish spots distributed over entire surface. No other information.
Movements. Partial austral migrant. During austral winter, some move N as far as Mato Grosso do Sul, S Goiás and S Minas Gerais (all S Brazil) and SE Paraguay (mostly E of R Paraguay).
Status and Conservation. Not globally threatened. Generally rather rare to uncommon over much of range. Not well known.
Bibliography. Armani (1983), van Perlo (2009), Ridgely & Tudor (1989, 2009), Rocha (2006), Sick (1993).

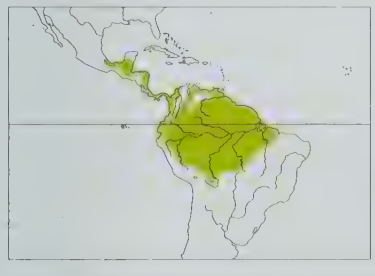
Genus *CYANOCOMPSA* Cabanis, 1861

33. Blue-black Grosbeak

Cyanocompsa cyanoides

French: Évêque bleu-noir **German**: Stahlbischof **Spanish**: Picogrueso Negriazul
Other common names: Rothschild's Grosbeak (*rothschildii*)

Taxonomy. *Coccoborus cyanoides* Lafresnaye, 1847, Panama.
Genus sometimes subsumed in *Passerina*; subspecific name *caerulescens* then becomes preoccupied, and replaced by *toddi*. Race *rothschildii* considered by some authors to represent a different species. Four subspecies currently recognized.
Subspecies and Distribution.
C. c. concreta (du Bus de Gisignies, 1855) – SE Mexico (Veracruz and N Oaxaca E to S Yucatán Peninsula), N Guatemala, Belize and Honduras.
C. c. caerulescens Todd, 1923 – Nicaragua S to W Panama.
C. c. cyanoides (Lafresnaye, 1847) – C & E Panama, NW Venezuela and N & W Colombia S (W of E Andes) to NW Peru (Tumbes).
C. c. rothschildii (E. Bartlett, 1890) – N, E & S Venezuela and the Guianas S to E Colombia, E Ecuador, E Peru, Brazil (S to N Mato Grosso and N Maranhão) and N & E Bolivia.



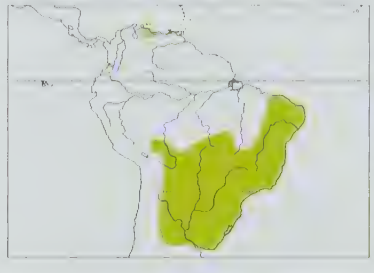
Descriptive notes. 17–18·5 cm; average 32·5 g. Male nominate race is rich deep blue above, rump somewhat paler blue, forehead and superciliary area slightly brighter blue than crown, slightly brighter blue shoulder patch; median and greater upperwing-coverts broadly edged deep blue, flight-feathers and rectrices dull blackish, narrowly edged deep blue; lores and area below eye blackish, chin blackish; throat and chest deep dark blue, becoming duller on lower belly and vent; iris dark brown; bill and legs blackish-grey. Female is uniformly dull chocolate-brown above and below; throat somewhat paler. Juvenile male is much like female, blue feathers first start to appear in forehead and around face, then on chest, full adult plumage not gained until autumnal moult of second year; juvenile female much as adult, may have obscure streaking on underparts. Race *caerulescens* male is decidedly darker blue, and larger, than nominate; *concreta* is similar to previous, but larger, male darker, more bluish-black, with throat and side of head distinctly blackish, female uniform rich brown; *rothschildii* male is much brighter than others, bright sky-blue on forehead, superciliary and malar regions and shoulder, female appreciably paler brown.
Voice. Song varies somewhat geographically: in Honduras 7–8 clear, flute-like notes, the first 4–5 rising slowly in pitch, the last 3 rapidly falling; in coastal Venezuela a few slow introductory notes, then a rich musical jumble of descending notes; other song patterns in other parts of South America. Female also sings, sometimes when incubating; male may sing in flight. Call a sharp metallic "chink"; also other low nasal or liquid calls.
Habitat. Humid evergreen forest, moist thickets, and dense vegetation. Sea-level to 1400 m in Venezuela; to 1200 m (one record at 2300 m) in Costa Rica; to 900 m in Mexico.
Food and Feeding. Diet probably mostly vegetable, including grass and bamboo seeds, maize (*Zea mays*) and rice; cracks seeds of *Psychotria brachiata* (Rubiaceae). Young fed mostly with mashed vegetable matter, also occasional insects. Generally in pairs. Typically forages low down in dense vegetation; will also venture well away from cover to eat maize and rice where available.
Breeding. Nest-building in Costa Rica starts in late Mar or Apr, earlier in wet Caribbean lowlands, but mostly in Jul–Aug; season mid-Mar to Jul in Belize, Feb through Oct in Colombia, and at least Mar and Apr in Brazil; two or three broods in a year in some regions. Nest built by both sexes, an open cup made from fine twigs, coarse fibrous materials and rootlets, placed 0·3–5 m up in spiny palm, tree-fern or similar plant; will nest also in maize fields with nearby woodland. Clutch usually 2 eggs, sometimes 1 (also 3–4 reported), bluish-white with brown dots at blunt end; incubation by female alone, fed on nest to variable degree by male, period 13–14 days; chicks fed by both parents, nestling period 11–12 days.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Common to fairly common in much of its range; widespread. Reported observations of race *rothschildii* in Trinidad are thought probably to be erroneous. Possibly benefits from presence of small grain fields alongside forested areas.
Bibliography. Armani (1983), Chubb (1910), Dallimer *et al.* (2005), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Lebbin (2006b), Moermond & Denslow (1985), Oniki (1984), Orians & Paulson (1969), Ridgely & Greenfield (2001a), Russell (1964), Salaman *et al.* (2008), Skutch (1954), Stiles & Skutch (1989), Todd (1923a).

34. Ultramarine Grosbeak

Cyanocompsa brissonii

French: Évêque de Brisson **German**: Ultramarinbischof **Spanish**: Picogrueso de Brisson
Other common names: Brazilian Blue Grosbeak

Taxonomy. *Fringilla brissonii* M. H. C. Lichtenstein, 1823, Bahia, Brazil.
Genus sometimes subsumed in *Passerina*. May form a superspecies with *C. parellina*.
Wild-bred hybrids with Double-collared Seedeater (*Sporophila caerulescens*), to which it is not closely related, have been reported in Brazil. Five subspecies recognized.
Subspecies and Distribution.
C. b. caucae Chapman, 1912 – SW Colombia in valleys of upper R Patía, R Cauca and R Dagua.
C. b. minor Cabanis, 1861 – mountains of N Venezuela (from Falcón and Lara E to Sucre and Monagas).
C. b. argentina (Sharpe, 1888) – E Bolivia (La Paz S to Tarija and Santa Cruz), S Brazil (W Mato Grosso), Chaco of Paraguay, and N Argentina (S to La Rioja, San Luis, Córdoba and N Buenos Aires).
C. b. brissonii (M. H. C. Lichtenstein, 1823) – NE Brazil from Piauí and Ceará S to Bahia.
C. b. sterea Oberholser, 1901 – E & S Brazil (from SE Mato Grosso, Goiás, Minas Gerais and Espírito Santo S to Rio Grande do Sul), E Paraguay, NE Argentina (Misiones and Corrientes) and Uruguay.



Descriptive notes. 15 cm; 27–28 g. Male nominate race has forehead, supercilium and cheek bright sky-blue, crown, nape and upperparts darker deep rich blue; shoulder patch bright medium-blue, feathers often having sky-blue streaks; flight-feathers and rectrices blackish; lores, area below eye and at base of bill, chin and throat blackish, becoming dark blue on chest and belly; lower flanks greyish-blue; iris dark brown; bill blackish-grey, often extensively paler grey around base of lower mandible; legs blackish. Female has upperparts warm brown, becoming more rufescent on rump; primaries and secondaries dull brown, lighter brown edgings on outer webs, rectrices dull blackish-brown; chin orange-buff, becoming brighter on belly. Juvenile male is orange-brown above and below, brighter and more orange below, with darker flecks on chest; blue feathers appear first on forehead and face, followed by abdominal region, and male may not attain full plumage until end of second year. Race *minor* is brighter blue on rump than nominate; *caucae* is smaller than nominate, similar to previous, but adult male has more ultramarine, less purple, on upperparts and underparts; *sterea* is smaller and darker than nominate; *argentina* is larger than nominate, male with larger frontal patch of silvery cobalt extending as spangled eyebrow to side of nape, female paler with light ferruginous-brown rump.
Voice. Song (in Venezuela) a rich series of rising and falling warbles, "we-se-weep wee so weep wee see wee-so-weep"; in Brazil, song described as flowing and melodious, alternating higher and lower cadences; dawn and dusk songs differ. Call a sharp metallic "pik".
Habitat. Thickets and other dense vegetation, also edges of *chaco*. In Venezuela and Colombia in arid or semi-arid desert scrub, dry forest borders, thickets etc., from sea-level to 1600 m, mostly below 900 m. In Argentina, race *argentina* occurs in shrubs and semi-open areas, sparsely as high as 2000 m, while *sterea* is found in denser forest.
Food and Feeding. No published data on diet. Usually found in pairs. Typically forages low down; generally difficult to see.
Breeding. Little information published, all of it referring to race *argentina*. Nest with eggs in mid-Dec. One nest was a cup of vegetable fibres, lined with finer fibres, external diameter 9 cm, height 7·5 cm, cup 5·5 × 5 cm, located 3 m up in a cornillo (*Schinopsis*) bush. One clutch, of 2 eggs, sky-

On following pages: 35. Blue Bunting (*Cyanocompsa parellina*); 36. Blue Grosbeak (*Passerina caerulea*); 37. Indigo Bunting (*Passerina cyanea*); 38. Lazuli Bunting (*Passerina amoena*); 39. Varied Bunting (*Passerina versicolor*); 40. Painted Bunting (*Passerina ciris*); 41. Rose-bellied Bunting (*Passerina rositae*); 42. Orange-breasted Bunting (*Passerina leclancherii*).

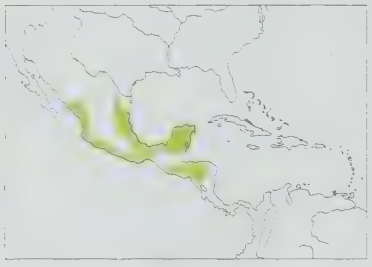
blue with fine chestnut spots all over, spots heavier at blunt end; other reports of clutches of 3 eggs, bluish-white or reddish-white, with pale cinnamon spots of variable extent. No other information.
Movements. Sedentary over most or all of range.
Status and Conservation. Not globally threatened. Quite common in many parts of range. Popular as a cagebird.
Bibliography. Barreira *et al.* (2007), Dinelli (1924), Hilty (2003), Hilty & Brown (1986), McCarthy (2006), de la Peña (2005), Ridgely & Tudor (1989, 2009), Salaman *et al.* (2008), Sick (1993), Todd (1923a).

35. **Blue Bunting**

Cyanocompsa parellina

French: Évêque paré **German**: Lasurbischof **Spanish**: Picogrueso Azul

Taxonomy. *Cyanoloxia parellina* Bonaparte, 1850, Alvarado, Veracruz, Mexico.
Genus sometimes subsumed in *Passerina*. May form a superspecies with *C. brissonii*. Four subspecies recognized.
Subspecies and Distribution.
C. p. indigotica (Ridgway, 1887) – W Mexico from C Sinaloa S on Pacific slope to S Oaxaca and extreme SW Chiapas.
C. p. beneplacita Bangs, 1915 – NE Mexico (Nuevo León and extreme W Tamaulipas).
C. p. lucida Sutton & Burleigh, 1939 – NE Mexico (S interior Tamaulipas).
C. p. parellina (Bonaparte, 1850) – E Mexico (from Veracruz, E Puebla and N Oaxaca E to Tabasco, C Chiapas and Yucatán Peninsula) S to NW Nicaragua.



Descriptive notes. 13–14 cm; male 11–24 g, female 9·8–21 g (nominate). Male nominate race has forehead bright sky-blue, becoming deeper blue with darker feather bases on crown; area in front of and behind eye blackish, bright blue cheek patch; upperparts deep blackish-blue, rump bright ultramarine; shoulder ultramarine, upperwing-coverts deeper blue, remiges dull black, rectrices dull black with blue edging on outer webs; chin, throat, breast and belly deep blue, often becoming greyish-blue on lower flanks; iris dark brown; bill blackish, lower mandible often extensively paler bluish-grey; legs blackish-brown. Female is uniformly dull brownish, darker on primaries and secondaries, warmer and more rufescent on belly; bare parts as for male. Immature male is generally grey-blue above and below, with much suffusion of dull brownish, especially on belly; immature female much like adult female. Race *beneplacita* male is duller blue than nominate, female obviously paler, duller and less rufescent brown, bill smaller and blacker; *lucida* male is brighter throughout than previous, more blue, with less of a purplish hue on underparts, rump lighter, blue on crown extending evenly over hindneck to back, female duller and less rufescent than nominate; *indigotica* is slightly larger than nominate, male duller indigo-blue, paler cerulean blue on light areas, female lighter brown. Voice. Song a sweet, rather sad warble, often with one or two separate notes at start, fading away at end; call a metallic "chik" or "chink".
Habitat. Forest edge, scrubby areas, undergrowth of tall forest, and thickets. Sea-level to 1800 m in Mexico; to 900 m in Guatemala.
Food and Feeding. No published data on diet. Feeds singly and in pairs, low down in understorey.
Breeding. Birds in breeding condition in May in Belize. Nest a cup of rootlets, grass and plant tendrils, placed at low to medium level in bush. Clutch 2–3 eggs, unmarked, moderately glossy bluish-white. No other information.
Movements. Apparently mainly sedentary. Several records of vagrants in S USA (Texas, Louisiana), at distances of up to 800 km from nearest part of known breeding range.
Status and Conservation. Not globally threatened. Fairly common to common in much of range. Fairly common in Guatemala, where no records prior to 1906. Reported occurrence in Costa Rica in 2007 uncorroborated. Seems able to accept moderate modification of habitat.
Bibliography. Anon. (2007a), Cardiff & Remsen (1981a), Howell & Webb (1995), Land (1970), Russell (1964), Todd (1923a), Waide & Hailman (1977).

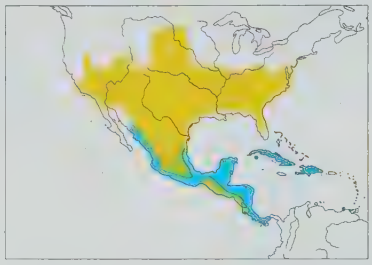
Genus *PASSERINA* Vieillot, 1816

36. **Blue Grosbeak**

Passerina caerulea

French: Guiraca bleu **German**: Azurfink **Spanish**: Azulillo Grande

Taxonomy. *Loxia caerulea* Linnaeus, 1758, South Carolina, USA.
Genus sometimes placed in family Emberizidae. This species formerly placed in monotypic genus *Guiraca*. Race *deltarhyncha* intergrades with *lazula* in Guatemala; former rather poorly differentiated, and sometimes synonymized with *eurhyncha*. Proposed race *mesophila* (Texas) included within nominate. Seven subspecies recognized.
Subspecies and Distribution.
P. c. salicaria (Grinnell, 1911) – breeds SW USA (C & S California, WC Nevada and SW Arizona) and extreme NW Mexico (NW Baja California); migrates to S Baja California and W Mexico (S Sonora S to Guerrero and Morelos).
P. c. interfusa (Dwight & Griscom, 1927) – breeds W USA (S South Dakota S to Arizona and New Mexico) and N Mexico (C Sinaloa, Durango and N Coahuila); migrates to W Mexico (Sonora and Durango) S to Honduras.
P. c. caerulea (Linnaeus, 1758) – breeds E USA from Kansas, Kentucky, SE Pennsylvania and S New Jersey S to C & S Texas, S Louisiana, C Alabama and C Florida; migrates to region from E & S Mexico S to Panama.
P. c. eurhyncha (Coues, 1874) – C & S Mexico from S Tamaulipas S to Oaxaca.
P. c. deltarhyncha (van Rossem, 1938) – Pacific slope in Mexico from S Sonora S to Guerrero.
P. c. chiapensis (Nelson, 1898) – S Mexico (E Oaxaca and Chiapas) E to S Guatemala.
P. c. lazula (Lesson, 1842) – S Guatemala, El Salvador and Honduras S through Pacific drainage to NW Costa Rica.



Descriptive notes. 15–19 cm; male 22–40·5 g, female 23–32·5 g. Breeding plumage attained through feather wear; after breeding, moults into fresh plumage (non-breeding). Breeding (worn) plumage has all body feathers blue except for a small black mask from lores and around bill down to chin, and undertail-coverts usually white-tipped, sometimes with remains of brownish tips here and there; lesser upperwing-coverts blue, some lesser and all median coverts chestnut, greater coverts blackish, edged blue and broadly fringed chestnut-brown on tips (two prominent bars on closed wing), primaries dull blackish-grey, narrowly edged whitish-brown on outer webs, secondaries similar but with bluer edgings, tertials usually with brownish remnants on edges of outer webs; rectrices greyish-black with bluish edgings, especially on central feathers, outer rectrix narrowly edged white; iris dark brown; bill mostly blackish above, silver below; legs greyish. Non-breeding (fresh) plumage has body feathers with fawn-brown edges, broad whitish edgings on undertail-coverts; bill horn; legs dull brownish. Female is medium-brown above, obscurely streaked dusky on mantle and scapulars, with some bluish, especially on lower back and rump, paler below, throat pale orange-brown, deeper-toned on chest; diffuse dull chestnut band on shoulder, some bluish on lesser upperwing-coverts, median coverts dusky, with tawny band reduced to broad tips, rest of wing similar to that of male but edgings are tawny to buff; bare parts as for non-breeding male. Juvenile is entirely brown in both sexes, although some males have traces of blue on bases of rectrices. Race *interfusa* is larger and paler than nominate, blue of male less purplish, anterior wingbar paler chestnut, posterior wingbar paler still; *salicaria* is closest to previous, but bill smaller, plumage generally paler, wing and tail on average longer; *eurhyncha* is similar to nominate in tone, but larger, with upper wingbar deep chestnut, bill larger; *deltarhyncha* male is darker than last; *lazula* is similar to *eurhyncha*, but male paler and much brighter blue; *chiapensis* is closest in plumage to last, but darker, larger and larger-billed. Voice. Song, from elevated perch or within cover, a series of rich warbled notes, in sequence lasting for up to 4 seconds, irregularly alternating up and down in pitch; nature of song varies according to stage of nesting, when female receptive male's song has more variants, with more versatile arrangement of elements, than when she is engaged in incubation; singing rates also up to three times higher during pre-pairing period than when female on eggs. Calls include metallic "tink", probably used in alarm; low buzzy note, "bzzzt"; high, rolling "preet"; also various other short calls.
Habitat. In E North America inhabits forest edge, regenerating farmland and open-pit mines, streamsides etc., often with medium-sized trees; in California, dense low vegetation near water; in Mexico, deciduous or semi-deciduous scrub, semi-open areas, often near water; in Costa Rica, from sea-level to 1100 m, often in tropical dry forest as well as in more humid zones. In non-breeding season found in brushy fields, areas with scattered trees and similar places. On migration various habitats, e.g. flocks found in rice fields.
Food and Feeding. Diet mixed animal and vegetable; in one extensive study of stomach contents of birds of all ages, 32% vegetable and 68% animal. Seeds of various plants, especially grasses, also wheat (*Triticum*) and oats (*Avena sativa*). Wintering birds in Guatemala seen to forage on waste grain in mule corrals. Animal matter mostly arthropods, e.g. caterpillars, beetles (Coleoptera), grasshoppers (Orthoptera), bugs (Hemiptera), treehoppers (Membracidae). Nestling diet almost exclusively animal matter, especially grasshoppers, also caterpillars and snails (Gastropoda). Opportunistic feeder, taking advantage of temporary abundances of prey, e.g. cicadas (Cicadidae) during period of emergence, or mantids (Mantidae). Feeds both on ground and in vegetation, sometimes by aerial flycatching.
Breeding. Virtually all studies have been on North American populations; few data on Middle American races. First egg dates from mid-Apr in California, May in Texas E to Carolinas, and Jun in Colorado and Indiana, and in arid SW USA may time nesting to coincide with summer rainy period; nestlings in Jul in Guatemala and nest-building May–Jul in Costa Rica; double-brooded, at least in S USA. Remarkable rate of extra-pair fertilizations, e.g. in one study 53% of nestlings (involving 70% of all nests) were result of cuckoldry by other males; males with brighter blue plumage tend to have larger and better territories than duller males, and they also had higher rates of cuckoldry and lower rates of being cuckolded; male also adjusts its mate-guarding behaviour according to attractiveness of neighbouring males, those with brightly coloured neighbours tending to guard mate more closely than do those having duller neighbours (but in study of captives, females did not prefer males with plumage artificially brightened over those which had been made more dull). Nest built mostly by female, male occasionally participating in work, a compact cup of twigs and rootlets, dead leaves, corn husks and similar, often with snakeskin and artificial material (e.g. cellophane, rags, etc.), cup diameter 6–8 cm, lined with finer grasses, hair, rootlets and the like, in Costa Rica often held together by spider webs; one nest in Oklahoma was built entirely from newspaper, though lined with fine roots; situated from 15 cm to 8 m up in shrub, vine tangle or small tree. Clutch 3–5 eggs, usually 4, pale bluish-white or blue, exceptionally with light brown streaky (not spot-like) markings; incubation by female alone, period 11–12 days; chicks fed mostly by female, though male more involved after young fledge, especially if female building another nest; fledging 9–13 days. Frequent host of both Brown-headed (*Molothrus ater*) and Bronzed Cowbirds (*Molothrus aeneus*), e.g. at least 50% of nests in one Arizona study were parasitized, and 10–20% in other studies. Although this species successful in rearing its own young in mixed broods, overall productivity is reduced by cowbird parasitism.
Movements. N races (nominate, *salicaria* and *interfusa*) totally migratory; other races appear to be sedentary. Nocturnal migrant. In autumn, leaves South Dakota mid-Aug to mid-Sept, migration continuing through Oct in other areas; E populations probably fly across Gulf of Mexico, as species occurs as migrant rather uncommonly in Bahamas and Cayman Is, more rarely in Cuba and Hispaniola (where small numbers overwinter), very sparsely elsewhere (including Puerto Rico), and very rarely Jamaica and Virgin Is. Return from mid-Apr in S California to middle/late May in South Dakota; among migratory populations, males arrive back on territory before females. Fairly frequent vagrant N of range, e.g. in S Canada (Ontario) and NE USA (Massachusetts and other places), and some winter records in New England; in S, vagrant in Bahamas, N Colombia and NE Ecuador.
Status and Conservation. Not globally threatened. Reasonably common, but never regarded as an abundant species. Fairly common over much of its USA range; fairly common to common breeder in Mexico; uncommon to fairly common in Costa Rica. In USA, greatest densities on E seaboard from Virginia and North Carolina S to Georgia. May benefit from abandonment of farmland and regenerating vegetation of open-pit mine sites.
Bibliography. Alsop (1979), Baicich & Harrison (2005), Ballentine & Hill (2003), Ballentine *et al.* (2003), Bent & Austin (1968), Brown (1994), Carling & Brumfield (2008b), Estep *et al.* (2005), Galligan *et al.* (2006), Gochfeld *et al.* (1974), Howell & Webb (1995), Ingold (1993), Keith *et al.* (2003), Keyser & Hill (2000), Lattin & Ritchison (2009), McAtee (1908), Mjøs (2002), Phillips *et al.* (1964), Pyle (1997), Ridgely & Greenfield (2001a), Ridgely &

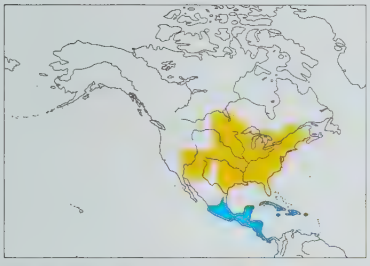
Gwynne (1989), Risch & Robinson (2006), Salaman *et al.* (2008), Stabler (1959), Stiles & Skutch (1989), Storer & Zimmerman (1959), Taylor *et al.* (1989), Whitehead *et al.* (2000).

37. Indigo Bunting

Passerina cyanea

French: Passerin indigo **German**: Indigofink **Spanish**: Azulillo Índigo

Taxonomy. *Tanagra cyanea* Linnaeus, 1766, South Carolina.
Genus sometimes placed in family Emberizidae. May form a superspecies with *P. amoena* and often treated as conspecific; the two hybridize extensively. Hybrids reported rarely also with *P. ciris* and, in captivity, with *P. leclancherii*; has hybridized also with captive domestic Island Canary (*Serinus canaria*). Monotypic.
Distribution. Breeds E North America, from S Canada (SE Saskatchewan and S Manitoba E to S New Brunswick) S in USA to W Kansas and C Texas across to Gulf Coast and E seaboard, also W into New Mexico and S Arizona. Migrates to Middle America from C Mexico (S Tamaulipas) S to E Panama and West Indies.



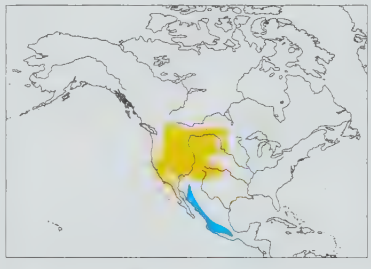
Descriptive notes. 14 cm; male 12·5–17·5 g, female 11·9–18·5 g (Michigan, in N USA). Male breeding has crown deep indigo, becoming more blue on nape and upperparts, feathers of back with dark blackish-grey bases (sometimes showing through); shoulder bright blue, alula mostly blackish, lesser upperwing-coverts bright blue, median and greater coverts dusky blue, broadly edged bright blue, tertials blackish with broad blue edgings; primaries and secondaries greyish-black, narrow bluish edgings on outer webs; rectrices blackish-grey, edged bright blue; chin and throat bright indigo, darker on lores, chest indigo, becoming more blue on sides and on belly, thigh and vent; iris dark chestnut; bill blackish above, blue-grey to whitish below; legs dull blackish. Male non-breeding is similar to female, but with much blue around head and body. Female is entirely medium-brown above, more grey-brown on shoulder (many individuals with blue tinge on shoulder, primary coverts and edges of rectrices); median and greater coverts grey-brown, edged paler brown; primaries and secondaries dull blackish-brown, tertials blackish-brown, broadly edged brown, rectrices dull brown; face buffy brown, chin and throat dull whitish-buff, chest medium-brown with obscure broad streaking, belly brownish-white, becoming darker on flanks and lower belly; bare parts as for male. Juvenile is generally dark brown all over, paler on lower chest and belly, some males with blue edgings on rectrices; male takes two years to gain full plumage, some older males may still retain substantial amount of brown on body feathers.
Voice. Song, usually from prominent elevated perch, more rarely in flight, a loud, cheerful series of robust high notes, 6–20 or more in a series, "swee-swee-swee" and so on, sequence sometimes lasting up to 6 seconds (usually 2–3). Much individual variation; males in neighbouring territories often have very similar songs, while more distant males may use different song type. Apparently only males sing; reports of female song may involve immature males. Begins to sing on spring migration, and on arrival on territory sings very persistently, throughout day, even on hot sultry afternoons. In range of sympatry with *P. amoena* the two share some elements of songs and often respond strongly to heterospecific song, whereas male response to heterospecific song weak in allopatric populations; females, however, respond much more to song of own species than to that of the other species. Calls mostly monosyllabic, "chip" and similar, sometimes in protracted series at times of agitation; female soliciting copulation may give trilling or twittering call.
Habitat. Woodland edge, bushy areas and successional bush along roadsides, riverside vegetation, clearings in woodland; usually not in interior woodland with unbroken canopy. On migration and on wintering grounds found in weedy cropland, low second growth, savanna and recently harvested rice fields.
Food and Feeding. Diet varies during year. In winter predominantly vegetable matter, including weed and grass seeds, rice and similar items. During breeding season much more animal matter, including spiders (Araneae), various insects such as caterpillars, bugs (Hemiptera), beetles (Coleoptera) and grasshoppers (Orthoptera), as well as seeds and berries. Nestling diet mostly animal matter, including caterpillars, spiders and their egg cases, grasshoppers and dragonflies (Anisoptera), as well as berries. In pairs; also in small flocks outside breeding season.
Breeding. Egg dates mid-May to mid-Aug, rarely later, in N of range (Ontario and Michigan), somewhat earlier in S; up to four clutches in a season (some probably replacements). Female may remain with same male for subsequent broods after first, or may change mates. Some males polygynous. Extra-pair copulations common; in one study, 35% of nestlings came from extra-pair copulations, and 48% of broods had at least one individual not sired by male nest-owner. Nest built entirely by female, on site chosen by her, male may accompany her during construction, an open cup of soft leaves, dried grasses, bark strips, rootlets and the like, often with spider webs around rim, occasionally snakeskin, lined with fine grass and hair, external diameter c. 9 cm, internal c. 4–6·5 cm, placed usually low down, 0·3–1 m (rarely up to 10 m) above ground, in bush or small sapling, or in herbage such as goldenrod (*Solidago*). Clutch usually 3–4 eggs, sometimes 2, larger clutches more common in early broods (clutches of up to 6 eggs probably due to two females laying in one nest), usually unmarked whitish or very pale bluish-white or greenish-white, rarely with purplish or brownish-red spots; incubation by female alone, period 11–14 days (usually 12–13 days), male may remain nearby and give alarm at intruders; small chicks brooded by female alone, fed almost exclusively by female, in some cases male may feed older nestlings; no information on duration of nestling period; fledglings fed largely by female, though male may help, and as they get older sometimes fed entirely by male; older males (i.e. after second-year) may be more attentive to feeding than are second-years, perhaps because of higher chance of their being the brood's genetic father (polygynous males significantly less likely to feed young). Frequent host of Brown-headed Cowbird (*Molothrus ater*); in studies in Michigan and Ontario, 20–25% of nests parasitized, sometimes with several cowbird eggs (later broods, when cowbirds have finished laying, less parasitized). Nesting productivity significantly worse in parasitized nests, especially when more than one cowbird egg laid.
Movements. Migratory; essentially no overlap between breeding and wintering ranges. Nocturnal migrant. Autumn migration starts late Aug in N (Ontario), Sept to Oct farther S; those wintering in Middle America may travel both around and across Gulf of Mexico; winters regularly in Greater Antilles and occurs on migration, but not as wintering resident, on offshore cays of Belize and islets N of Yucatán. Return to breeding grounds late Apr to early Jun, N populations being later, and males arriving on territory 1–2 days before females. Ring recoveries reveal that birds are quite strongly philopatric on wintering grounds. Vagrant N to British Columbia, shores of Hudson Bay, S to Coco I (S of W Costa Rica), Providencia, San Andrés, Trinidad, Netherlands Antilles, N Colombia and Venezuela; also Iceland, NW Russia (Curonian Spit), Ireland, Britain, Netherlands, Azores (numerous records). Some extralimital records may involve escaped cagebirds.
Status and Conservation. Not globally threatened. Common to abundant over much of its range; in some areas (e.g. Kentucky and Tennessee) regarded as the most common nesting bird. Population estimates, based on Breeding Bird Survey routes, vary from 10,000,000 to 40,000,000 breeding pairs, although latter figure may be an overestimate. Has recently extended range W into New Mexico and S Arizona, where more sparsely distributed. May benefit from clearing of woodland, also from defoliation of trees in formerly dense stands by introduced gypsy moths (*Lymantria dispar*). Population reduced by more intensive agriculture, more frequent mowing of roadside verges and urbanization. Popular as a cagebird in Mexico and Central America, but this unlikely to have any significant effect on population. A favourite species for scientific investigation of migration physiology and navigation.
Bibliography. Baker (1991, 1994, 1996), Baker & Boylan (1995, 1999), Belcher & Thompson (1969), Bell & Whitmore (2000), Blake (1969), Bradley (1948), Carey (1982), Carey & Nolan (1979), Carling & Brumfield (2008a, 2008b, 2009), Carling *et al.* (2010), Dearborn (1996), Downer (1972), Emlen (1967a, 1967b, 1969, 1970, 1971a, 1971b), Emlen, Rising & Thompson (1975), Emlen, Wiltschko *et al.* (1976), Fisk (1979), Forsythe (1974), Howell (1989), Hylton & Godard (2001), Johnston (1965, 1967, 1970), Johnston & Downer (1968), Keith *et al.* (2003), Koblik *et al.* (2006), Kopachena & Crist (2000a, 2000b), Krementz & Christie (2000), Kroodsma (1975), Lücking & Lücking (1994), MacLean (1886), Margoliash *et al.* (1991, 1994), McCarthy (2006), Morris (2005), Olafson (1993), Payne (1981, 1982, 1983, 1991, 1992, 1996, 2006), Payne & Payne (1989, 1990, 1993a, 1993b, 1996, 1998), Payne & Westneat (1988), Payne, Payne & Doehlert (1988), Payne, Thompson *et al.* (1981), Pyle (1997), Quay (1987), Rice & Thompson (1968), Rohwer (1986), Russell (1964), Schill & Yahner (2009), Shiovitz (1975), Shiovitz & Thompson (1970), Sibley & Short (1959), Sniegowski *et al.* (1988), Taber & Johnston (1968), Taylor *et al.* (1989), Thompson (1970), Van Tyne (1932), Weldon & Haddad (2005), Westneat (1987a, 1987b, 1988a, 1988b, 1990), Wiltschko *et al.* (1980), Wormington (1986), Young (1989).

38. Lazuli Bunting

Passerina amoena

French: Passerin azuré **German**: Lazulifink **Spanish**: Azulillo Lapislázuli

Taxonomy. *Emberiza amoena* Say, 1822, near Canyon City, Colorado, USA.
Genus sometimes placed in family Emberizidae. May form a superspecies with *P. cyanea* and often treated as conspecific; the two hybridize extensively. Monotypic.
Distribution. Breeds SW Canada (SE British Columbia, SW & extreme S Alberta and S fringe of Saskatchewan), W USA from C Washington and Oregon and most of California (except SW) E to W North Dakota and South Dakota, NW Nebraska, EC Colorado, N New Mexico and Arizona, and extreme NW Mexico (NW Baja California). Migrates to SE Arizona S through W Mexico to NW Oaxaca.



Descriptive notes. 13–14 cm; male 13–19·5 g, female 12·7–16·9 g (California). Male has head, chin, throat and upper chest bright lazuli-blue, becoming suffused with darker on mantle, back and scapulars; rump lazuli-blue; primaries greyish-black with bluish edgings on outer webs; median upperwing-coverts broadly tipped whitish and greater coverts more narrowly tipped whitish (two wingbars on closed wing); rectrices dull greyish-black, suffused with bluish, especially on outer webs; chest chestnut-brown, lower chest and belly off-white; iris black; upper mandible black, lower mandible light bluish-grey; legs dark brown or black. Male non-breeding is similar to breeding, but plumage brightness obscured by extensive buff feather tips. Female is uniformly greyish-brown above, becoming more grey or bluish on rump; whitish-buff below, with stronger buff on chest and pale buffy grey on belly; lesser upperwing-coverts with bluish tinge, median coverts dusky with broad buffy-white to dull buff tips, greater coverts dusky with brownish-buff fringes and broad tips forming a second, usually less contrasting, wingbar; bare parts as for male. Juvenile is entirely brown, and can probably not be reliably sexed until after some coloured fresh body feathers (blue or orange on male, brown on female) appear in Oct of first year.
Voice. Song a cheerful series of variously phrased warbling whistles, sometimes paired, often ending in buzz; similar to that of *P. cyanea*, but less strident and considerably faster (in areas of allopatry, the two are usually indifferent to playback of the other species' song; where both species occur, each reacts aggressively to other's song). In sympatric areas each species may use some phrases borrowed from the other's song. Considerable variation of song type, but individuals tend to stick to one type, which is apparently learnt during first year and then remains fairly constant. Calls include short "chip" when agitated, either by humans or by other species, or in territorial disputes; during copulation and pre-copulation a "tseep" from male and a "ti-ti-ti-ti" from female; alarm calls include a trill and "seet"; loud, strident distress call, "eeee", used when nest or fledglings threatened. Various other calls described.
Habitat. Breeds in wide variety of brushy habitats, including arid brushy hillsides, wooded valleys and open scrub. To 3000 m in Sierra Nevada of California, and to 2400 m in NW Mexico and 2000 m in W Mexico. Rapidly colonizes new regenerating scrubland. On wintering grounds occurs in overgrown fields, thorn-forest, roadside verges and similar places.
Food and Feeding. Food predominantly vegetable, mainly fruits and seeds of such plants as chickweed and wild oats (*Avena*), but also substantial amounts of animal matter, especially during spring and summer. Invertebrate prey includes caterpillars, small spiders (Araneae), bugs (Hemiptera), beetles (Coleoptera) and ants (Formicidae). Forages singly and in pairs; in non-breeding season also in small loose flocks. Picks up seeds from ground; perches in grasses to eat seedheads. Insect prey usually gleaned from leaf surfaces. Both sexes also flycatch, in short flights.
Breeding. Season May–Sept, mostly Jun–Aug; usually double-brooded. Monogamous; male occasionally polygynous. Nest-site chosen by female, she also exclusively responsible for construction of nest, an open cup of rootlets, grasses, bark strips and similar material, often with caterpillar silk or spider webs on outside, cup lined with finer grasses and animal hairs, external dimensions 8–11·5 cm, cup diameter 4–7 cm, depth 3–5·5 cm, usually low down, mostly below 1 m (only rarely up to 2 m), in low shrub, tangle or sapling. Clutch usually 3–4 eggs, sometimes 1 or 6 (though large clutches may come from more than one female, and small ones due to activities of cowbirds), pale bluish-white or greenish-white, sometimes pure white, unmarked; incubation by female alone, period 11–14 days, average c. 12 days; chicks fed by both sexes, mostly by female, in individual cases male may provide none or up to 50% of all food, nestling period 9–11 days, shorter if nest disturbed; young fed by parent or parents for up to two weeks after leaving nest; if pair starts a

second breeding attempt, the feeding and post-fledging care of the first brood are often done exclusively by male while female is incubating. Frequent host of Brown-headed Cowbird (*Molothrus ater*), e.g. in California (Sacramento Valley) and in one area of W Montana parasitism rates may approach 100% (and one nest near cowbird roost contained ten cowbird eggs), but in one study in S Canada (Alberta, at edge of present species' range) no parasitism found. Effect on nesting success of cowbird parasitism varies according to hatching times: if young cowbird hatches simultaneously with, or before, the host's young, few or none of latter fledge; if host chick has a head-start of 2–3 days it seems able to compete for food with the cowbird chick. Breeding success seems to be more deleteriously affected by cowbirds than is the case with *P. cyanea*, perhaps because of relative paucity of food in dry habitat.

Movements. Entirely migratory; no overlap between breeding and wintering ranges. Nocturnal migrant. Leaves territories in Jul or mid-Aug, when small flocks found; autumn migration interrupted for about a month while birds undergo moult involving flight-feathers and most of body feathers (this occurs in S Arizona, SW New Mexico and S Baja California), after which they proceed to wintering areas in S USA (SE Arizona) and W Mexico (mainland; formerly wintered also S Baja California). Return to breeding areas from early Apr (in Texas and S California) to late May (Wyoming) and early Jun (at N end of range in Alberta), males arriving on territory 4–6 days before females. Extralimital records have occurred widely in North America, N & E to Ontario, Nova Scotia, Maine, Virginia, South Carolina and Florida, as well as in E Atlantic in Faroe Is and arctic Norway; in some cases, question of vagrancy complicated by possibility of escapes from captivity.

Status and Conservation. Not globally threatened. Quite common or even abundant in suitable habitat over much of its range. Some populations under heavy, possibly unsustainable, pressure from Brown-headed Cowbird, which has benefited from human-induced habitat changes. Has been suggested that, in Sacramento Valley, the rate of nest loss due to cowbird parasitism may be such that local populations of present species are sustained only by constant replenishment from outside. In Mexico, frequently taken as a cagebird, although this unlikely to be a major drain on population.

Bibliography. Baicich & Harrison (2005), Baker (1991, 1994), Baker & Baker (1988, 1990), Baker & Boylan (1995, 1999), Baker & Johnson (1998), Carling & Brumfield (2008a, 2008b, 2009), Carling *et al.* (2010), Cook (1977), Emlen *et al.* (1975), Erickson (1968), Gardali *et al.* (1998), Greene *et al.* (1996), Kroodsma (1975), Leidolf *et al.* (2007), Maybank (1985), Maybank & McKenna (1997), McCarthy (2006), Michaelson (1985), Muehter *et al.* (1997), Phillips *et al.* (1964), Rothstein (1994), Russell & Monson (1998), Sauer *et al.* (1997), Sibley & Short (1959), Stokes (1993), Thompson (1968, 1969, 1976), Young (1991).

39. Varied Bunting

Passerina versicolor

French: Passerin varié **German**: Vielfarbenfink **Spanish**: Azulillo Morado
Other common names: Versicolour Bunting

Taxonomy. *Spiza versicolor* Bonaparte, 1838, near Temascaltepec, Mexico.

Genus sometimes placed in family Emberizidae. This species has hybridized with *P. ciris*. Races *pulchra* and *purpurascens* considered by some authorities to be too weakly differentiated to be tenable. Four subspecies currently recognized.

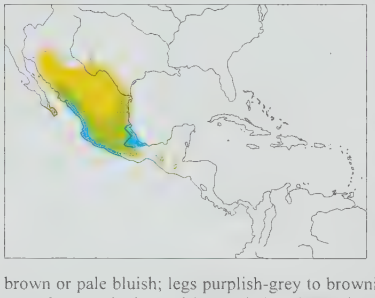
Subspecies and Distribution.

P. v. dickeyae van Rossem, 1934 – breeds S USA (C & S Arizona, S New Mexico) and W Mexico (Sonora and WC Chihuahua S to Colima).

P. v. versicolor (Bonaparte, 1838) – breeds S USA (S New Mexico; S Texas from Big Bend to Rio Grande Valley) and S through C Mexico to Oaxaca.

P. v. pulchra Ridgway, 1887 – S Baja California (Mexico).

P. v. purpurascens Griscom, 1930 – S Mexico (Chiapas) and S Guatemala (Motagua Valley).



Descriptive notes. 11–14 cm; male average 13 g, female average 12·8 g. Male nominate race has forehead and area between bill and eye down to chin blackish, crown bright violet-blue, becoming more reddish-purple on nape; ear-coverts are violet-blue, strongly tinged purplish-pink; upperparts dark purplish-pink, almost black, becoming deep azure-purple on rump; primaries and secondaries greyish-black, rectrices blackish, tinged with purplish; throat reddish, chest deep pinkish-purple, becoming darker and bluer on lower belly; iris dark brown or greyish-brown; upper mandible blackish to dark lead-grey, lower mandible light horn-brown or pale bluish; legs purplish-grey to brownish-black. Female is fairly uniformly brownish-grey above, paler brownish-grey below, becoming paler grey on lower belly; bluish tinge on wings and tail, and variably and patchily over upperparts; bare parts as for male. Juvenile is entirely brownish, sexes indistinguishable until some fresh purple or red (male) or brown (female) body feathers appear, which may not be until second year. Race *pulchra* is smaller than nominate, with shorter tail and wing, male nape patch brighter red, throat less reddish (never decidedly red), flanks brighter plum-purple, rump more purplish-blue or lavender, female greyer, especially below and on sides of head and neck; *dickeyae* is smaller than nominate, male red nuchal patch larger and brighter than previous, female and immature male rufescent brown, not greyish-brown; *purpurascens* is smaller and darker than nominate. Voice. Song a rich series of short, rapidly repeated phrases or syllables, lasting for 3–6 seconds; older individuals use a more prolonged series. Calls include short "chip" or "buzz" notes, given as alarm.

Habitat. Dry scrubland, thorn-scrub, acacia (*Acacia*) thickets and similar; in Mexico found in deciduous thorn-forest, overgrown clearings etc., from sea-level to 2000 m. Sometimes in more humid forest edge on wintering grounds.

Food and Feeding. In summer, mixed animal and vegetable diet. Invertebrate prey includes caterpillars, small grasshoppers (Orthoptera), beetles (Coleoptera), ants (Formicidae), termites (Isoptera) and ant-lions (Myrmeleontidae); vegetable matter includes seeds of grasses and other plants, prickly pear (*Opuntia*) fruit, berries. Nestling diet invertebrates (caterpillars, grasshoppers etc.). No data on diet in wintering areas. Forages singly and in pairs; also in small flocks in non-breeding season. Feeds on ground and in vegetation; seen to pluck at spider webs. Sometimes flycatches for aerial prey.

Breeding. Season mid-Apr to mid-Jul; said to be single-brooded in S Arizona, but in Texas apparently double-brooded. Male strongly philopatric. Pair-bond may be maintained for repeated nesting through breeding season or even into succeeding years; female may switch territories, and hence mates, between years, but not observed to do so between broods. Nest built by both sexes (unlike congeners in North America), an untidy cup of dry grasses, small weed stems, plant fibres, plant down and similar material, sometimes snakeskin incorporated, lined with fine grasses, hair and rootlets, external diameter 6·5–8 cm, cup 4·5–6·5 cm, placed 0·7–1·3 m (occasionally to 4 m) above ground, usually in thorny scrub. Clutch 2–5 eggs, most commonly 4, bluish-white or greenish-white, unmarked or lightly speckled with brownish markings; incubation by female alone, period c. 14 days; female alone broods small young, young fed initially only by female, male helps after c. 4–5 days, nest sanitation by both sexes, young can leave nest, especially if disturbed, in c. 10 days; after fledging, brood may split, typically two young being cared for by each parent; young may then rejoin into one group, cared for by male, while female starts second brood. Nests parasitized by Brown-headed Cowbird (*Molothrus ater*), but few data on frequency, and little information on impact on nest success.

Movements. Sedentary in S of range, although some of those breeding in S Baja California (race *pulchra*) may migrate across Gulf of California to mainland Mexico (Sonora and Sinaloa). N populations migratory, making post-breeding movement to S parts of breeding range and to coastal areas of Mexico. Nocturnal migrant, so far as can be determined. Leaves breeding grounds mostly by late Aug; returns in Texas about mid-Apr, males arriving on territory before females. Vagrant recorded in SE USA (Florida) in Jun 2005.

Status and Conservation. Not globally threatened. Classified as "Declining" in USA (Yellow WatchList priority species for conservation). Locally common to uncommon. Has decreased in some parts of former range owing to conversion of habitat to agriculture; now rare in lower Rio Grande Valley. Overgrazing by cattle and (in Mexico) goats causes habitat degradation, as have various road-building and mining operations in USA–Mexico border region. In New Mexico declared as "threatened". Popular cagebird in Mexico, but effect, if any, on populations not known.

Bibliography. Baicich & Harrison (2005), Groschupf & Thompson (1998), Howell & Webb (1995), Lebbin *et al.* (2010), Lockwood (1995), McCarthy (2006), Meitzen (1967), Phillips *et al.* (1964), Pulich (1963), Russell & Monson (1998), Storer (1961), Todd (1987), Walker (2009), Woolfenden & Van Deventer (2006).

40. Painted Bunting

Passerina ciris

French: Passerin nonpareil **German**: Papstfink **Spanish**: Azulillo Sietecolores
Other common names: Nonpareil

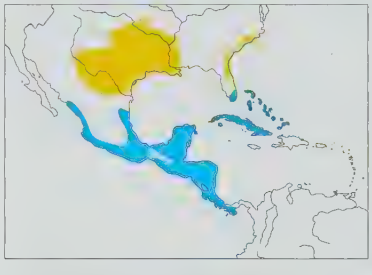
Taxonomy. *Emberiza ciris* Linnaeus, 1758, South Carolina, USA.

Genus sometimes placed in family Emberizidae. In the wild, present species rarely hybridizes with other members of genus; crosses with *P. cyanea* and *P. versicolor* described. In captivity has hybridized with *P. cyanea* and with domestic Island Canary (*Serinus canaria*). Races poorly differentiated and widely separated geographically, and they differ significantly in migration and moult strategies, suggesting that there is very little gene flow between them, and that they perhaps warrant treatment as two separate species; further study required. Two subspecies currently recognized.

Subspecies and Distribution.

P. c. ciris (Linnaeus, 1758) – breeds on US Atlantic seaboard from North Carolina S to C Florida; migrates to S Florida, Bahamas and Cuba.

P. c. pallidior Mearns, 1911 – breeds in S USA (SE Kansas E to W Tennessee and Mississippi, S to C & S New Mexico and Texas) and adjacent Mexico (Chihuahua E to NW Tamaulipas); migrates to Mexico (S from C Sinaloa, S San Luis Potosí and S Tamaulipas, but absent from central highlands) and S to W Panama.



Descriptive notes. 13 cm; male 13·3–19 g, female 12·9–19 g (Florida). Male nominate race has head deep blue, rose-pink eyering; upperparts copper-green, rump pinkish-rose; lesser upperwing-coverts dull, dark green-blue, median coverts bronze to maroon, greater coverts green, remiges dusky with dull bronze to dull green on outer webs; rectrices dark grey-brown, suffused with pinkish-brown; chin and throat rose-red, chest rose-red with deep blue at side, remainder of underparts somewhat paler rose-red; iris dark brown; bill blackish or dark brown; legs dull brown or dusky brown. Female is uniformly olive-green above, becoming brighter green on rump; primaries dull dark greyish with green edgings (giving greenish area on closed wing), rectrices dark greyish, strongly tinged with green on outer webs; dull yellowish-green below, greyer on chest, brighter yellow on belly; bare parts as for male. Juvenile on leaving nest is entirely dull brownish, becoming more bright greenish after body-moult (about Oct); sexes not separable in most instances until subsequent moult. Race *pallidior* is larger and paler than nominate, but differences clinal and complicated by individual variation. Voice. Only male sings. Song a series of high-pitched whistled notes, in phrases of 1–3 notes, totalling c. 10 syllables, lasting for up to 2 seconds; generally described as less loud than that of *P. cyanea*, and with tinkling quality. No apparent constant differences in songs between E & W populations. Calls include "pik-pik-pik" and "chip", sometimes used in agonistic situations.

Habitat. Areas of scattered bush, recently abandoned farmland, disused orange groves, riparian thickets; uses wooded areas in otherwise open habitat, in contrast to *P. cyanea* (which typically uses open areas in woodland). In wintering areas found in overgrown shrubby pasture, forest edge, clearings and similar habitats; sea-level to 1400 m in Honduras, to 1800 m in Mexico and to 1850 m in Guatemala.

Food and Feeding. On breeding grounds predominantly vegetable, including seeds of various grasses, sedges (Cyperaceae), some dicotyledons including spurges (*Euphorbia*), figs (*Ficus*) and wood sorrel (*Oxalis*). In one extensive study of stomach contents, 79% vegetable, 21% animal. Animal prey mostly arthropods, including caterpillars, grasshoppers (Orthoptera), boll weevils (*Anthonomus grandis*) and other beetles (Coleoptera), sometimes spiders (Araneae) and snails (Gastropoda). Nestling food largely or entirely animal, e.g. caterpillars, beetle larvae, grasshoppers. Few data on winter diet. Singly and in pairs; outside breeding season also in small groups, and frequently joins flocks of other granivorous birds. Forages mostly on or near ground, though higher up in breeding season.

Breeding. Nest-building from late Mar in SW, early May to mid-May elsewhere; usually two broods, occasionally three. Mostly monogamous, but polygyny not uncommon. Nest built entirely by female, starting within a few days of arrival on site and often complete in two days, a neat, deep, thin-walled cup c. 8 cm in external diameter, cup c. 5·5 cm across, made of grasses, fine weed stems and similar materials, occasionally incorporating artificial matter such as tissue paper, bound together by cobweb, sited 0·3–2·5 m up in low vegetation, rarely up to 15 m above ground. Clutch 3–4 eggs, sometimes 2 (rarely 5), pale bluish-white or greyish-white, quite heavily speckled (unusual for

genus) with russet or chestnut-brown; incubation by female alone, period 11–12 days; chicks fed only by female, nestling period 9 days; recently fledged young very poor flyers for first couple of days, attended mostly by female, sometimes (about a quarter of cases in one study) assisted by male; if female involved in a second brood, male may take exclusive charge of fledglings; parental care may extend to about three weeks after departure from nest. Nests quite frequently parasitized by Brown-headed (*Molothrus ater*) and Bronzed Cowbirds (*Molothrus aeneus*): W population co-evolved with cowbirds and has developed some defences, primarily by abandoning parasitized nests, e.g. in one Oklahoma study almost a third of nests parasitized but almost three-quarters of these were subsequently deserted; eggs of W population thicker-walled than those of E population, perhaps to prevent puncturing by cowbirds; relatively little information on E population, where parasitism rates seem to be lower.

Movements. Almost totally migratory; winters casually in extreme S Louisiana and SE Texas, otherwise breeding and wintering areas do not overlap. Nocturnal migrant. W population moves S from late Jul to Oct, substantially earlier than E one (moves from late Sept to late Oct, with smaller numbers into early Nov), this difference a result of different moult strategies: W birds move short distance into specific areas of S Arizona (irregularly) and Sonora, pausing to moult before continuing on to wintering grounds as far S as Panama; those from E seaboard complete moult on breeding grounds before proceeding, without interruption, to wintering grounds. Birds in S Florida strongly faithful to wintering areas. Both arrive back on breeding grounds in Apr, or early May in N parts of range, males usually on territory several days before females. Many extralimital records, in W from Oregon and Nevada S to California and S Baja California; farther E, N to Minnesota, Ontario, Quebec, Nova Scotia and Maine, two records from Bermuda, also vagrant to Hispaniola, Jamaica and Cayman Is. Many reports of vagrants are not acceptable owing to possibility of escaped cagebirds.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Classified as "Declining" in USA (Yellow WatchList priority species for conservation). Locally fairly common. Estimated global population c. 4,500,000 individuals. Some populations are shrinking, or have shrunk, at very significant rate, and overall general decline noted throughout range. Breeding Bird Survey data show statistically significant average decline of 3·2% annually (giving overall accumulated decline of 63·5%) during years 1966–1996 (based mainly on data from W populations in Texas and Oklahoma), this decline possibly slowing in more recent years; E population estimated to have declined 75% over same period. Declines probably attributable mainly to habitat loss, for example more aggressive suppression of brush along highway borders. The species appears unable to adapt to most golf courses, now a widespread potential habitat. For W populations, loss of riparian habitat in moult staging area is potentially damaging. Effect on E population of increased breeding range of Brown-headed Cowbirds is a further concern, although these populations appear to have retained or acquired some defence mechanisms against nest parasitism. Trapping for cagebird trade, both for domestic market and for export, still widespread in Mexico and Central America and may have significant effect on overall numbers. Recent studies in the Carolinas may indicate that decline there could be slowing.

Bibliography. Anon. (2004, 2010c), Beal *et al.* (1916), Brennan & Kuvlesky (2005), Butchart & Stattersfield (2004), Dhondt & Dhondt (2008), Fisk (1974), Forsythe (1974), Fuller (2010), Jones *et al.* (2005), Kopachena & Crist (2000a, 2000b), Land (1970), Lanyon & Thompson (1984, 1986), Lebbin *et al.* (2010), Lowther, Lanyon & Thompson (1999), (1999), McCarthy (2006), Monroe (1968), Parmalee (1959, 1964), Springborn & Meyers (2005), Sprunt (1968), Storer (1961), Strecker (1893), Taber (1968a), Taylor (1974), Taylor *et al.* (1989), Thompson, C.F. & Lanyon (1979), Thompson, C.W. (1991a, 1991b), Thompson, W.L. (1969, 1976), Whitehead *et al.* (2002).

41. Rose-bellied Bunting

Passerina rositae

French: Passerin à ventre rose **German**: Rosenbauchfink **Spanish**: Azulillo Ventrirrosado
Other common names: Rosita/Rosita's Bunting

Taxonomy. *Cyanospiza rositae* Lawrence, 1874, Cacoprieto, Isthmus of Tehuantepec, Mexico.
Genus sometimes placed in family Emberizidae. Monotypic.
Distribution. E Oaxaca (W to c. 97° W) and W Chiapas (E to c. 93° W), in S Mexico.



Descriptive notes. 13·5–14·5 cm; 19·5–20·5 g (Chiapas). Male is bright electric-blue above, purplish-blue on crown, becoming brighter on lower back and rump; lores dark, white eyering broken in front and behind (giving two crescents); shoulder bright blue, primaries and secondaries greyish-black with broad blue edgings (giving overall blue appearance to closed wing); rectrices bright blue with black shafts; chin greyish-white, throat and chest blue, reddish-pink mottling on chest becoming salmon-pink on belly and vent; flanks blue; iris dark brown; bill blackish above, pale greyish-blue below; legs lead-grey. Female has head and upperparts greyish-brown, sometimes with hint of bluish, becoming bluish on rump; wing feathers dull brown, buff-brown edging is less contrasting than on similar congeneric females, rectrices grey with bluish on outer webs; face grey-brown, pale broken eyering; buffy brown or pinkish-buff below, becoming warmer on throat to lower breast and paler on lower belly; bare parts as for male. Immature male has crown dull grey-black, bright deep indigo-blue feathers growing through as moult progresses, back grey-brown with bright blue patches, uppertail-coverts bright blue, chin whitish, throat, chest and belly rose-coloured, lower belly yellowish-buff; immature female similar to adult, but generally duller, with only faint blue on uppertail-coverts and rump, underparts dusky buff. Voice. Song a sweet, slightly burry warble; call note a wet "plik" or "plek".

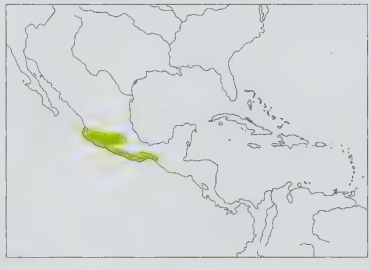
Habitat. Arid and semi-arid thorn-forest, denser parts of deciduous forest, also semi-humid deciduous gallery woodland, also swamp-forest; sometimes associated with pasture edge. At 180–800 m.
Food and Feeding. No information available on diet. Forages singly and in pairs. Occurs at lower to middle levels.
Breeding. Only two nests described, one with fresh eggs on 30th Jul and one with heavily incubated eggs on 29th Jun. Nest an open cup made from dead leaves, shredded bark and fine weed stems, lined with finer plant material, external diameter 10–12 cm, internal cup 4–5·5 cm, each in crotch of small sapling at height of 1·5 m and 4 m, respectively. Clutch 3 or 4 eggs, plain white or light bluish, spotted and blotched, especially at blunt end, with reddish-brown or lavender. No other information.
Movements. Largely sedentary; in some locations in Chiapas present in some months and less common or absent in others.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Isthmus of Tehuantepec EBA. Locally fairly common to common within its limited range. Global population estimated at fewer than 50,000 individuals. Possibly declining because of habitat degradation. Within overall indicated range, not all habitat is suitable for this species; for example, in La Sepultura Biosphere Reserve (Chiapas), less than 20% was found to be suitable. Notwithstanding its attractive plumage, does not appear to be threatened by trapping for cagebird trade.
Bibliography. Anon. (2010c, 2010f), Butchart & Stattersfield (2004), Carling & Brumfield (2008a), Crossin & Petite (1962), González-Ortega *et al.* (2002), Howell (1999), Howell & Webb (1995), Palomera-García *et al.* (1994), Stattersfield & Capper (2000), Wheatley & Brewer (2001).

42. Orange-breasted Bunting

Passerina leclancherii

French: Passerin arc-en-ciel **German**: Orangeblaufink **Spanish**: Azulillo Pechinaranja
Other common names: Leclancher's Bunting, Rainbow Bunting

Taxonomy. *Passerina leclancherii* Lafresnaye, 1840, Acapulco, Guerrero, Mexico.
Genus sometimes placed in family Emberizidae. This species reported as hybridizing with *P. cyanea* in captivity; reports of hybridization in wild apparently incorrect. Two subspecies recognized.
Subspecies and Distribution.
P. l. grandior Griscom, 1934 – W & SW Mexico from Colima, Michoacán and interior Guerrero E to S Puebla and S on Pacific slope of Oaxaca to SW Chiapas.
P. l. leclancherii Lafresnaye, 1840 – coastal C Guerrero, in SW Mexico.



Descriptive notes. 12·5 cm; 12–15·1 g. Male nominate race has crown bright apple-green, becoming bright turquoise-blue on nape and greener-tinged turquoise on upperparts; rump bright blue, shoulder bright blue, greater coverts and outer webs of flight-feathers dull blue-green with narrow bright blue fringes; rectrices dull blue with narrow paler bright blue edges; ear-coverts turquoise or light cerulean blue, eyering, lores and throat bright yellow, becoming richer and more orange on chest; belly and vent bright yellow; iris dark brown; bill blackish-grey above, greyer base below; legs greyish. Female is greenish-grey above, becoming more clear green on rump, more bluish uppertail-coverts and tail; eyering, lores and throat yellow, becoming more greyish-yellow or olive-yellow on chest and flanks; bare parts as for male. Immature male is similar to female, but brighter, with ear-coverts mostly turquoise, chest more orange, uppertail-coverts turquoise; immature female duller and greyer above than adult, duller yellow below, chest dusky yellow, little blue above; female (unlike that of congeners) exhibits delayed plumage maturation. Race *grandior* is identical to nominate in plumage, but significantly bigger. Voice. Song a sad, sweet warble, often slower and shorter than that of other members of genus. Call "chlik" or "tchik".
Habitat. Arid or semi-arid deciduous thorn-forest, field edges, scrubby pasture; in areas of high seasonality of rainfall. Sea-level to 1200 m, mostly below 900 m.
Food and Feeding. No published data on diet in the wild; captives will take apples, canary seed (*Phalaris canariensis*) and white millet seeds, ant pupae (Formicidae) and mealworms. Occurs in pairs and in small groups. Forages on or near ground, often along roadsides.
Breeding. Birds in breeding condition, mid-May to late May and in laying condition mid-Jun to late Jun; at higher altitudes, in breeding condition late Jul to early Aug. Nest a cup made from grasses, roots and dry leaves, lined with finer dry grasses, well hidden low down in bush or thick shrub. Clutch 3–4 eggs, bluish-white or greenish-white. No other information.
Movements. Largely resident. At certain locations in Chiapas present in some months and absent in others; e.g. in dry habitat present in Feb and absent Oct–Dec, while at more humid locations, not far distant, present in Jul–Aug and absent in May, Jun and Sept. One record in extreme S USA (S Texas), c. 1400 km N of normal breeding range, but possibility of captive origin cannot be totally excluded.
Status and Conservation. Not globally threatened. Fairly common in much of its range. In Chiapas, only a minor proportion of apparently suitable habitat is occupied by this species. Commonly caught as a cagebird; several hundred legally exported in 2000 and 2001, although this number diminished in 2002.
Bibliography. Armani (1983), Buffel (2007), Friedman *et al.* (1957), González-Ortega *et al.* (2002), Howell & Webb (1995), Hutto (1989), Novy & McGrew (1974), Rivera *et al.* (2008), Sánchez (2005), Soderberg (1963), Thompson & Leu (1995), Vega Rivera *et al.* (2008).

Class AVES

Order PASSERIFORMES

Suborder OSCINES

Family EMBERIZIDAE (BUNTINGS AND NEW WORLD SPARROWS)



- Tiny to medium-sized passerines with conical bill, many simply patterned in brown, black, grey, yellow and white, often streaked brown or grey, some more colourful and/or strikingly marked.
- 8·5–24 cm.



- Holarctic, Neotropical, Afrotropical and Oriental Regions.
- Open and semi-open habitats, especially grassland; also woodland and forest edge.
- 76 genera, 326 species, 887 taxa.
- 36 species threatened; at least 3 subspecies extinct since 1600.

Systematics

The buntings and the New World sparrows form a large assemblage of passerines with a geographical range that covers most of the world. They are absent only from the Australasian Region and Oceania. As currently constituted, the family Emberizidae contains more than 300 species, 326 in the present treatment, but it seems highly likely, on the basis of recent molecular-genetic research, that several genera do not really belong in this family.

Although the family has a wide distribution, the majority of its members, more than 80%, are found in the New World, and it is in this part of the world that most of the generic diversification has occurred. They are closely related to a larger group, commonly referred to collectively as the "New World nine-primaried oscine passerines", a not entirely accurate designation because some species are not exclusively New World taxa, and some other oscine groups that have only nine primary wing feathers are not placed in this group.

The New World nine-primaried oscines are generally divided into as many as seven families, and most of the species seem to fall within one or other of these. The families include the New World warblers (Parulidae), with 116 species; the tanagers (Thraupidae), containing 283 species in the present treatment; the cardinals (Cardinalidae) with 42 species; the New World blackbirds (Icteridae), containing 111 species; and the present family, Emberizidae, with more than 300 species. Some authors recognize Coerebidae, with the Bananaquit (*Coereba flaveola*) usually as its the sole member, and recently some separate the longspurs and snow buntings as the family Calcariidae, with a total of six species. In the present arrangement, the Bananaquit is included within the tanager family, while the longspurs and snow buntings are incorporated within Emberizidae. With the exception of Emberizidae (including Calcariidae), all of these families normally occur only in the New World. Collectively, they contain nearly 880 species, some 8% of the world total. The Olive Warbler (*Peucedramus taeniatus*), which has generally been accorded its own monotypic family, Peucedramidae, has sometimes been placed with the above families because it resembles a New World warbler, but it appears not to be closely allied to them. Indeed, molecular analysis carried out by K. A. Jønsson and J. Fjeldså suggested that *Peucedramus* is allied to the Eurasian accentors (Prunellidae).

Most authors now recognize five or six basic groups of taxa, the Bananaquit being probably best placed with the tanagers, rather than in a monotypic family. They differ, however, in their hierarchical classifications, some recognizing most or all of the aforementioned families as subfamilies within a greatly expanded Emberizidae. For example, E. C. Dickinson, in the revised and enlarged third edition of *The Howard and Moore Complete Checklist of the Birds of the World*, published in 2003, treats the groups as separate families, as also does the *AOU Check-list of North American birds*. C. E. Hellmayr, in the first half of the twentieth



The three longspur species in the genus Calcarius *are not closely related to other members of Emberizidae. Together with McCown's Longspur* (Rhynchophanes mccownii) *and the Snow Bunting* (Plectrophenax nivalis) *and McKay's Bunting* (P. hyperboreus), *they are sometimes placed in a new family, Calcariidae. Smith's Longspur* (Calcarius pictus) *and the* ***Chestnut-collared Longspur*** *are exclusively North American in their distribution, but the Lapland Longspur* (C. lapponicus) *breeds throughout the arctic and subarctic regions of North America, Europe and Asia. Longspurs are named after their elongated hind claw.*

[*Calcarius ornatus*, Saskatchewan, Canada. Photo: Glenn Bartley]



*The **Snow Bunting** is a large emberizid with a large conical bill and relatively short, notched tail. The wings are pointed and relatively long, which is typical of emberizids that migrate long distances or live in windy environments. The three* Calcarius *longspurs include two species with long, pointed wings and one with shorter and more rounded wings. Snow Buntings are sexually dimorphic both in their breeding plumage and in size, the female being smaller. Geographical variation in Snow Buntings is not well understood and is complicated by a high degree of individual variation.*

[*Plectrophenax nivalis nivalis*, Helsinki, Finland. Photo: Markus Varesvuo]

century, treated the cardinals, Darwin's finches of the Galapagos Islands, the cardueline finches, and the New World sparrows and buntings as subfamilies in the family Fringillidae, whereas C. G. Sibley and B. L. Monroe, in 1990, considered them to be distinct tribes within the subfamily Emberizinae. Shortly thereafter, S. Cramp and C. M. Perrins, in the *Handbook of the Birds of Europe, the Middle East* and *North Africa*, listed Parulidae, Thraupidae and Icteridae as three separate families, and split the Emberizidae into the subfamilies Emberizinae and Cardinalinae.

Although these basic groups are generally recognized by all taxonomists, there are many species that appear to be borderline cases. As a result, a relatively large number are considered to be *incertae sedis*, of uncertain position, this no doubt reflecting the close similarity among the species of nine-primaried oscines. As more information is gathered and more knowledge gained, especially through molecular biology, it is certain that substantial changes in the higher-level classification will continue to be made.

Over the past century, much information has been gathered by ornithologists with regard to the affinities of these nine-primaried oscines. Although explicit criteria for classification usually were not stated, traditional taxonomies were doubtless based on external morphology, especially bill configuration: buntings and New World sparrows generally have a conical bill that can be used for cracking and milling seeds. Characters associated with feeding, however, seem to be evolutionarily malleable, and subject to convergence. We have learnt that many species with bills that are well suited for seed-eating, or, for that matter, for nectarivory or fruit-eating, have apparently evolved independently in groups that are otherwise not particularly closely related; bill morphology alone, therefore, does not necessarily predict similarities based on other features. In other words, many bird species with a conical bill like that of a New World sparrow are not particularly closely related to the Emberizidae. Some studies have concentrated on various anatomical and physiological features. In particular, W. J. Beecher studied comparative jaw musculature; D. Mainardi, C. G. Sibley and W. Stallcup examined pelvic musculature and serology; J. Robins, G. Schnell, J. D. Rising, J. D. Webster and J. R. Webster undertook multivariate analyses of skeletal measurements; H. B. Tordoff investigated cranial and palatal characters; and R. Raikow studied appendicular myology.

All of this research has generally supported the recognition of the Emberizidae as a natural group which, if not monophyletic, is at least paraphyletic, but it has yielded few characteristics that have supported a constant classification.

Ongoing molecular analyses are contributing significantly to an understanding of the relationships among these nine-primaried oscine species. In 2006, for example, Jønsson and Fjeldså compared results from 99 different molecular analyses of sparrow-like birds and provided a useful summary. More recently, analyses of mitochondrial DNA by J. M. DaCosta and colleagues, added to earlier work, clarified the relationships of the species within the genera *Aimophila* and *Pipilo*, supporting the contention that these genera are, as delimited in earlier taxonomies, polyphyletic. Again, these studies corroborate the conclusions of the many ornithologists who had previously based their analyses on morphology, breeding biology, ecology and behaviour.

Modern molecular-genetic research has strongly indicated that several genera placed in the present family Emberizidae almost certainly do not belong there. The monotypic genus *Euneornis*, formerly placed in Coerebidae, a family no longer recognized, and currently included in Emberizidae, may well be closest to the tanagers in the family Thraupidae. Similarly, several other Caribbean genera, namely *Loxipasser*, *Melopyrrha*, *Loxigilla* and *Melanospiza*, are probably better included within Thraupidae, as also are the Galapagos genera *Certhidea*, *Platyspiza*, *Camarhynchus* and *Geospiza*. In fact, these modern molecular-genetic studies suggest that 19 other genera currently in Emberizidae are more closely related to members of the tanager family. These are the *Tiaris* grassquits, the high-Andean and Patagonian *Phrygilus* and *Diuca*, *Haplospiza*, the *Poospiza* mountain-finches of the high Andes, *Sicalis* yellow-finches, *Embernagra* pampa-finches, the monotypic grassquit genus *Volatinia*, the *Sporophila* seedeaters and *Oryzoborus* seed-finches, the *Catamenia* seedeaters of the high Andes, the Central American *Acanthidops*, the Argentine *Saltatricula*, the *Coryphospingus* and *Rhodospingus* finches, the *Paroaria* cardinals, and the three monotypic genera *Porphyrospiza*, *Charitospiza* and *Gubernatrix*.

The Snow Bunting (*Plectrophenax nivalis*) and the Lapland Longspur (*Calcarius lapponicus*) are Holarctic in distribution, but probably of New World origin. In North America there are two species of *Plectrophenax*, one of which, McKay's Bunting (*Plectrophenax hyperboreus*), breeds only on a few islands in the Bering Sea, and is perhaps better treated as a well-marked race of the Snow Bunting. Of the four species of longspur, only the Lapland Longspur has an Holarctic distribution, the other





All except four of the 35 Eurasian emberizid species are, at present, placed in the genus Emberiza. *The* ***Yellow-throated Bunting****'s permanently erect crest is unusual; most emberizids with a crest raise this only when excited or displaying. The* ***House Bunting*** *is more typical of* Emberiza *(and, with its rather plain plumage, easily confused with three other* Emberiza *species in its range), though smaller and slighter than many of its congeners.*

[Left: *Emberiza elegans elegantula*, Sichuan, China. Photo: Zhou Huaming.

Right: *Emberiza sahari*, Oued Massa, Morocco. Photo: Mathias Schäf]

three being exclusively North American. The Lapland Longspur, until fairly recently considered an *Emberiza* in Europe, has a circumpolar distribution, breeding throughout arctic and subarctic regions; Smith's Longspur (*Calcarius pictus*) breeds in northern Canada and central Alaska, and McCown's Longspur (*Rhynchophanes mccownii*) and the Chestnut-collared Longspur (*Calcarius ornatus*) breed in the northern Great Plains. Molecular studies undertaken by R. Carson and G. Spicer, T. Yuri and D. Mindell, Jønsson and Fjeldså, J. Klicka and co-workers, and P. Alström and colleagues suggest that these six species are not closely related to other members of Emberizidae, and may, in fact, be basal to many of the other New World nine-primaried oscines. Some taxonomists nowadays place them in a new family, Calcariidae. While such treatment may prove to be preferable, the present treatment includes these "calcariid" genera in Emberizidae, as has been the traditional arrangement. Indeed, in terms of their biology and in various other aspects, they are very similar to the emberizids.

Of the 326 species in the Emberizidae as currently constituted, 35 are found in Eurasia. All except four of these are, at present, placed in the genus *Emberiza*. The exceptions are the Lapland Longspur and Snow Bunting, both found across the Holarctic; the Crested Bunting (*Melophus lathami*), resident in southern Asia from the Indian Subcontinent eastwards to south-east China; and the Slaty Bunting (*Latoucheornis siemsseni*), restricted to central and eastern China. The Corn Bunting (*Emberiza calandra*) of Europe and western Asia was for a while generally placed in the monotypic genus *Miliaria*, but in recent years it has been returned to *Emberiza*, in which it had previously been included.

All nine African members of the family are included in the genus *Emberiza*. In the South Atlantic, the Gough Finch (*Rowettia goughensis*) is confined to the island of that name in the Tristan da Cunha group, and the three species of *Nesospiza* are likewise found only in that group of islands, the Inaccessible Finch (*Nesospiza acunhae*), the Nightingale Finch (*Nesospiza questi*) and Wilkins's Finch (*Nesospiza wilkinsi*) being restricted to, respectively, Inaccessible Island, Nightingale Island and some of its offshore islets, and Nightingale Island alone; the three are sometimes treated as conspecific. All of these Tristan species are probably derived from South American emberizids. The Gough Finch, for example, closely resembles the Canary-winged Finch (*Melanodera melanodera*) of the Falkland Islands, and there are strong prevailing westerly winds at that latitude. The genus *Emberiza* is not represented in the Americas, except in the form of rare migrants and vagrants from the north-east Palearctic Region. No species of Emberizidae is native to the Australasian Region.

The sparrows inhabiting the northern temperate region of America have often been divided into two general groups, the grassland sparrows and the brushland sparrows. This separation, while based on ecological and behavioural characteristics, seems also, in general, to separate groups of closely related species, although several genera are not easily placed in either category. The grassland clade has been thought to include *Passerculus*, *Ammodramus* and, perhaps, *Xenospiza*. Of these, *Passerculus*, the savannah-sparrow complex, has often been subsumed in *Ammodramus*, but molecular data do not support this treatment. Similarly, the monotypic *Xenospiza*, containing the Sierra Madre Sparrow (*Xenospiza baileyi*), has been placed in *Ammodramus*, but this has been questioned for several reasons. F. A. Pitelka, for example, argued that the similarities of *Xenospiza* to *Ammodramus* were superficial, and that, in general size and proportions, the Sierra Madre Sparrow was more like Lincoln's Sparrow (*Melospiza lincolnii*). Klicka and G. M. Spellman's molecular data separate *Ammodramus* into two groups, a grassland group and a marshland group. The former included the savannah-sparrow complex, currently in *Passerculus*, and Baird's Sparrow (*Ammodramus bairdii*), the Grasshopper Sparrow (*Ammodramus savannarum*), the Grassland Sparrow (*Ammodramus humeralis*) and the Yellow-browed Sparrow (*Ammodramus aurifrons*). The marshland group incorporated the Seaside (*Ammodramus maritimus*), Nelson's (*Ammodramus nelsoni*), Saltmarsh (*Ammodramus caudacutus*), Le Conte's (*Ammodramus leconteii*) and Henslow's Sparrows (*Ammodramus henslowii*), and perhaps also the Sierra Madre Sparrow. Robins and Schnell's multivariate analysis of 48 skeletal characters of selected species of grassland sparrow more or less supports this separation, placing the Grassland, Grasshopper and Baird's Sparrows and the savannah-sparrow complex in one group, and Le Conte's, Saltmarsh and Seaside Sparrows in another; *Xenospiza* is in the former group, but does not cluster closely with it, and Henslow's Sparrow is with the latter, but again is not closely clustered with it. Within the grassland assemblage, the Grassland Sparrow and the Yellow-



The "Fox Sparrow" was formerly treated as a single, highly variable species. The 18 recognized races were divided into four groups according to plumage, bill morphology and breeding distribution: red (iliaca), *sooty* (unalaschcensis), *thick-billed* (megarhyncha) *and slate-colored* (schistacea). *Mitochondrial DNA analysis provided support for the four groups to be recognized as species, which is the treatment followed here. The race* zaboria *of the* ***Red Fox-sparrow*** *(shown here) is more faintly streaked than the nominate, but plumage varies gradually over distance, and many individuals cannot safely be assigned to either race.*

[*Passerella iliaca zaboria*, British Columbia, Canada. Photo: Glenn Bartley]

browed Sparrow occur only in South America, and have sometimes been put into a separate genus, *Myospiza*.

From recent molecular studies, including that by Klicka and Spellman, and others, it appears that Henslow's Sparrow and Baird's Sparrow are sister-species, and Le Conte's Sparrow, the Saltmarsh Sparrow, Nelson's Sparrow and the Seaside Sparrow form a monophyletic clade. Traditionally, the savannah-sparrow complex, the Grassland Sparrow and the Yellow-browed Sparrow have been thought to be closely related to Henslow's and Baird's Sparrows, but the molecular data available do not support this. Klicka and Spellman, however, found that the Sierra Madre Sparrow clusters with the three species of *Melospiza*, namely the Swamp Sparrow (*Melospiza georgiana*), Lincoln's Sparrow and the Song Sparrow (*Melospiza melodia*), which have traditionally been placed with the brushland sparrows, and these, in turn, cluster with Henslow's Sparrow, Baird's Sparrow and the savannah-sparrow complex. Their analyses also support the placement of the Vesper Sparrow (*Pooecetes gramineus*) and Bell's Sparrow



Recent molecular-genetic studies suggest that the genus Junco *spread quickly north from Central America in the post-glacial period. The farther south in Central America, the older is the lineage. The southernmost, and the largest of the three species, is the monotypic* ***Volcano Junco****. Its closest relative is the southern race* alticola *of the Yellow-eyed Junco* (Junco phaeonotus). *Northern populations of Yellow-eyed Junco are, in turn, very close genetically and morphologically to southern races of the Dark-eyed Junco* (J. hyemalis). *The 16 races of the Dark-eyed Junco vary in size, plumage and bill colour and form six groups, which are sometimes treated as six separate species.*

[*Junco vulcani*, Irazú Volcano National Park, Costa Rica. Photo: Boris Nikolov]



The sparrows inhabiting the northern temperate region of America have often been divided into two general groups, the grassland sparrows, to which Ammodramus *belongs, and the brushland sparrows. Molecular data have been used to separate* Ammodramus *into two further groups, a grassland group and a marshland group, the latter containing the* ***Seaside Sparrow*** *along with Nelson's* (Ammodramus nelsoni), *Saltmarsh* (A. caudacutus), *Le Conte's* (A. leconteii) *and Henslow's Sparrows* (A. henslowii). *Seven extant races of Seaside Sparrow are recognized. Two races, including the very distinctive "Dusky Seaside Sparrow"* (nigrescens), *are extinct.*

[*Ammodramus maritimus fisheri*,
Brazoria, Texas, USA.
Photo: Brian E. Small]

(*Artemisiospiza belli*), but not the Black-throated Sparrow (*Amphispiza bilineata*), and the monotypic Striped Sparrow (*Oriturus superciliosus*) appears to belong in this group. Recent work shows that the Five-striped Sparrow (*Amphispiza quinquestriata*), formerly included in the genus *Aimophila*, is best placed in *Amphispiza*, close to the Black-throated Sparrow.

What was formerly a large genus, *Aimophila*, has recently been split into several smaller genera. Its greatest species richness was in Mexico and Central America, a few species reaching the southern USA, and with two found only in South America. Research by L. Wolf, however, indicated that *Aimophila* was not monophyletic, and that its species should be separated into three or four groups that probably have separate evolutionary histories and are not particularly closely related to each other. This has recently been supported by the genetic work of DaCosta and co-workers, and their results have been widely accepted by the ornithological community. Two groups of species are now placed in the genus *Peucaea:* the Cinnamon-tailed (*Peucaea sumichrasti*), Rufous-winged (*Peucaea carpalis*), Stripe-headed (*Peucaea ruficauda*), Black-chested (*Peucaea humeralis*) and Bridled Sparrows (*Peucaea mystacalis*); and Cassin's (*Peucaea cassinii*), Bachman's (*Peucaea aestivalis*) and Botteri's Sparrows (*Peucaea botterii*). These all occur in grassland, often xeric, and among xeric shrubs, and in pine (*Pinus*) savanna in Mexico and the southern USA. The first group, the Cinnamon-tailed, Rufous-winged, Stripe-headed, Black-chested and Bridled Sparrows, probably radiated in the lowland thorn-forests of Mexico and the Pacific lowlands of Central America. The third group contains the Rufous-crowned (*Aimophila ruficeps*), Rusty (*Aimophila rufescens*) and Oaxaca Sparrows (*Aimophila notosticta*), which appear to have radiated in the pine–oak (*Pinus–Quercus*) woodlands of Mexico and Central America; these remain in the genus *Aimophila*, the type species of which is *Aimophila rufescens*. As mentioned above, the Five-striped Sparrow, often placed in *Aimophila*, is now included with the Black-throated Sparrow in *Amphispiza*, and this genus appears to be closely allied to *Chondestes* and *Calamospiza*.

Recent genetic data published by DaCosta and colleagues showed that the relationships among some of the North American genera were not properly reflected in the linear sequence of earlier lists. For example, the towhee genus *Pipilo* was diphyletic. Four species, the Collared (*Pipilo ocai*), Green-tailed (*Pipilo chlorurus*), Spotted (*Pipilo maculatus*) and Eastern Towhees (*Pipilo erythrophthalmus*), should follow *Atlapetes* in the sequence, with the three *Aimophila* species, the Rufous-crowned, Rusty and Oaxaca Sparrows, coming next. The four species of "brown towhee", namely the Canyon (*Pyrgisoma fuscum*), White-throated (*Pyrgisoma albicolle*), California (*Pyrgisoma crissale*) and Abert's Towhees (*Pyrgisoma aberti*), are now placed in the



In keeping with their largely terrestrial lifestyles, the New World sparrows are generally brownish or rusty in colour. Many, including the ***Lark Sparrow****, have a boldly marked head pattern. The tail pattern of the Lark Sparrow is also very distinctive, the outermost pair of rectrices being edged with white, and the other outer rectrices boldly white-tipped. The sexes are similar in coloration, although the female is somewhat smaller. The Lark Sparrow occupies the monotypic genus* Chondestes. *It appears closest to the Lark Bunting* (Calamospiza melanocorys) *and the Five-striped* (Amphispiza quinquestriata) *and Black-throated Sparrows* (A. bilineata).

[*Chondestes grammacus strigatus*,
Alberta, Canada.
Photo: Glenn Bartley]

genus *Pyrgisoma* along with the Rusty-crowned Ground-sparrow (*Pyrgisoma kieneri*), which was formerly placed with the two other ground-sparrows in the genus *Melozone*. The summary analyses of Jønsson and Fjeldså suggest that the *Chlorospingus* bush-tanagers, conventionally classified with the tanagers in Thraupidae, belong in this group.

The grassquits in the genera *Volatinia* and *Tiaris*, the seedeaters in *Sporophila*, the seed-finches in *Oryzoborus*, the grass-finches in *Emberizoides*, and their allies form a widespread and diverse group of small, seed-eating Neotropical nine-primaried oscines. Although they have often been included within Emberizidae, Sibley and Monroe placed them with the tanagers in Thraupidae, and this treatment is supported by the molecular-genetic studies of Jønsson and Fjeldså. The Caribbean bullfinches (*Loxigilla*, *Melopyrrha*), the Yellow-shouldered Grassquit (*Loxipasser anoxanthus*), the Orangequit (*Euneornis campestris*) and the St Lucia Black Finch (*Melanospiza richardsoni*) are part of this group, as probably are the Galapagos finches in the genera *Geospiza* and *Camarhynchus*. These molecular data also indicate that the South American cardinals (*Paroaria*), flowerpiercers (*Diglossa*), sierra-finches (*Phrygilus*) and warbling-finches (*Poospiza*) should all be placed in the tanager family.

Unsurprisingly, a number of taxonomic problems at the species level remain to be resolved. For example, in the genus *Sporophila*, the second largest in the family after *Emberiza*, some authors recognize a species *Sporophila melanops*, given the English vernacular name of the "Hooded Seedeater". Indeed, this is even listed "officially" as a Critically Endangered emberizid. It is known only from a single specimen, an adult male taken in October 1823 on the western border of Goiás, in Brazil; the precise locality was a lake 15 km north of Registro do Araguaia, on the east bank of the Araguaia River. This seedeater has not been found again, even with the advantages of modern technology and methods. Searches carried out along the floodplain of the Araguaia, most recently in December 2008 and January 2009 and, again, in July 2010, failed to produce any sightings. Although the Hooded Seedeater is included in a number of checklists and other authoritative works, it is considered likely that it was, in fact, a variant of the Yellow-bellied Seedeater (*Sporophila nigricollis*) or perhaps a hybrid between it and another member of this genus. Another seedeater of uncertain standing is the "Tumaco Seedeater", described as *Sporophila insulata* and known only from the island of Tumaco, a short distance off the coast of the south-west Colombian province of Nariño. It has a rufous rump and rufous underparts, but is otherwise more or less identical to the Chestnut-throated Seedeater (*Sporophila telasco*), which is resident on the Pacific coast and coastal slope from south-west Colombia southwards through the coastal lowlands to the desert valleys of northernmost Chile. The Tumaco population, which may well be extinct, is thought to be a subspecies or a variant of the Chestnut-throated Seedeater or, perhaps less likely, a hybrid between the latter and the Ruddy-breasted Seedeater (*Sporophila minuta*).

A further example from this problematic genus involves the form described as *Sporophila zelichi*, known as "Narosky's Seedeater" or the "Entre Ríos Seedeater", the latter name denoting the region of north-east Argentina from where the bird was initially described, in 1977. Narosky's Seedeater is still poorly known. It differs from the Marsh Seedeater (*Sporophila palustris*) only in its possession of a broad white nuchal collar, and is indistinguishable from the latter in its vocalizations and habitat choice; the two can even be found at the same localities. The form "*zelichi*" is considered to be a white-necked morph of the Marsh Seedeater or just possibly a hybrid between it and the Chestnut Seedeater (*Sporophila cinnamomea*).

Hybridization is probably not uncommon among the emberizids. Indeed, the Yellowhammer (*Emberiza citrinella*) and the Pine Bunting (*Emberiza leucocephalos*) regularly interbreed in a fairly extensive area of western and central Siberia, and there are many examples of occasional hybridization involving other members of the family. Among Darwin's finches in the Galapagos Islands, the Medium Ground-finch (*Geospiza fortis*) interbreeds rarely with the Small Ground-finch (*Geospiza fuliginosa*), and the resultant hybrids tend to have low fitness. On the island of

Until recently, the ***Sage Sparrow*** *and Bell's Sparrow* (Artemisiospiza belli) *were placed in the "brushland" sparrow genus* Amphispiza, *but recent molecular work indicates that the two are, instead, members of a well-resolved clade of "grassland" sparrows. They are, however, found in sagebrush, chaparral and other scrub habitats. Bell's and Sage Sparrows were formerly considered conspecific, the Sage Sparrow differing mainly in its larger size, paler coloration and more obvious streaking above. The race* canescens *of Bell's Sparrow, which is very similar to the Sage Sparrow and possibly hybridizes with it where the ranges meet, may be a separate species.*

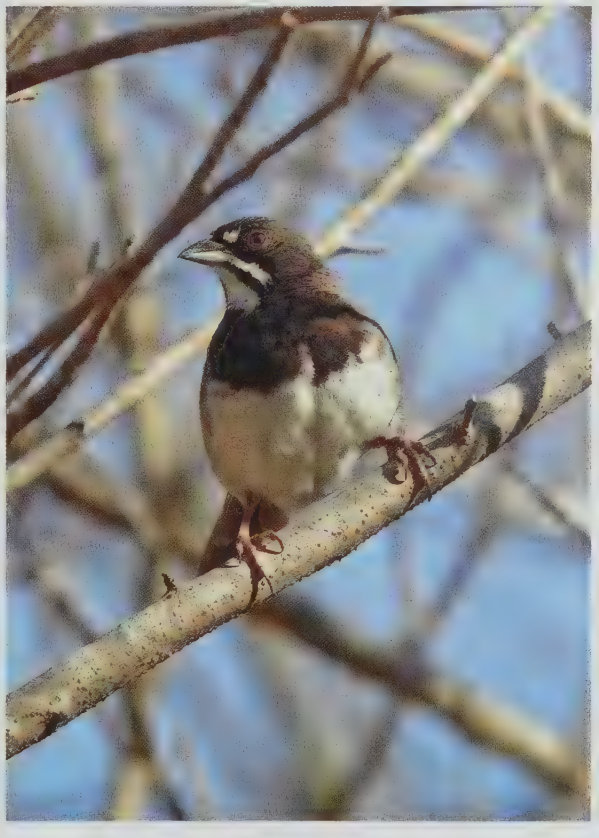
[*Artemisiospiza nevadensis nevadensis*, Mono County, California, USA. Photo: Brian E. Small]



Daphne Mayor, however, following the 1982–1983 El Niño event and the accompanying huge rainfall, these smaller-billed hybrids had elevated fitness as a result of the subsequent superabundance of small seeds on the island (see also Morphological Aspects). Similarly, hybridization between the Medium Ground-finch and the Common Cactus-finch (*Geospiza scandens*) is rare and hybrids have low fitness, but the latter's fitness was again greater after the El Niño event. It is thought that large-scale hybridiza-

The ***Black-chested Sparrow*** *is a restricted-range species from Mexico. Two of its closest relatives are also Mexican endemics with restricted ranges. The* Peucaea *species were formerly included in* Aimophila, *a large genus of mostly Mexican and Central American sparrows of arid tropical scrub-forest and thorn-forest habitats. The* Aimophila *species were morphologically and vocally diverse, and held by many to constitute an "unnatural assemblage". Genetic data subsequently indicated that* Aimophila *included four distinct lineages. The resurrected genus* Peucaea *includes eight species.*

[*Peucaea humeralis astica*, Colima, Mexico. Photo: Pete Morris]





The Neotropical sparrow genus Arremon *includes more than 20 medium-sized, robustly built, predominantly greenish and relatively colourful species. The* ***Golden-winged Sparrow*** *is a stocky and pot-bellied, long-billed and short-tailed sparrow, one of a group of five similar species that may form a superspecies. Two former genera,* Lysurus *and* Buarremon, *were merged with* Arremon *in 2008. The eight taxa forming the "White-browed Brush-finch complex" (formerly* Buarremon torquatus*) were subsequently proposed as representing eight distinct species, a treatment followed here.*

[*Arremon schlegeli schlegeli*, Santa Marta, Colombia. Photo: Pete Morris]

tion between the Medium Ground-finch and the Large Ground-finch (*Geospiza magnirostris*) has occurred on Santa Cruz, where the former species is noticeably larger-billed than are its populations on other islands in the archipelago.

Several intriguing taxonomic problems require full investigation. As just one example, in Argentina, a form of yellow-finch breeding in the Sierra de la Ventana, in Buenos Aires, was originally identified as the Patagonian Yellow-finch (*Sicalis lebruni*), but it was then reidentified as an isolated form of the Greater Yellow-finch (*Sicalis auriventris*). However, quite apart from its notable geographical separation from the otherwise known ranges of both of these species, the big problem is that its nesting behaviour is quite different from both of theirs. Its cup-nest, built from dry grasses and with a finer lining, is placed approximately 36 cm up in tussock paspalum grass (*Paspalum quadrifarium*); in this it lays four whitish eggs, with darker markings concentrated at the wide end, which it incubates for twelve days, and the young take at least ten days to fledge. The nest-site is very different from those of both of the species in which it has been tentatively placed, and clutch size and egg coloration are also different from those of the Greater Yellow-finch. It could be that an as-yet-undescribed species is involved.

Morphological Aspects

Buntings and New World sparrows are tiny to medium-sized songbirds, ranging in mass from about 6 g to almost 70 g, and in length from about 8·5 cm to 25 cm. As a group, the smallest emberizids are the grassquits and seedeaters, 6–15·5 g in weight and 8·5–12 cm in length. The Yellow-bellied Seedeater, for instance, has a length of 8·5–10·3 cm and weighs 8·5–11·2 g, the Ruddy-breasted Seedeater measures 8·6–9·6 cm and weighs 7–9 g, and the corresponding figures for the Blue-black Grassquit (*Volatinia jacarina*) are 8·7–10·9 cm and 8–12 g. Sparrows in the genus *Spizella* are among the smallest of the New World sparrows, generally being 10–15 g in weight and 11–14 cm in length. The largest of the sparrows are the towhees: the California Towhee is 21–24 cm in length and weighs about 33–67 g. Weight data are, of course, of limited value in expressing size, because many individuals, prior to migration, deposit large quantities of fat, sometimes even doubling their usual body mass. In addition, the body mass of a females during the laying period varies considerably and on a daily basis.

Many species exhibit geographical variation in size. Song Sparrows, for example, provide a striking example of this. Wing lengths of males of the subspecies *maxima* and *sanaka*, from the Aleutian Islands, in Alaska, range from 82 mm to 87 mm, females being slightly smaller, 78–85 mm, whereas, at the other



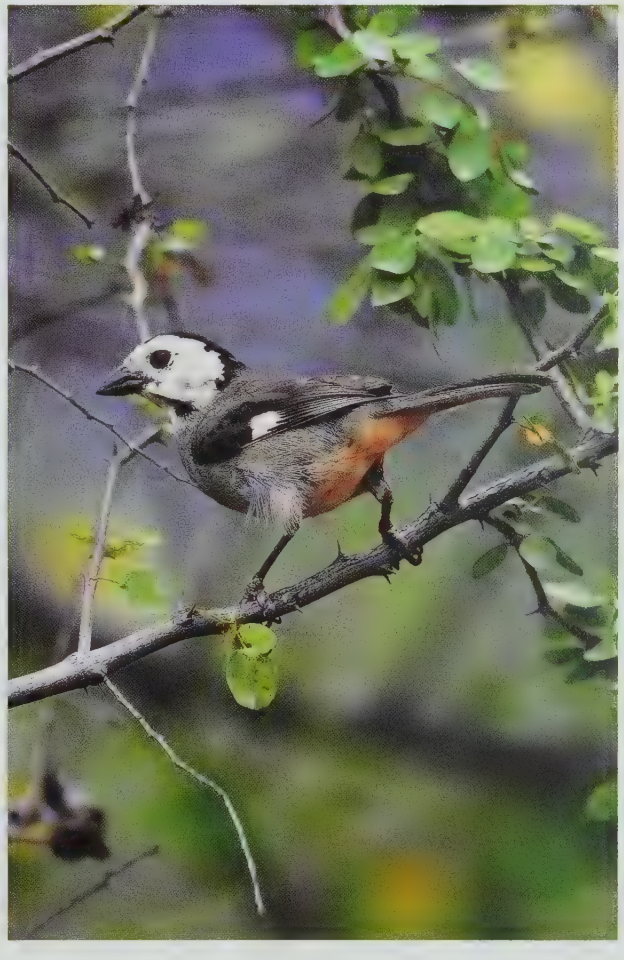
The ground-foraging ***Large-footed Finch*** *uses its large feet and powerful legs to scratch in soil and leaf litter. The simultaneous use of both feet, bilateral or double scratching, is widespread among the Emberizidae, but especially well developed in this species. The Large-footed Finch is the only species in the genus* Pezopetes, *but is sometimes included in the brush-finch genus* Atlapetes. *It typically lays only one egg, which is unusual for the family in general and for mainland emberizids in particular.*

[*Pezopetes capitalis*, San Gerardo, Costa Rica. Photo: Theodoulos Poullis]









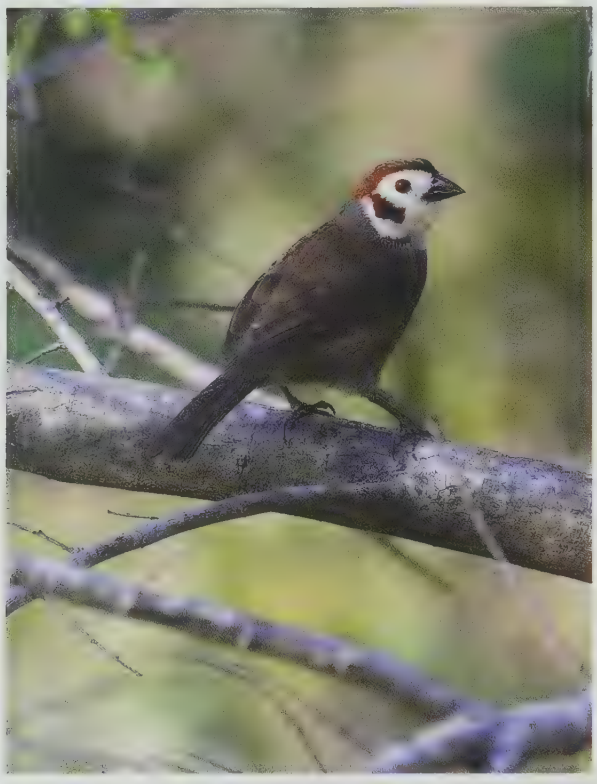
The brush-finches of the genus Atlapetes *have their greatest diversity in the Andes. Forms with different colours may replace each other sharply at different altitudes on the same slopes, or in similar habitats on different slopes. In older classifications, grey species such as the* ***Slaty Brush-finch*** *and yellow-and-green species such as the* ***Bolivian Brush-finch*** *were placed in different groups, and similarly coloured populations replacing each other in corresponding ecological zones on different slopes were ranked as subspecies of the same species. Mitochondrial DNA sequence data indicate that traditional groupings based on plumage colours did not follow evolutionary trajectories in the genus, and also that many forms currently ranked as subspecies are genetically more divergent than sympatric species. The restricted-range* ***Santa Marta Brush-finch*** *is the only* Atlapetes *species in the Santa Marta Mountains of Colombia, but the Tumbesian endemic* ***White-winged Brush-finch*** *is found in mixed flocks with other brush-finches.*

[Top left: *Atlapetes schistaceus schistaceus*, Chicaque, Colombia. Photo: Jussi Vakkala.

Top right: *Atlapetes rufinucha rufinucha*, Carrasco National Park, Cochabamba, Bolivia. Photo: Daniel Alarcón.

Bottom left: *Atlapetes melanocephalus*, El Dorado Bird Reserve, Colombia. Photo: Ketil Knudsen.

Bottom right: *Atlapetes albiceps*, Chaparri Ecological Reserve, Tumbes, Peru. Photo: Heinz Plenge]



extreme, males of the subspecies *samuelis*, from San Francisco Bay, in California, range from 56 mm to 64 mm and females from 56 mm to 60 mm.

Individuals living on islands commonly have a larger average body size than those from nearby mainland populations. For example, Savannah Sparrows (*Passerculus sandwichensis*) of the subspecies *princeps*, from Sable Island, in Nova Scotia, have wing lengths of 73·3–83·4 mm, whereas those from Kuujjuaq, in north mainland Quebec, have wing lengths of 66·9–72·7 mm. Similarly, Savannah Sparrows from Umnak Island, in the Aleutian Islands, have wing lengths measuring 73·4–78·3 mm, whereas those from Wasilla, on the Alaskan mainland, range from 68·8 mm to 76·8 mm.

Wing shape varies both among species and, geographically, within species. Generally, individuals that migrate long distances, or live in windy environments, have relatively pointed wings, as illustrated by, among others, the longspurs and the snow buntings, whereas those that are resident or migrate only short distances have more rounded wings. Within the genus *Calcarius*, the Lapland and Smith's Longspurs, which breed in the north and, in North America, winter in the southern Great Plains, have pointed wings, whereas the Chestnut-collared Longspur, which breeds in the prairies of southern Canada and the northern USA and winters in the southern Plains and northern Mexico, has shorter and more rounded wings. McCown's Longspur, in the monotypic genus *Rhynchophanes*, which has a range similar to that of the Chestnut-collared Longspur, has a wing shape intermediate between the extremes found in *Calcarius*.

Emberizids have twelve rectrices. There is some variation in the tail shape, but most species have a rather short tail that is either rounded or slightly notched, but not forked. Some members of the family, such as Le Conte's, Grasshopper, Nelson's and Saltmarsh Sparrows, have a short tail with pointed rectrices, this group hence being known collectively as "sharp-tailed sparrows". Towhees, on the other hand, have a long tail with more evenly round-ended rectrices.

Bill shape is variable, both among and within species, but emberizids generally have a bill that is conical in shape and appears to be adapted to foraging for seeds, which these species, indeed, commonly do. The upper and lower mandibles of most of the species are sharply angled downwards at the base, this being especially marked in the Old World genus *Emberiza*; corresponding with a variably developed protuberance at the base of the horny palate is a recess in the lower mandible, which, towards the base, is often much deeper than the upper mandible. Rictal bristles are generally lacking, although some species have a few. The *Atlapetes* brush-finches have a medium-sized to rather

The genus Melozone *includes two large ground-feeding sparrows with dull olive upperparts, paler underparts and a striking head pattern.* ***Prevost's Ground-sparrow*** *was formerly considered close to, and sometimes conspecific with, the Rusty-crowned Ground-sparrow* (Pyrgisoma kieneri), *but differs in both adult and juvenile plumages. The second member of* Melozone, *the White-eared Ground-sparrow* (Melozone leucotis), *is a big sparrow with large feet and much black on its head and foreparts. The Costa Rican race* cabanisi *of Prevost's Ground-sparrow is sometimes considered to be a separate species.*

[*Melozone biarcuata hartwegi*, Mapastepec, Chiapas, Mexico. Photo: Nick Athanas]



The ***Rusty-crowned Ground-sparrow*** *was formerly included with the ground-sparrows in* Melozone, *but has been returned to the recently resurrected genus* Pyrgisoma. *Following a review of the towhee genus* Pipilo, *the towhees have been split and the four "brown towhee" species, the Canyon* (Pyrgisoma fuscum), *White-throated* (P. albicolle), *California* (P. crissale) *and Abert's Towhees* (P. aberti), *have also been moved to* Pyrgisoma, *reflecting the close relationship between these species and the Rusty-crowned Ground-sparrow.*

[*Pyrgisoma kieneri kieneri*, Durango Highway, Mexico. Photo: Pete Morris]

DNA-sequencing of Phrygilus *sierra-finches found evidence that the genus comprises four distantly related clades, with at least nine other genera between them. The four clades correspond to groups previously established mainly on the basis of plumage characters. Studies suggest that the* ***Mourning Sierra-finch*** *and the Carbonated Sierra-finch* (Phrygilus carbonarius) *should be in a separate genus. The* ***Black-hooded Sierra-finch*** *is one of four "hooded group" species; their nearest relatives may be* Sicalis *yellow-finches.*

[Left: *Phrygilus fruticeti fruticeti*, Chubut, Argentina. Photo: Darío Podestá.

Right: *Phrygilus atriceps*, Lauca National Park, Parinacota, Chile. Photo: Alejandro Torés]





long bill, in most cases with a distinctly curved culmen, while the somewhat longer conical bill of the *Phrygilus* sierra-finches is similar but usually more pointed and less curved. The Barbados Bullfinch (*Loxigilla barbadensis*) has a relatively short and rounded bill, and it is this bill shape that gave the four Caribbean species in this genus their English name of "bullfinch". The fringillid finches bearing that name have a similarly shaped bill, but the two are not in any way related. The bill of the Barbados Bullfinch is slightly longer than it is deep, and the upper mandible is often slightly longer than the lower mandible.

In an interesting study of adaptive diversification, A. Herrel and colleagues examined the functional consequences of variation in the size and shape of the bill of Darwin's finches in the genera *Certhidea*, *Platyspiza*, *Camarhynchus* and *Geospiza*. It was found that the sexes differed in head shape and in "bite force", the pressure exerted by the closing of the mandibles, females having a longer bill than that of the males in any given size class. Significantly, there were clear differences in the morphology of the bill and the head, these correlating with different feeding methods. Those species which crushed items at the base of the bill had a greater bite force, even at the tip of the bill, than those which used the bill tip to crush items or used probing as a means of foraging. The shape of the bill of "base-crushers" and that of "tip-biters" appeared to confer certain mechanical advantages by minimizing stress at the bill base and the bill tip, respectively, thereby reducing the risk of potential fracture. The researchers' findings corroborated the theory that bill shape is adaptive, and that it evolves through mechanical optimization through natural selection on feeding method.

It is instructive to consider the differences in bill shape and bill size of the ground-finches in the Galapagos genus *Geospiza*. The Small Ground-finch is widely sympatric with the Medium and Large Ground-finches, but there are no plumage features by which the three species can be reliably distinguished from one another. They do, however, differ in body size and bill structure, as well as in voice. The bill of the Medium Ground-finch is intermediate between those of the other two species, and, unlike that of the Large Ground-Finch, is always longer than it is deep. The small Ground-finch has a less powerful-looking bill which is thinner and narrower, and, because the culmen is shorter and straighter, it looks more triangular and pointed than the bill of the Medium Ground-finch. Another member of the genus, the Sharp-beaked Ground-finch (*Geospiza difficilis*) can occur alongside the Small Ground-finch in the higher parts of the Galapagos islands of Fernandina, Pinta and Santiago; as its vernacular name implies, however, the bill of the Sharp-beaked Ground-finch is noticeably longer and more pointed than that of its otherwise similar-looking relative.

An intriguing example of evolution in action was recorded on the island of Daphne Mayor, in the central Galapagos Archipelago, in the 1980s. The Medium Ground-finch is a generalist forager, and changes its diet according to the availability of suitable items. After the big rains produced in 1982–1983 by an El Niño event, small seeds became abundant on the island, where large seeds became rare. Consequently, individuals with a larger and wider bill, suited to feeding on large seeds, became far less numerous, and the population of the Medium Ground-finch on Daphne Mayor exhibited a reduction in mean bill size, brought about by natural selection for individuals which could forage more efficiently on smaller seeds (see also Systematics).

Most emberizids exhibit little sexual dimorphism in size, the males being slightly larger, by about 5%, than the females, as evidenced by, for example, the data on Song Sparrows (see above). There are, however, some exceptions. Male Corn Buntings are substantially larger than females of the species: males of the nominate race in Europe have an average wing length of 101·4 mm and a wing-length range of 96 mm to 107 mm, whereas the average for females is 92·8 mm and the range is 87–98 mm.

Many of the emberizids are sexually dimorphic in colour. Commonly, females are much like the males in general pattern, but are less brightly coloured. This is true, for instance, for most of the Old World species, the *Emberiza* buntings, though not the Corn Bunting, the sexes of which are virtually identical in plumage. The *Volatinia* and *Tiaris* grassquits, the seedeaters, the seed-finches and related species of Central and South America are dimorphic, and many also quite geographically variable in colour, as are the longspurs, the two snow buntings, the Lark Bunting (*Calamospiza melanocorys*) of the American Great Plains, and some of the towhees, such as the Eastern and Spotted Towhees, but not others, such as the Green-tailed, Canyon and Abert's Towhees. Most American sparrows are monomorphic in colour, although some, including the Black-chinned Sparrow (*Spizella atrogularis*) and the juncos (*Junco*), display slight colour dimorphism. The South American sierra-finches, warbling-finches and others are sexually dimorphic, whereas the sexes of the Inca-finches (*Incaspiza*) are similar in colour.



*The **Long-tailed Reed-finch** occupies the monotypic genus* Donacospiza, *but its song and colour pattern suggest that it may be closely related to the* Poospiza *warbling-finches. This species and the Black-and-rufous Warbling-finch* (Poospiza nigrorufa) *are reported as responding to one another's songs. A small, slim finch with short, rounded wings, the Long-tailed Reed-finch has pointed tail feathers, with the inner two pairs longer than the outer rectrices. The ends of these feathers may be frayed to even narrower points.*

[*Donacospiza albifrons*, Corrientes, Argentina. Photo: Darío Podestá]

In keeping with their largely terrestrial and near-terrestrial lifestyle, the New World sparrows are generally brownish or rusty in colour, although some, such as the Spotted and Eastern Towhees, the Lark Bunting and the longspurs, may be boldly patterned with black, white and chestnut, while the male of McKay's Bunting is mostly white. Many, such as several *Zonotrichia* sparrows, the Lark Sparrow (*Chondestes grammacus*), the two *Amphispiza* sparrows, and the Sage Sparrow (*Artemisiospiza nevadensis*) and Bell's Sparrow, have a boldly marked head pattern. Most of the Eurasian species likewise are predominantly brownish, but many also have rich rufous or chestnut colours, and also yellow; males of the Yellowhammer are mostly yellow in coloration, with some admixed rufous, especially on the rump. Many of the Middle and South American taxa, such as *Arremonops* and *Arremon*, are predominantly greenish, as is the Green-tailed Towhee, often



*The **White-winged Diuca-finch** was previously thought to form a superspecies with the Common Diuca-finch* (Diuca diuca). *But aspects of morphology and voice and the fact that the White-winged Diuca-finch hops, rather than walking as the Common Diuca-finch does, suggest that the two are not close. The White-winged Diuca-finch may be closest to the grey-and-white group of sierra-finches, the White-throated* (Phrygilus erythronotus) *and Red-backed Sierra-finches* (P. dorsalis). *It possibly breeds at a higher elevation than any other passerine in the Americas; nesting has been recorded at up to 5400 m. It will roost in crevasses within glaciers.*

[*Diuca speculifera magnirostris*, Cordillera Blanca, Peru. Photo: Cyril Ruoso/Bios]

with rusty, black or white markings on the head, and many of the seedeaters and grassquits also are brightly coloured. Seedeaters can be quite variable, both within species and among species, being mostly black, or a varying mixture of black, cinnamon, grey and rusty. The sierra-finches and others, such as the Short-tailed Finch (*Idiopsar brachyurus*), some *Atlapetes*, *Junco* and *Diuca*, are predominantly grey, as are the Grey Bunting (*Emberiza variabilis*) and Slaty Bunting of the Palearctic. Many species possess a small crest. Some of these, including the Crested Bunting and the Yellow-throated Bunting (*Emberiza elegans*), have a permanently erect crest, but more commonly the crest is raised only when the bird is excited or is displaying.

The Slate-colored Seedeater (*Sporophila schistacea*) presents an intriguing example of apparent polymorphism. In a study of the species extending over a period of more than ten years, R. Restall found that both sexes had three discrete plumage phases, which he termed, respectively, the juvenile plumage, the intermediate plumage and the adult plumage. The female proceeded through each stage to adult plumage in a predictable manner, and exhibited comparatively little variation in appearance. The males, on the other hand, became increasingly variable in plumage as they became older, and the adults varied from being grey and white, which is the typical adult plumage of the male of this species, to being almost entirely blackish or dark grey, or being very pale, or being brownish and pale yellow, and with variable white markings or almost none at all. Restall illustrated eight different morphs, but stated that up to as many as 20 have been identified in northern Venezuela.

Relatively little conspicuous age variation is apparent within the family. Most individuals in juvenile plumage resemble those in adult non-breeding plumage; in sexually dimorphic species, young in their first-winter plumage tend to resemble adult females. White-crowned Sparrows (*Zonotrichia leucophrys*) are an exception. In their first winter, White-crowned Sparrows have a rusty tone in the crown where the adults are black. They lose this rusty colour by a partial pre-breeding moult that occurs before the spring migration and before they breed for the first time. Otherwise, most American sparrows during their first winter are like adults in appearance, although commonly somewhat duller in colour, with buffy tones.

The very long spike-like bill is perhaps the most striking feature of the ***Short-tailed Finch****. The tail is, in fact, not particularly short; the short-tailed appearance is created by the big body of this large and thickset bird. Plain lead-grey above and paler grey below, with a grey bill, this species can be distinguished from the similarly plumaged Plumbeous Sierra-finch* (Phrygilus unicolor) *by its larger size and its peculiar bill. Originally placed near the quiscaline icterids, the Short-tailed Finch may be moved to the tanager family (Thraupidae) if it proves to be close to the sierra-finches.*

[*Idiopsar brachyurus*, Pongo, La Paz, Bolivia. Photo: Joe Tobias]



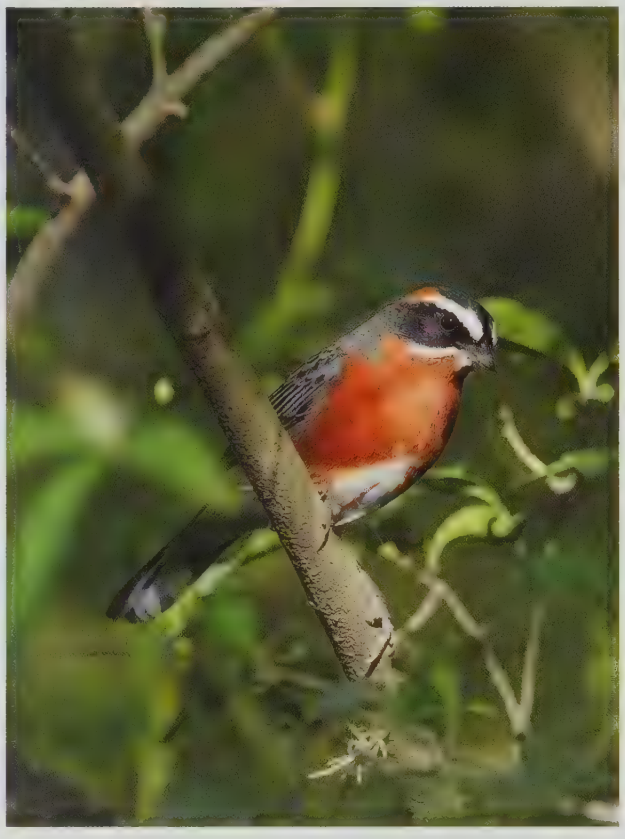
Juveniles of the Band-tailed Seedeater (*Catamenia analis*) are similar in plumage to the adult female, but are generally much browner and more densely streaked on both the upperparts and the underparts. This seedeater shows much variation in subadult plumages, and, like the two other species in this Neotropical genus, it has a complex cycle of ageing. Both sexes appear to have two immature post-juvenile stages before acquiring the adult plumage. Males become progressively less streaked and

The five Incaspiza *inca-finches are rather long-tailed, with a slim, pointed orange-yellow bill. Four of the species, including the* ***Rufous-backed Inca-finch****, are found in and around the poorly known dry inter-Andean valley of the Río Marañón, in northern Peru. All five have small ranges; the Grey-winged Inca-finch* (Incaspiza ortizi) *possibly has a global distribution of no more than 1300 km². The Rufous-backed Inca-finch is sometimes considered conspecific with both the Grey-winged and the Great Inca-finches* (I. pulchra), *the latter, despite its name, being the smaller of the two.*

[*Incaspiza personata*, Huaylas, Peru. Photo: Lieven De Temmerman]







Species diversity of the Poospiza *warbling-finches is concentrated in the Andes of Peru, Bolivia and Argentina. Fifteen species are recognized here. Cytochrome* b *sequences of the two races of the* ***Ringed Warbling-finch****, however, differ by as much as 4·4%, equivalent to the difference between undisputed* Poospiza *species. Similarly, two races of the* ***Black-and-rufous Warbling-finch*** *are sometimes treated as forming a separate species.*

[Left: *Poospiza torquata torquata*, Monteblanco, Santa Cruz, Bolivia. Photo: Daniel Alarcón.

Right: *Poospiza nigrorufa nigrorufa*, Ribera Norte, Buenos Aires, Argentina. Photo: James Lowen]

more solidly and darker greyish above and below. Similarly, younger females are more heavily streaked than older ones, and adult females are the most greyish and the least streaked of all. More research is required in order to determine the full extent of variation in this pattern, and, in particular, whether or not it applies throughout all of the species' extensive range, which runs from the far north of Colombia southwards in the Andes as far as north-west Argentina.

A recent study by R. Maia and R. H. Macedo investigated the prenuptial moult pattern of the Blue-black Grassquit and whether or not it predicted the presence of iridescent structural coloration in this species' plumage. During three breeding seasons, the scientists captured males of this species and measured morphological variables and breeding-plumage coverage, and also collected feathers for spectrometry examination. It was found that saturation of the iridescent coloration was positively



The Sicalis *yellow-finches are birds of open country, from arid lowlands to the high Andean* puna. Sicalis *species are found from Mexico southwards throughout South America to southernmost Chile, Patagonia and Tierra del Fuego. Although all have some yellow, some are predominantly olive, green or brownish. They vary greatly in proportions and bill size. The* ***Orange-fronted Yellow-finch*** *is a compact yellow-finch with a very short tail and wings and a large and rounded head. Its bill is large for the bird's size. Molecular data indicate that the yellow-finches are close to the "hooded" group of the* Phrygilus *sierra-finches.*

[*Sicalis columbiana leopoldinae*, Tocantins, Brazil. Photo: William Price]



Until the early 1980s, the genus Emberizoides *was thought to be monotypic, comprising the* ***Wedge-tailed Grass-finch****. The Duida Grass-finch* (Emberizoides duidae) *is restricted to the Cerro Duida, in southern Venezuela, but the ranges of the Wedge-tailed and Lesser Grass-finches* (E. ypiranganus) *overlap in Brazil, Argentina and Paraguay. All three species have a very long tail, with the inner two pairs of rectrices longer and sharply pointed. In playback experiments, the nominate race of the Wedge-tailed Grass-finch does not react to songs from the race* apurensis, *suggesting that yet another species may be involved.*

[*Emberizoides herbicola herbicola*, Chapadão do Céu, Goiás, Brazil. Photo: Dante Buzzetti]

related to relative moulting speed, indicating that males which invested more in pre-breeding moult also produced more saturated, UV-shifted plumage. The body condition of individuals was not related to brightness or saturation of the iridescent plumage, and no male morphological attributes were associated with the coloration or size of the white underwing patch. The findings indicated that the moult pattern, and possibly that of feather growth, might affect the organization of optical nanostructures responsible for iridescent coloration, and also that the ontogeny of iridescent plumage ornamentation must be taken into consideration when developing hypotheses regarding honest advertisement of such signals. The coloration of the male Blue-black Grassquit may be a reliable reflection of the amount of energy allocated to the moulting process, thereby constituting an honest indicator of male quality. It appears that this is the first study in which natural variation in moulting



The ***Coal-crested Finch*** *is a small, plump-bodied finch with a distinctive thin spiny crest springing from its forehead and forecrown. The crest is often held flat. The female is much duller than the male, and her crest is brownish and poorly developed. This species is often considered a fire specialist, and has been observed invading recently burnt areas of the* cerrado. *The monotypic genus* Charitospiza *probably belongs in the tanager family (Thraupidae).*

[*Charitospiza eucosma*, Chapada dos Guimarães, Mato Grosso, Brazil. Photo: Edson Endrigo]



*The spectacular crest of the **Red-crested Finch** is usually held flat. This species and the Pileated Finch* (Coryphospingus pileatus) *are often considered conspecific and are reported as hybridizing in Brazil. But they show 5·9% DNA-sequence divergence, reflecting a long history of isolation. In addition to DNA, the red-and-black plumage, the relatively thin bill and the presence of a crest all support the placement of* Coryphospingus *in a clade of lowland tanagers that includes* Tachyphonus, Ramphocelus, Eucometis *and* Lanio.

[*Coryphospingus cucullatus cucullatus*, Capão do Leão, Rio Grande do Sul, Brazil. Photo: Edson Endrigo]

pattern has been found to be associated with sexually selected structural colour in the plumage.

In a different study, P. Benites and colleagues examined wavelength-reflectance data with regard to the plumage of four female seedeaters, the Tawny-bellied (*Sporophila hypoxantha*), Dark-throated (*Sporophila ruficollis*), Chestnut-bellied (*Sporophila castaneiventris*) and Rufous-rumped Seedeaters (*Sporophila hypochroma*). The females of these closely related species are very difficult to differentiate on appearance alone. Reflectance values were measured on museum skins, and differences among the species were analysed. It was found that interspecific distances in the colour space were considerably higher than the threshold for colour discrimination, indicating that there were differences in colour among species that should be detectable by the birds themselves. The greatest colour differences were between the Tawny-bellied Seedeater and the other three species. Ultra-violet wavelength was particularly important in discriminating between the species. From these findings, it is apparent that the females of these four seedeaters differ considerably in plumage, although the differences are imperceptible to the human eye.

Moults of emberizids generally follow much the same pattern. After fledging, the young undergo a partial post-juvenile moult, known also as the first prebasic moult, which usually involves the wing-coverts, some body plumage and, for some species, the tertials, and is generally completed on the breeding grounds. With a few species, such as the Corn Bunting, this moult is complete. Among adults, the commonest strategy is for a single complete moult once each year, whereby the bird replaces all of its feathers during the same period, normally immediately after the breeding season. Migratory species sometimes need to complete this post-breeding moult quickly, in order to be able to make the flight to their non-breeding grounds without delay. Those breeding in the far north, such as the Snow Bunting, may become almost flightless for a brief period, as they renew the flight-feathers in a very rapid sequence. Some others begin to moult while on the breeding grounds and then suspend the moult during their migration, completing it when they reach their winter quarters. Species having distinct "winter" and "summer" plumages, such as the Lark Bunting and the longspurs and snow buntings, among others, acquire the summer plumage mostly by means of plumage wear. The brightly coloured contour feathers often have buffy tips, which obscure the rest of the feathers and make them appear drab in winter; after a few months during which the feathers are subject to continuous abrasion, the brighter colours are finally exposed. In the spring, generally before migration, there is often a pre-breeding moult, known also as the prealternate moult. For some species, such as the Saltmarsh Sparrow, this is extensive, often involving the rectrices, but for most it is partial. Longspurs, for example, generally renew only a few head feathers in this moult. The pre-breeding moult is generally completed while the bird is still on the wintering grounds, but some species may not complete it until after their arrival on the breeding grounds.

The above details of moult apply mainly in the Northern Hemisphere. Far less is known about the moult process in the tropics, where the seasons are less well marked and where breeding may take place over longer periods and/or during several different periods during a single year. From the limited information available, it is likely that adults undergo a complete moult once yearly.

Males of some of the "capped" seedeaters, or "capuchinos", in the genus *Sporophila* are well known for moulting into a dull non-breeding plumage, at which time they appear much more



All members of the genus Paroaria *are adorned with red somewhere on the face or throat, and have a variably developed crest. They differ in the distribution or lack of black on the face, in bill colour and in the colour of their upperparts, from greyish to blackish. All are whitish below. The **Crimson-fronted Cardinal** may form a superspecies with the Masked* (Paroaria nigrogenis), *Red-capped* (P. gularis) *and Yellow-billed Cardinals* (P. capitata).

[*Paroaria baeri baeri*, Kuryala Lodge, São Felix do Araguaia, Mato Grosso, Brazil. Photo: Edson Endrigo]

With 31 species presently recognized, Sporophila *is the second largest genus in the family after* Emberiza. *Molecular evidence suggests that* Oryzoborus *is closely related and should perhaps be subsumed in* Sporophila, *which would add six species. Along with the grassquits, seedeaters are the smallest emberizids, 7–15·5 g in weight and 8·5–12 cm in length. They have a short, thick bill. They are strongly dichromatic, the males colourful or boldly patterned. The females are quite drab and, to human eyes, very similar to one another, but, when ultraviolet wavelengths visible to birds are included, their plumages are found to be considerably divergent in colour. The* ***White-bellied Seedeater*** *is one of the largest in the genus, with a deep, very short, rounded bill.* ***Dubois's Seedeater*** *is very closely related to the Yellow-bellied Seedeater* (Sporophila nigricollis), *or conspecific with it or even a morph of that species. Molecular-genetic data indicate that the* ***Rusty-collared Seedeater*** *belongs in a clade with the Yellow-bellied Seedeater. Its plumage becomes brighter from north to south. The* ***Chestnut Seedeater*** *is one of the southern clade of the "capuchino group" of seedeaters. The very low sequence divergence among the eight species in this clade suggests that radiation occurred very recently, probably within the last half-million years.*

[Above left: *Sporophila leucoptera leucoptera*, São Francisco Lodge, Miranda, Mato Grosso do Sul, Brazil.

Above right: *Sporophila ardesiaca*, São Roque de Minas, Minas Gerais, Brazil.

Below left: *Sporophila collaris melanocephala*, Transpantaneira, Poconé, Mato Grosso, Brazil.

Below right: *Sporophila cinnamomea*, Candiota, Rio Grande do Sul, Brazil. Photos: Edson Endrigo]











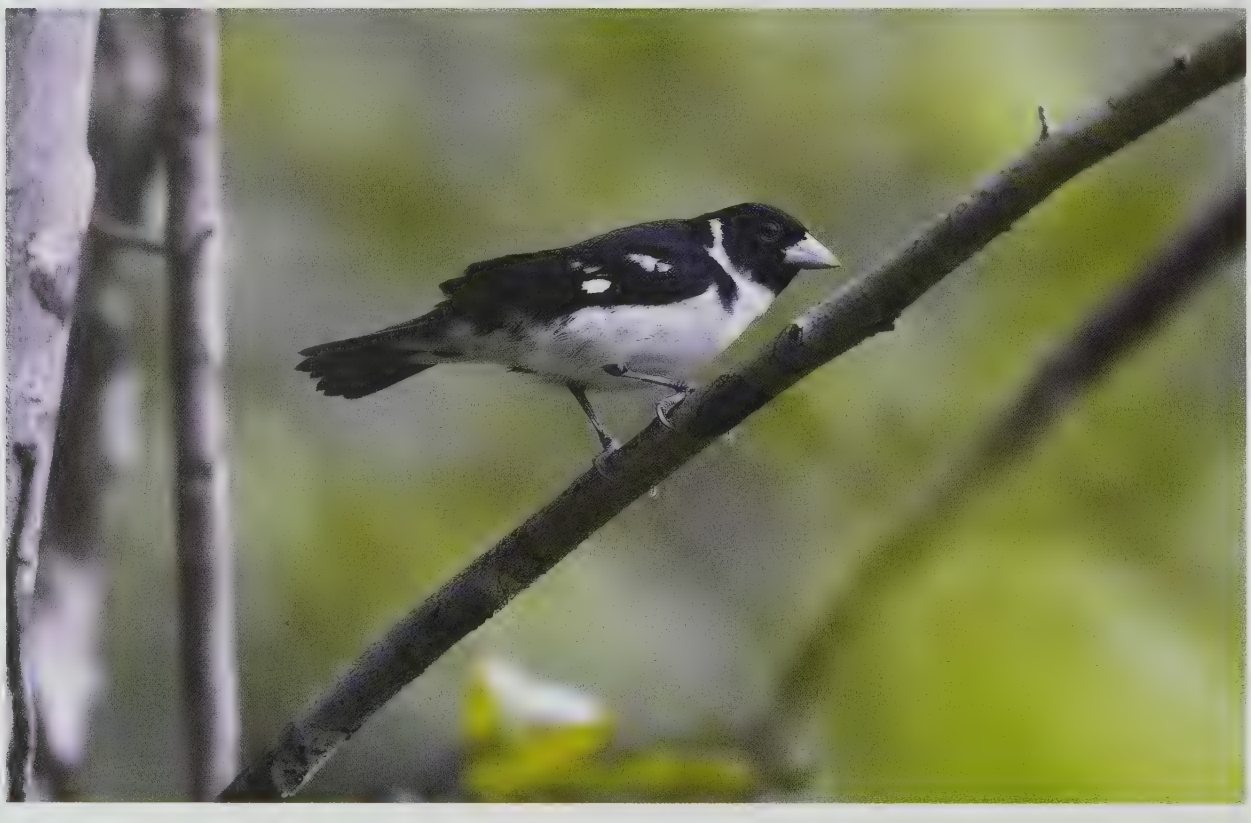
*The male **Chestnut-bellied Seed-finch** differs from all the others in the genus in his chestnut-coloured underparts. The males of the other five species are entirely black, except for white patches at the base of the primaries. (One species lacks these; another also has white patches at the base of the secondaries and on the underwing-coverts.) All* Oryzoborus *species have a large, heavy bill, and the bills of the Large-billed* (Oryzoborus crassirostris) *and Great-billed Seed-finches* (O. maximiliani) *are so massive that the crown appears to sweep back from the base of the upper mandible, making the birds look flat-headed.*

[*Oryzoborus angolensis angolensis*,
Pousada Aguapé,
Aquidauana,
Mato Grosso do Sul, Brazil.
Photo: Edson Endrigo]

similar to their respective females. It is not certain, however, that all southern members of the capped group, which consists of the Capped Seedeater (*Sporophila bouvreuil*) and the Tawny-bellied, Rufous-rumped, Dark-throated, Marsh, Chestnut and Black-bellied Seedeaters (*Sporophila melanogaster*), do adopt such plumage. Nor is it known whether the males of either of the two northern capuchinos, namely the Ruddy-breasted and Chestnut-bellied Seedeaters, moult into a female-like plumage after breeding.

Habitat

Buntings and New World sparrows are found in a variety of habitats, but characteristically they spend much of the time close to the ground. They forage generally on or near the ground, and they commonly place their nests on the ground or low in vegetation, often under tussocks of grass or similar vegetation. Nevertheless, many members of the family commonly sing from trees and bushes. Many species, such as the Rock Bunting (*Emberiza*



*The **White-naped Seedeater** is a rare and patchily distributed endemic of white-sand scrub in the Guianan Shield region of Colombia, Venezuela, Brazil and Guyana. Molecular work indicates that* Dolospingus *is very close to* Sporophila *and should perhaps be merged with it. The White-naped Seedeater shares its black-and-white plumage with at least five* Sporophila *species, and may fill a void in a* Sporophila *allospecies complex which is otherwise absent from the Guianan Shield.*

[*Dolospingus fringilloides*,
Mitú, Vaupés, Colombia.
Photo: Nick Athanas]



A small finch-like bird with a relatively slim and slightly decurved bill, the ***Orangequit*** *is confined to the island of Jamaica. Unusually for the Emberizidae, it is a nectar specialist. The evolutionary relationships of the monotypic genus* Euneornis *are unknown. It has been suggested that this and other problematic Caribbean island taxa are remnants of an ancient and widespread lineage that has since become extinct in mainland South America. Alternatively, they may represent a very recent lineage which has had more success in colonizing islands than in competing with mainland species. The Orangequit is sometimes placed in the tanager family (Thraupidae), with which it perhaps has closer ancestral affinities.*

[*Euneornis campestris*, Marshall's Pen, Jamaica. Photo: Neil Bowman/FLPA]

cia), often select a nesting site in a cleft in rocks, or sometimes under a roof. The six longspurs and snow buntings breed primarily in treeless terrain and always nest on the ground, commonly among rocks. Marsh-dwelling species, such as the Seaside, Nelson's, Saltmarsh and Le Conte's Sparrows and the Swamp Sparrow, place their nests low down, above water level, and in tidal areas generally above the mark of the highest tides. The Reed Bunting (*Emberiza schoeniclus*) breeds in dense, moist vegetation, which means that this species is generally associated with marshes, fens and bogs, but its nest-site preference is apparently related more to vegetation than to a need for an aquatic site. In some parts of its range, such as in southern England, this bunting also visits gardens, especially during the winter months, in order to forage. Some species, such as the Chipping Sparrow (*Spizella passerina*), commonly nest in trees, occasionally more than 10 m up, but even these often forage on the ground.

In addition to the longspurs and snow buntings, which may belong in their own family, Calcariidae (see Systematics), typi-



Along with the seedeaters, the grassquits are the smallest emberizids. The ***Cuban Grassquit*** *is 11·5 cm in length and weighs just 6–9·5 g. Most grassquits are sexually dichromatic; the duller female Cuban Grassquit has a dark chestnut (instead of black) face and a paler yellow collar. The male Dull-colored Grassquit* (Tiaris obscurus)*, however, differs from the males of the other four species in its plain, brownish plumage, which resembles that of the female and juvenile. It has been suggested that this plumage may have originated through the evolutionary retention of immature plumage from a dichromatic ancestor species (paedomorphosis).*

[*Tiaris canorus*, Las Terrazas, Cuba. Photo: Zhao Chao]



The four Caribbean species in the genus Loxigilla *get their English name of "bullfinch" from the short and rounded bill. The Greater Antillean* (Loxigilla violacea) *and Lesser Antillean Bullfinches* (L. noctis) *have, respectively, five and eight island or island-group races. The Barbados Bullfinch* (L. barbadensis) *was formerly considered a race of the Lesser Antillean Bullfinch. The* ***Puerto Rican Bullfinch*** *has one extant race, confined to Puerto Rico; the much larger race* grandis, *found on St Kitts, and sometimes considered a full species, has not been reported since the 1920s and is thought to be extinct.*

[*Loxigilla portoricensis portoricensis*, Puerto Rico. Photo: Adrian & Jane Binns/ VIREO]

cal emberizids breed at high latitudes and from low to high elevations. They can be found from sea-level to above 5000 m. In South America, the Bright-rumped Yellow-Finch (*Sicalis uropigyalis*) is found at up to 4800 m in grasslands in the Andes, and the White-winged Diuca-finch (*Diuca speculifera*) ascends even higher, to 5500 m, with nesting recorded at 5400 m; several of the *Phrygilus* sierra-finches live above 4500 m. In Central America, Volcano Juncos (*Junco vulcani*) are commonest above the tree-line, to at least 3000 m. Some of the buntings of Eurasia can also be found at high elevations. For example, the Rock Bunting occurs at up to 4000 m in Asia, and the Tibetan Bunting (*Emberiza koslowi*) lives on relatively barren, steep scrubby slopes above the tree-line between 3600 m and 4600 m. The last-mentioned species favours a mixture of dwarf alpine shrubs, especially cotoneaster (*Cotoneaster*), juniper (*Juniperus*), barberry (*Berberis*) and others, at the base of steep cliffs in areas where the alpine grassland is grazed seasonally by yaks (*Bos grunniens*).

Harris's Sparrow (*Zonotrichia querula*) breeds in the forest–tundra ecotone in Canada, where it is locally very common, although many aspects of its life are still little known. On the other side of the Atlantic Ocean, the taiga of northern Eurasia is the breeding habitat of several buntings, including the Rustic Bunting (*Emberiza rustica*) and the Chestnut Bunting (*Emberiza rutila*).







Recent molecular-genetic research suggests that the Galapagos group consisting of the genera Certhidea *(the* ***Green Warbler-finch****, left),* Camarhynchus *(the* ***Small Tree-finch****, centre),* Geospiza *(the* ***Large Ground-finch****, right) and* Platyspiza, *collectively known as "Darwin's finches", is allied to the tanagers (Thraupidae).*

[Left: *Certhidea olivacea*, Genovesa, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos.

Centre: *Camarhynchus parvulus parvulus*, Santa Cruz, Galapagos. Photo: Tim Laman.

Right: *Geospiza magnirostris*, Genovesa, Galapagos. Photo: Eric VanderWerf]

The Snow Bunting is circumpolar in distribution. In the Old World it breeds north into the high Arctic, including Iceland, Spitsbergen and Novaya Zemlya, and in the New World it nests in the Aleutian and Pribilof Islands, Alaska, northern Canada, including the arctic islands, and Greenland. Snow Buntings commonly nest in dry, sparse rocky areas. The similarly circumpolar Lapland Longspur also breeds in the high Arctic. At the other end of the globe, in South America, many finches and seedeaters breed at high altitudes in the Andes, among them the Paramo Seedeater (*Catamenia homochroa*) and its two congeners, the Short-tailed Finch, and most of the sierra-finches. These occur in *páramo* and *puna* grasslands and in timber-line bushes, often foraging on the ground. The Peg-billed Finch (*Acanthidops bairdi*) of Central America is also found above the timber-line. Brewer's Sparrow (*Spizella breweri*) of North America uses two distinctly different breeding habitats: the nominate race breeds in sagebrush (*Artemisia*) grasslands and in pine–oak savanna over a wide range of elevations; race *taverneri* breeds in dwarf balsam fir–willow (*Abies balsamea–Salix*) or birches (*Betula*) at or above the timber-line. The elevational ranges of these two populations do not overlap. In high mountains in western North America, as well as in the north, White-crowned Sparrows breed in krummholz, at or above the tree-line, where they place their nests in dwarf spruce (*Picea*), balsam or birches. In the west, however, they commonly occupy deciduous thickets along the coast, or make use of urban gardens for nesting purposes.

Farther south, in Middle America and the Neotropics, the Blue-black Grassquit is often abundant in seasonally wet grassland or open bushy habitats at lower elevations up to 1100 m, in some places ascending to 2600 m, and the *Sporophila* seedeaters in general are found in lowland grassland, often in tall grasses near water. Although most *Sporophila* species live in grassland or in grassy areas with scattered deciduous shrubs, the Slate-colored Seedeater occurs mostly in woodlands, and may place its nest as high as 5 m above the ground. Brush-finches in the genera *Atlapetes* and *Arremon* are denizens of the understorey of humid forests or forest edge. The Sooty-faced Finch (*Arremon crassirostris*) favours wet woodlands bordering swift rivers and streams, and the *Oryzoborus* seed-finches are likely to be encountered in shrubby clearings. The Blue Seedeater (*Amaurospiza concolor*) is generally an uncommon species, and in Costa Rica and Panama is characteristically found in bamboo thickets at overgrown forest borders and secondary woodland. In Mexico this species occurs also in humid pine–oak woodland and even in cloudforest, and in the Neotropical part of its range, from south-west Colombia south to northern Peru, it is often found away from bamboo.

Several New World sparrows inhabit dry grasslands, often living in grassland with sparse, small trees and shrubs. In the arid grasslands of the south-western USA, Cassin's Sparrows and Lark Buntings can be common as breeding birds. Their breeding ranges fluctuate with variation in the climate, and during dry periods may extend farther east than they do in wetter years. In some areas, McCown's and Chestnut-collared Longspurs breed in the same fields, but the former are generally found in drier sites with sparse vegetation, whereas the Chestnut-collared are likely to settle in more mesic areas with taller grasses; the range of the Chestnut-collared Longspur extends farther east than that of McCown's. Rufous-winged Sparrows prefer flat desert grassland interspersed with xeric shrubs, and are commonly seen along ephemeral washes. Rufous-crowned Sparrows, on the other hand, are found in dry rocky hillsides and canyons, and Black-throated Sparrows can be encountered in similar sites, but generally favour more open, rocky sites with scattered desert shrubs. In the western USA, in the Great Basin and eastern California, Sage Sparrows breed in cold desert with saltbush (*Atriplex*) or in semi-desert with sagebrush, where they typically occur in dry grasslands interspersed with sagebrush, saltbush, and scattered junipers or pines; outside the breeding season they can be found in antelopebrush (*Purshia*) and rabbitbrush (*Chrysothamnus*). Bell's Sparrow, which is commonly treated as conspecific with the Sage Sparrow, breeds in "hard" chaparral dominated by dense chamise (*Adenostoma fasciculatum*), and less often in coastal California sagebrush (*Artemisia californica*) or brittlebush (*Encelia farinosa*) and in mixed brush on sand dunes near the coast. The range of Bell's Sparrow extends southwards through Baja California, in north-west Mexico, and here the species is found also in scrub dominated by wolfberry (*Lycium*), known locally as "frutilla".



*The **Yellow-billed Cardinal** is usually seen in pairs, family parties or small groups. Outside the breeding season, larger flocks may form. Straggling flocks of hundreds, with a large proportion of immatures, have been reported. They regularly congregate around settlements to feed on grain and food scraps. Juveniles of the congeneric Red-capped Cardinal* (Paroaria gularis), *which is highly territorial when breeding, flock with the adults until the dull orange plumage of the head starts to change to the bright red of the adult, at about one year of age, when they become targets of aggression from the adult male.*

[*Paroaria capitata capitata*, Pantanal, Mato Grosso, Brazil. Photo: Fabio Colombini]

On the Pacific Coast of North America, Belding's (*Passerculus guttatus*) and Large-billed Sparrows (*Passerculus rostratus*), both often treated as being conspecific with the Savannah Sparrow, breed in coastal saltmarshes dominated by pickleweed (*Salicornia*), iodinebush (*Allenrolfea occidentalis*), sea blight (*Suaeda*), saltbush and saltgrass (*Distichlis spicata*). On the Atlantic coast, Seaside Sparrows and also Nelson's and Saltmarsh Sparrows breed in dense smooth cordgrass (*Spartina alterniflora*), blackgrass (*Juncus gerardii*), cat-tail (*Typha*) and marsh-elder (*Iva*) habitats that are sometimes flooded at high tides.

Most of the species breeding at high latitudes or at higher-lying elevations undertake seasonal movements, shifting to more hospitable climes during the non-breeding period (see Movements). Many then choose habitats similar to those in which they breed, although there are some differences. The Yellowhammer of the Western Palearctic is partially migratory, all of the northernmost breeding birds moving to areas farther south, but generally still within the species' total breeding range. In the winter months, as in the breeding season, they avoid dense woodlands and wetlands, and heavily populated areas, but they can be found in hedgerows, at forest edges and in parkland and similar semi-open habitats. The Ortolan Bunting (*Emberiza hortulana*), in contrast, is a long-distance migrant. On its breeding grounds from north, central and south-west Europe eastwards to central Mongolia and, in the south, to Turkmenistan, it prefers cool, open woodlands, often open pine woodland or forest-steppe in low mountains, ascending to about 2500 m; in its wintering areas in sub-Saharan Africa, this bunting is found in subtropical upland savannas, grasslands and cleared forests, and in semi-arid cultivation, especially in open upland habitats, generally between 1000 m and 3000 m.

Although none of the North American sparrows is a long-distance migrant, most do migrate short distances. Species that



*Outside the breeding season, **Snow Buntings** are generally found in flocks, which can include tens to hundreds of individuals. In the winter of 2004–2005, concentrations of up to 1600 Snow Buntings were recorded in Lower Silesia, in south-west Poland. Average flock size on snowless days was eleven times higher than on snowy days. Snow Buntings form both single-species flocks and mixed flocks with Horned Larks* (Eremophila alpestris) *and Lapland Longspurs* (Calcarius lapponicus). *They can also be found singly and in twos and threes. Flocks of males may arrive in the breeding area 2–3 weeks ahead of females.*

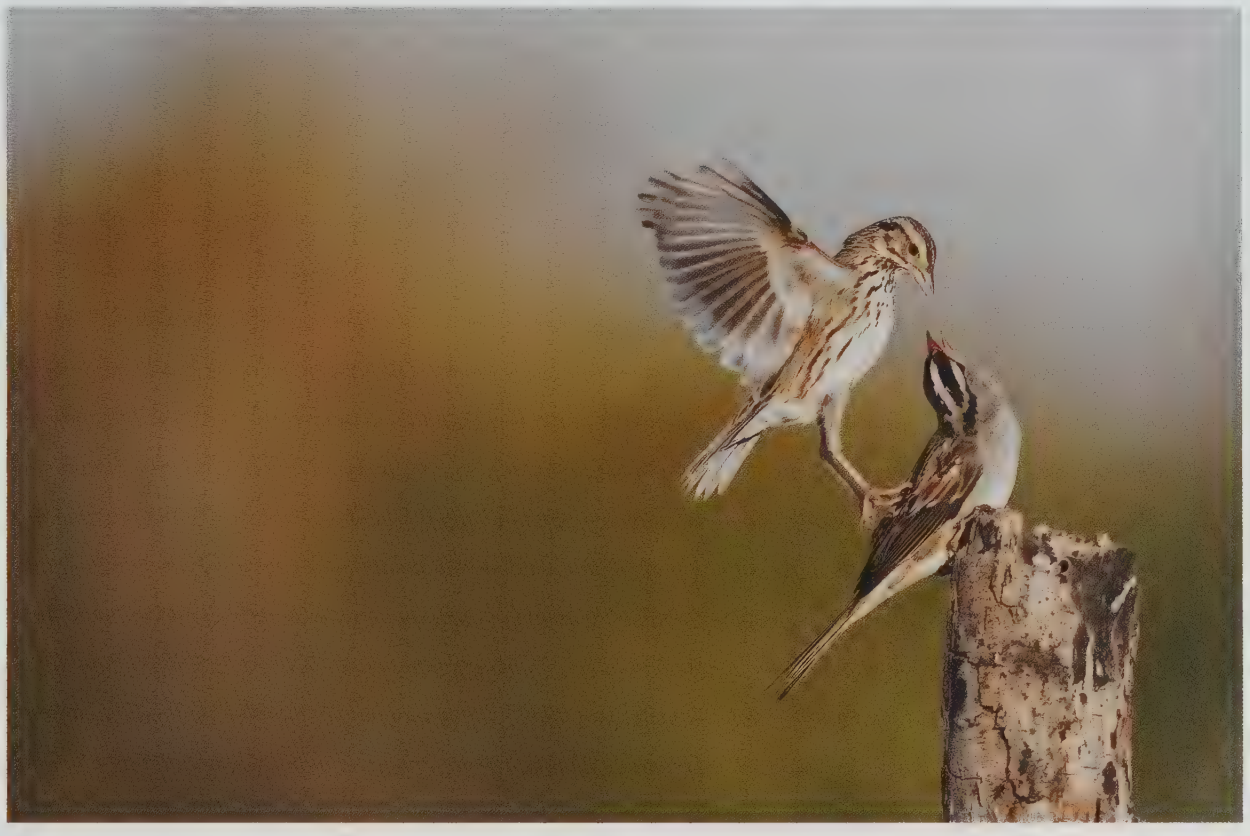
[*Plectrophenax nivalis nivalis*,
New York, USA.
Photo: Marie Read]

breed at high latitudes move southwards in autumn, but most do not venture south of the USA or central Mexico. In winter, the sparrows tend to form loose flocks, often of mixed-species composition, as also do most of the buntings in the Old World. Weedy fields and hedgerows, and open woodlands with a shrubby understorey are among the favoured habitats. Outside the breeding season, longspurs and Snow Buntings are generally found in flocks, and at times in rather large flocks, those of Snow Buntings commonly consisting only of individuals of that species, but sometimes mixed with Horned Larks (*Eremophila alpestris*) and Lapland Longspurs. They then occur in pastures and large fields, along roadsides, and along the shoreline. Snow Buntings generally stay on the ground, but they will at times alight in a tree in open country. Likewise, wintering flocks of longspurs often contain only a single species, but mixed flocks, especially with Horned Larks and other longspurs, can also be observed, not surprisingly, especially where the wintering ranges of several populations overlap. They almost invariably remian on the ground, but occasionally they will perch on a fence, on a telephone wire or in a small tree.



*The "bill-tilting" or "head up" threat display, shown here by the **Many-colored Chaco Finch**, has been recorded for many emberizids and is common also among the icterids. It is usually performed by members of the same sex in agonistic situations, such as territorial boundary disputes between males. The feathers of the head and neck are sleeked, and the birds are usually silent. Many-colored Chaco-finches sing persistently even through the hottest part of the day.*

[*Saltatricula multicolor*,
Perforación,
Santa Cruz, Bolivia.
Photo: Joe Tobias]



*The male **Savannah Sparrow** defends his territory by singing from border perches, chasing intruders, walking side by side along the boundaries with males of adjoining territories, or assuming threatening postures face to face at the borders. Sometimes, disputes also involve chasing birds of other species, as illustrated by this one attacking a White-crowned Sparrow* (Zonotrichia leucophrys). *In a field study in south-east Michigan, the males seldom left their territories except under stress, but adults accompanying fledglings could cross boundaries with impunity.*

[*Passerculus sandwichensis sandwichensis*, Sinton, Corpus Christi, Texas, USA. Photo: Imagebroker/photolibrary.com]

Several species of emberizid are confined to the Caribbean islands. In Cuba, the Cuban Bullfinch (*Melopyrrha nigra*) breeds in forests and mangroves, as well as in bushy areas and undergrowth in open pinewood areas, while the Cuban Grassquit (*Tiaris canorus*) is found primarily in semi-arid country, often near the coast, and also in open pine stands, brushy areas, shade coffee and citrus plantations, and rural farmland with shrubbery. The Zapata Sparrow (*Torreornis inexpectata*) occurs as three distinctly different ecological forms: the nominate race lives in seasonally flooded sawgrass prairies with scattered shrubs in the Zapata Swamp, in west Cuba, the subspecies *varonai* inhabits dry to semi-wet open forest in Cayo Coco, in north Cuba, and the subspecies *sigmani* inhabits coastal thorn-scrub, dry forest and cactus stands in Guantánamo, in the south-east of the island. Jamaica is the home of the Yellow-shouldered Grassquit and the Orangequit. The former can be found at the edges of forest, including montane evergreen forest, and in woodland, as well as in gardens where these are close to wooded areas. The Orangequit is more a species of humid forest, but is commonly encountered also in shade coffee plantations. The Puerto Rican Bullfinch (*Loxigilla portoricensis*),



*The crest of the **Red-crested Cardinal**, usually held flattened and pointing backwards, is raised when the bird is excited, giving it a shaggy appearance. In captivity, breeding-age males are said to become noticeably aggressive, "charging at the cage walls, calling, stretching their necks and engaging in combat anything that moves". They are non-territorial outside the breeding season. In Manu National Park, in Peru, Red-capped Cardinals* (Paroaria gularis) *defend territories along the shores of oxbow lakes and rivers, each territory containing two short stretches of shore on opposite sides of the water.*

[*Paroaria coronata*, Pantanal, Mato Grosso, Brazil. Photo: Cassiano Zaparoli]



The preening and other feather maintenance and comfort behaviour of emberizids appear to be typical of passerines. This preening ***Nightingale Finch*** *is an adult male.* Nesospiza *plumages vary with age and sex; immature plumage is retained for at least two years. In experiments with another emberizid, Dark-eyed Juncos* (Junco hyemalis) *were able to discriminate between the preen-oil odour of their own and other species. Unexpectedly, females spent more time with the odour of smaller males, even though their odours were less "male-like" than those of larger males.*

[*Nesospiza questi*, Nightingale Island, Tristan da Cunha Group. Photo: Peter Ryan]

restricted to the island of that name, breeds in dense mountain forest and tropical lowland forest, as well as dry coastal thickets and, on occasion, mangroves. The more widespread Greater Antillean Bullfinch (*Loxigilla violacea*) inhabits dense thickets and undergrowth in various habitats, including pine savanna and gardens, wet upland forest and dry coastal scrub; its range incorporates the Bahamas, Jamaica and Hispaniola, including some of the latter's offshore islands. The Lesser Antillean Bullfinch (*Loxigilla noctis*), which ranges from the Virgin Islands southwards through most of the Lesser Antilles to Grenada, lives in tropical evergreen forest and deciduous woodlands, venturing also into second growth and gardens, and sometimes dry areas and mangrove swamps. Far more restricted in range, the St Lucia Black Finch, found only on St Lucia, in the south-central part of the Lesser Antilles chain, lives in tropical lowland evergreen forest and secondary forest from sea-level to 950 m; it prefers forest with a relatively complex understorey, usually in moister sites, and is generally more likely to be found in mountains than in the dry lowlands.



All New World sparrows and Old World buntings for which information is available scratch the head by the indirect method, as this ***Buff-bridled Inca-finch*** *is doing. They droop one wing and lift the foot over it, tilting the head to one side. Inca-finches are reported as being relatively easy to observe in the early morning, when they perch openly on shrubs, cacti and boulders, but behaving much more inconspicuously during the rest of the day. The Buff-bridled Inca-finch, which is less shy than others in its genus, often raises its tail abruptly, then slowly lowers it again.*

[*Incaspiza laeta*, Celendín–Balsas road, Marañon Valley, Peru. Photo: Heinz Plenge]

General Habits

Characteristically, buntings and New World sparrows spend much of their time on or close to the ground, foraging on the ground in open country, under low vegetation in brush or in woodland understorey. Many species can be difficult to observe. When approached by a human observer, some prefer to run away and take cover, rather than to take flight. In general, however, they are most easily seen in the early morning. Emberizids often give sharp, staccato contact notes, which can frequently be used for specific identification, although the calls of many of the species are rather similar to one another. If they are silent, the sparrows and buntings are easily overlooked. A well-tried method of luring them out from cover is that of "pishing", making a sound like "pssssh" a few times in quick succession, such as "psh psh psh", which is often effective in attracting a skulking bird out into the open, where it can be observed, even if only for a brief time.

Notwithstanding the often skulking nature of these birds, there are times when they are easily visible and even conspicuous. During the breeding season, males of many species sing from prominent and conspicuous perches, and, in open country, some perform elaborate display-flights, making them easy to observe.

When on the ground, the members of this family move by hopping or running, and most species will do either, depending on the context. Species living in places with sparse ground vegetation, such as the longspurs, the two snow buntings and some populations of Sage Sparrows, commonly run; when moving over only short distances, hopping is the more usual method of locomotion for most species. Some will walk slowly while foraging, and then run or hop when moving more rapidly.

The long-distance flight of sparrows is usually direct, or slightly undulating. This contrasts with the short flights of many species, especially those that are characteristically found in brushy and old-field habitats, such as the *Aimophila* sparrows and the Song Sparrow, which is seemingly laboured and "floppy", with brief bursts of flapping. Short flights of species that live in open fields, for instance the Savannah Sparrow (*Passerculus sandwichensis*), the longspurs and the Snow Bunting, are direct. The migratory species may form loose flocks during passage movements. Diurnal migrants, such as the longspurs and the Snow Bunting, often move in large flocks. When flying in flocks, sparrows and buntings commonly utter calls, and these call notes are, perhaps always, species-specific (see Voice). Juncos and other sparrows with white in the tail, such as the Vesper Sparrow and the longspurs, flick the tail, showing the white, when on the ground.

Many species of New World sparrow have flight displays, and these can sometimes be elaborate. As an example, male Cassin's Sparrows leap into the air to a height of about 6 m, and float downwards on set wings, while singing. Similarly, Lark Buntings and McCown's Longspurs have elaborate aerial songs: they



When bathing, the ***White-crowned Sparrow*** *wades into still or slowly moving shallow water, and dips and splashes about, thrusting its head beneath the water, and fluffing its feathers to ensure that its plumage is thoroughly wet. After bathing, the sparrow may squat in a flattened posture in a sunny spot, occasionally preening, and turning its head from side to side to look around as its feathers dry. The posture is different from that used in sun-bathing, and the feathers are not fluffed so as to expose their bases. White-crowned Sparrows have also been seen to use wet leaves to bathe.*

[*Zonotrichia leucophrys*, Roma, Texas, USA. Photo: Arthur Morris/ Birds As Art]



The typical song of an Emberiza *bunting is a short series of simple notes, with little variation. The* ***Ortolan Bunting*** *sings from a prominent perch, and more rarely in a short song flight. Its song consists of 5–6 notes in two parts, the first with a ringing quality, the second lower-pitched and melancholy. The song varies individually and geographically, but recalls an abbreviated version of the Yellowhammer's* (Emberiza citrinella) *song, which is a series of 5–12 notes ending in a drawn-out descending note on a different pitch. Corn Buntings* (E. calandra), *in regions where they have become rare, may sing perfect renditions of Yellowhammer and Ortolan Bunting songs.*

[*Emberiza hortulana*, Gredos, Ávila, Spain. Photo: Jesús Rodríguez-Osorio]



*The song of the **Black-throated Sparrow** appears to be divided into two general sections: an introduction, containing a croak and a complex of notes, and a repetitive section made up of trills or buzzes, or both. The birds achieve variability in their individual repertoires by combining the basic elements in different arrangements. Unlike many other North American sparrows, male Black-throated Sparrows do not necessarily sing from prominent perches, but often deliver their songs from the middle of a shrub or from the ground.*

[*Amphispiza bilineata deserticola*, Anza-Borrego Desert State Park, California, USA. Photo: Tim Zurowski/ photolibrary.com]

rise to 10–20 m or so, with slow stiff wingbeats, singing vigorously, and then glide back to the ground. In a display similar to this, the male Lark Bunting flashes the large white patches on its wings, and both species flash the white in the tail.

Maintenance activities and comfort behaviour by emberizids appear to be fairly normal. Chipping Sparrows, the group of *Ammodramus* sharp-tailed sparrows, the *Passerella* fox-sparrows, juncos, the Song Sparrow and the Lapland Longspur are all known to scratch the head by the indirect method, bringing a foot over one wing, which is slightly drooped, as they tilt the head to one side. Old World buntings have been observed to use the same method for head-scratching, and apparently most sparrows scratch in this manner. Sunning and, especially, water-bathing have been recorded for some of the better-known members of the family, and both seem to be much as would be expected for small to medium-sized passerines. When bathing, for instance, the bird wades into still or slowly moving shallow water, such as a puddle or the shallow margin of a lake or river; there it dips and splashes about, occasionally thrusting the head beneath the water's surface, and fluffs its feathers in order to wet its plumage thoroughly, before coming out and preening. Vesper Sparrows, and other species of open arid grasslands, dust-bathe. They stretch either unilaterally, by extending the wing and leg on one side, or bilaterally, by raising both wings over the back. There are, of course, many species in this family for which no information on comfort behaviour is available, and this is true particularly of the Neotropical species.

Emberizids also drink while standing in water, or they will drink droplets of water from the vegetation. In saltmarshes, Song Sparrows will drink seawater, as do other saltmarsh-dwelling sparrows, although many definitely seem to select fresh water if this is available. For example, while Saltmarsh Sparrows will drink seawater, it was found in tests that they prefer non-saline water, and the same is true of San Benito Sparrows (*Passerculus sanctorum*).



The dawn songs of Atlapetes *brush-finches have highly species-specific patterns, but their songs may be more variable and less distinctive later in the day. The song of the **White-naped Brush-finch** is a deliberate series of notes, sometimes alternating with longer variations, which is transliterated as "oh see, I'm weary, pity me". The Pale-headed Brush-finch* (Atlapetes pallidiceps) *sings from the edges of clearings, or from near the tops of taller bushes or trees. Apparently, only males sing, but partners will give a cascading series of notes in duet when they meet after having been out of each other's sight, or when they encounter another pair.*

[*Atlapetes albinucha gutturalis*, Río Blanco Reserve, Caldas, Colombia. Photo: Ketil Knudsen]

Voice

Many emberizid sparrows give the impression to many people of being rather drab brownish or olive or greenish birds. As unimpressive as their plumage may be to most human eyes, however, they often have songs that are both impressive and musical. The song generally appears to serve both as a way of advertising a territory and as a means of attracting mates. Two males may countersing across territorial boundaries. In addition, they sometimes sing in mid-winter, when they are not on their breeding territories or attempting to mate. Non-conspecific mimicry is uncommon. In Eurasia, the Corn Bunting, which

normally has a simple jangling song, has been reported as singing the songs of some other *Emberiza* species, such as the Ortolan Bunting and the Yellowhammer. This perhaps is best not considered mimicry, but it does reflect the importance of learning in the formation of oscine song. The songs of the *Emberiza* buntings, incidentally, are not very striking, and tend to consist of a short series of simple notes, often with a buzzing quality, and with little variation.

Typically, only the males sing, although the females of many of the species do occasionally sing. The female's song is often not so loud or forceful as the male's, although, because the sexes of most species are similar in appearance, it can be difficult to know if a singing individual is a male or a female. Territorial birds do respond vigorously to playback of their song. Although most members of the family tend to be inconspicuous, when not on territory, they frequently deliver the song from an exposed perch, making them easier for the ornithologist to study. Territorial Bachman's Sparrows, although difficult to see when not on territory, commonly sing from an exposed branch in a pine tree, often from a perch several metres above the ground. This species' song is loud, melodious and varied, and the male will often sing through his many songs for several minutes without moving; when doing this, he certainly is not inconspicuous. The closely related Botteri's Sparrow, although similar in appearance to Bachman's Sparrow, both having rather drab plumage, sings from an exposed perch in a bush or small tree in xeric grassland, and the congeneric Cassin's Sparrow, a bird of open grasslands with scattered bushes, commonly, or perhaps even usually, delivers a flight song; jumping into the air, it sings its song while floating back earthwards on set wings. These species sometimes will sing from a fence. As similar as these three species are in appearance, their songs are quite different, as are their habitat preferences. All three give loud songs that carry well in their open environments, and all three are conspicuous when singing, but otherwise are difficult to see.

Like Cassin's Sparrow, most sparrows and longspurs that breed in open country have flight songs. The aerial song of the Lark Bunting is perhaps typical. The male flies up into the air, and then drifts back to earth with slow stiff-winged beats, singing while doing this. The flight songs and displays of McCown's Longspur and the two snow buntings are similar. The Corn

*The male **Spotted Towhee** usually sings from an exposed perch, often (as shown here) from the top of a bush. The song is variable, typically consisting of two "chip" notes followed by a trill, although on the US Pacific coast it may be a dry buzz, lacking the introductory notes. There are records of female towhees singing. Spotted Towhees hybridize with Eastern Towhees* (Pipilo erythrophthalmus) *in the Great Plains of the USA, although the song of the Eastern Towhee is a quite different and distinctive ringing "drink your tea". In playback experiments, Spotted Towhees did not respond to Collared Towhee* (P. ocai) *songs, although the two commonly hybridize in Mexico.*

[*Pipilo maculatus megalonyx*, San Diego County, California, USA. Photo: Brian E. Small]



Bunting usually sings from a low perch, but it may sing also while flying, often accompanied by a dangling-leg display, and it regularly sings when alighting on a perch. Unlike most New World sparrows, Nelson's Sparrow does not form pair-bonds. Rather, both sexes are promiscuous. The males do not defend territories, but they gather in suitable habitat and display, a performance in which the male flies high into the air, perhaps to more than 50 m, and then floats diagonally downwards while singing its song,

*The **Pale-throated Pampa-finch** and the Great Pampa-finch* (Embernagra platensis) *are birds of grassland habitats with scattered shrubs. Both have loud and distinctive whistled songs which carry well in their open environment. The song of the race* olivascens *of the Great Pampa-finch is more complex, longer and lower in frequency than those of the other races, and on this and other grounds it may merit species rank. Many other grassland emberizids have buzzy, insect-like songs, which can be heard over surprisingly long distances, although the source of the song may be hard to locate.*

[*Embernagra longicauda*, Serra da Gandarela, Rio Acima, Minas Gerais, Brazil. Photo: Edson Endrigo]





Many open-country New World sparrows perform flight displays. The male ***Lark Bunting****, which also sings from the ground and from perches, has an elaborate song flight. He rises several metres into the air and then glides down with slow, stiff flaps of his extended wings. As he does so, he flashes his large white wing patches. Most song flights are given during the first four hours after sunrise, with a lull in the afternoon until just before sunset, when song begins again. When the males first arrive back on the breeding grounds, these displays may be performed communally. The song flights continue at least throughout the incubation period.*

[*Calamospiza melanocorys*, USA.
Photo: Mike Danzenbaker/ AGAMI]

which is reminiscent of the sound made by water being dropped on a hot stove, two or three times, before settling back into the sedge marsh perhaps 100 m from where it first rose to start the display. In the Neotropics, the little Blue-black Grassquit sits on a perch, such as a fence post, and "flits" into the air, flashing the white under its wings, and then drops back to the perch. During these "song-jumps" it gives its buzzy "b-zeer song", or alternatively a simpler "t-s-e-u" song. Song-jumps may be made every few seconds for half an hour or more. The grassquit will also sing while perched.

Aerial displays are obviously useful in communicating information over longer distances, and they are probably particularly useful in environments where there are no convenient singing perches. It is interesting to note that longspurs generally advertise with aerial displays, but when telephone wires are available they will sing from these.



Like other New World sparrows, ***Harris's Sparrow*** *forages on the ground, scratching vigorously in leaves and soil. In the breeding season it also gleans and chases arthropods, and makes aerial sallies to catch insects. Typical breeding habitat includes stands of spruce* (Picea), *and spruce needles and buds are seasonally important in this sparrow's diet. Early in the breeding season, Harris's Sparrows restore their body mass and fat reserves by feeding extensively on tundra fruits such as cranberry* (Vaccinium) *and crowberry* (Empetrum). *Out of season they are often found in mixed flocks with other sparrows, which they tend to dominate by usurping productive food patches.*

[*Zonotrichia querula*, Manitoba, Canada.
Photo: Christian Artuso]

The songs of many grassland sparrows have a buzzy, insect-like quality. It is apparently difficult to pinpoint the source of such songs, and this kind of vocalization also carries well in an open, windy environment. For example, the song of the Grasshopper Sparrow is described as being insect-like, with several buzzy trills on different pitches. That of Le Conte's Sparrow is an insect-like "tzeek-tzzz-tick". The song of Baird's Sparrow has been transcribed as "zhe zhe zheze zurrrrrrr"; the trill at the end of the song is on a lower pitch, and carries well in this species' open environment. Henslow's Sparrow gives a short, but distinctive "tsi-lick", again similar to the sound made by an insect. The song of the Corn Bunting, often given while the bird is in flight, is commonly described as sounding like the sound made by jiggling keys or by splintering glass.

Thicket-dwelling sparrows characteristically have songs that are loud, are often melodious, and can carry for long distances. The Eastern Towhee's song, for instance, is a loud, ringing "drink-your-tea" or "drink-tea". That of the Red Fox-sparrow (*Passerella iliaca*) consists of more than six loud, clear, slurred ringing notes on different pitches, often ending in a phrase that sounds like "aujourd'hui". The song of the Song Sparrow is likewise loud; typically, it starts with two to four loud, clear whistles on the same pitch, followed by a trill, often a buzzy trill, and then several short notes. The songs of Chipping Sparrows and juncos, species that often occur in fairly open woodlands, are similar, and consist of a dry trill, that of the juncos more fluid than that of the Chipping Sparrow.

Several species are known to have geographical song dialects, the Yellowhammer and the Ortolan Bunting being two well-known examples. The song of the Yellowhammer consists of two parts, termed the "initial phrase" and the "final phrase". The male has up to four variations of the initial phrase, these representing song types, whereas the final phrase can differ dialectically. Similarly, the Ortolan Bunting's song has two sections, the second lower-pitched and more melancholy than the first. In this case, it is again the end phrase that is subject to dialectal differences, but often the early phrases of the song also differ regionally.

In the Galapagos Islands, the songs of Darwin's finches consist mostly of various trills and buzzes. The song of the Vegetarian Finch (*Platyspiza crassirostris*), however, is particularly distinctive. It consists of a long, drawn-out nasal note, translit-erated as "ph'wheeeuuuuu-íiíúúú", with the stress towards the end. This note lasts for almost two seconds, and is repeated at intervals. While many of Darwin's finches have a high-pitched call, that of the Vegetarian Finch is most extreme, resembling the electronic sound made when one is tuning in a radio station, "tzeeeeiiiiiiiiippppppp". Its calls also include a rather whining "pheep".

All emberizids have call notes. These can be contact notes or warning notes. They are species-specific, although non-conspecifics often react to warning notes. Although species-specific, some of these calls are far more easily identified than are others. For example, the call note of the Song Sparrow is a distinctive, somewhat hoarse "chimp" or "tchenk", and the alarm call of the Red Fox-sparrow is a loud metallic "thick" or "whack". These are easily told from the notes of other species. On the other hand, the differences between many species are less striking: the Grasshopper Sparrow's call is a weak "tillic", that of the Savannah Sparrow a thin "seet" or "chip", the call of Le Conte's Sparrow a sharp "chip", junco calls a "chip" or "stip", and so on and so forth.

Flight calls are often distinctive, but again there are numerous vocal similarities among many members of the family. Flying longspurs have a flight note that is a whistled "wheere" or, when alarmed, a rattling "tri-ri-rip" or a staccato rattle, "tic-tic-tic-tic". With practice, the notes of the four species of longspur can be differentiated, but they are all similar to one another. In Asia, the calls of the Little Bunting and the Rustic Bunting, when flushed, are very similar, being a hard "tzick" or "pzick", but this note, used for both contact and alarm, is also indistinguishable from the calls of several other buntings, including the Chestnut-eared (*Emberiza fucata*) and Yellow-throated Buntings. Many people find the New World sparrows difficult to distinguish, but learning to identify their vocalizations can be a great help in identification. Indeed, in some instances interspecific differences in vocalizations serve as the most reliable way in which to separate species in the field. This is the case with, for example, Botteri's and Bachman's Sparrows: the ranges of these two just barely overlap, if they do at all, but the species are very different in their songs and habitat preferences. An individual outside its normal range, however, would be hard to identify with certainty unless it sang.



*The foraging **Tristram's Bunting** hops slowly on the ground, turning its head from side to side, in search of seeds and insects. Emberizids generally have a bill that is conical in shape, typical of seed-eating passerines. The upper and lower mandibles of most species are sharply angled downwards at the base, this being especially marked in* Emberiza *buntings. Larger-billed buntings can take a wider range of seeds, including large ones, but smaller species appear to compensate by selecting seeds with higher nutritional value.*

[*Emberiza tristrami*, Fuzhou, Fujian, China. Photo: Dong Lei]

Food and Feeding

Buntings and American sparrows are characteristically and typically seed-eating passerines. The conical bill, which is a defining characteristic of this family, as it is with several other groups of seed-eating birds such as the fringillid finches, the Old World sparrows (Passeridae) and some tanagers, no doubt reflecting convergence, is one of the first things that field biologists look for when trying to identify sparrows.

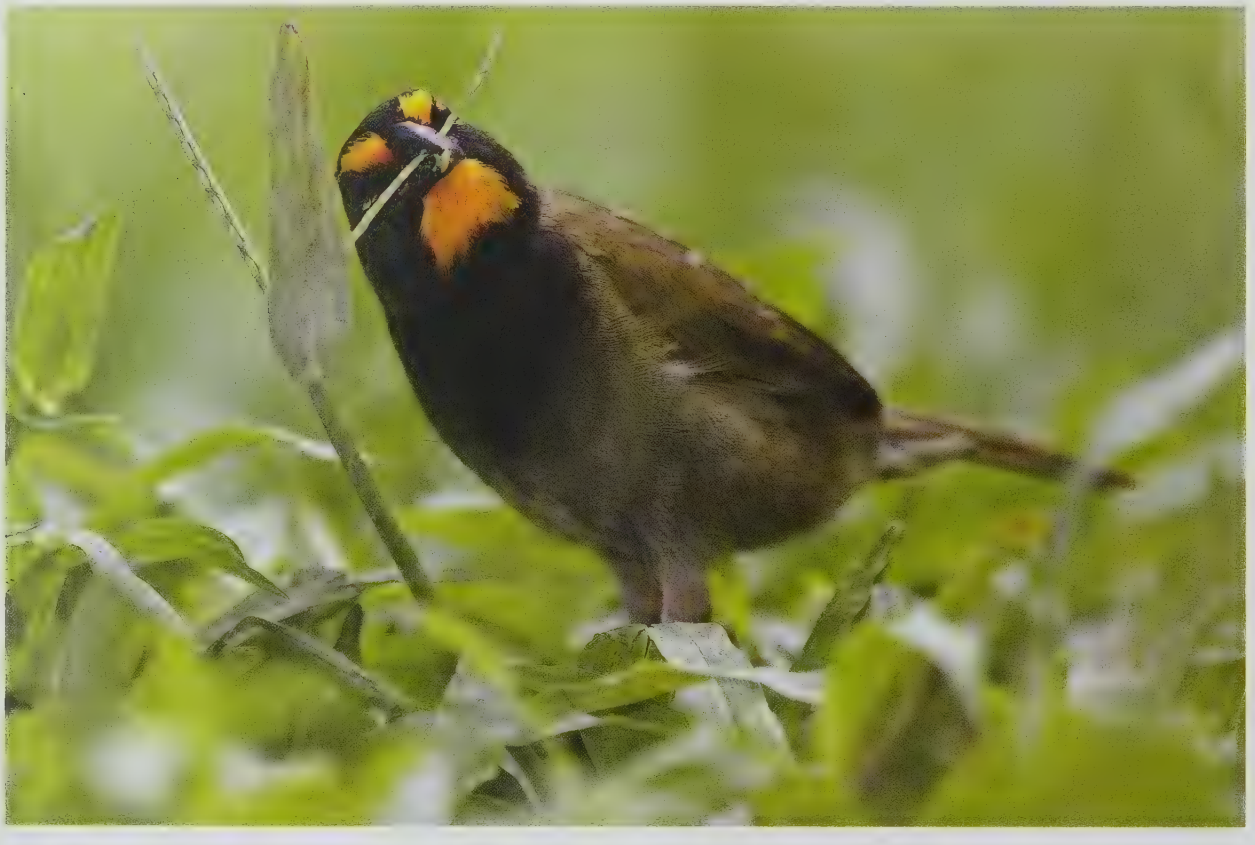
Indeed, seeds comprise an important component of the diet of most of the buntings and New World sparrows, but diets do change seasonally. The majority of the species feed their young with insects and other invertebrates during the nesting season, and berries and other fruits are also commonly taken as food. During the winter months, seeds account for most of the diet, but insects and berries are taken if they are available. Sparrows generally forage on the ground, picking up seeds, or searching under leaves for food, but most emberizids occasionally glean insects and other invertebrates from vegetation.

Although the conical bill is well suited for seed-eating, several grassland-dwelling sparrows, especially those living in xeric grasslands, such as Botteri's Sparrow, the Lark Bunting, the Grasshopper Sparrow, Henslow's Sparrow and McCown's Longspur, have a relatively large bill with which, in summer, they capture and process grasshoppers (Orthoptera) and other large insects. The Large-billed Sparrow, which breeds in saltmarshes in north-west Mexico, captures and eats fiddler crabs (*Uca*). Small species, such as seedeaters and grassquits in the respective genera *Sporophila*, *Volatinia* and *Tiaris*, will forage on grass seedheads while clinging to the stems of grasses, and the Lark-like Bunting (*Emberiza impetuani*) of southern Africa will jump from the ground to pull down grassheads. The Striolated Bunting (*Emberiza striolata*), found from Israel patchily southwards to north-east Africa and eastwards to north-west India, has been observed to forage in the same way, by pulling down grass stems in order to reach the seeds. Aerial flycatching is an uncommon and an unimportant method of food-gathering among these birds, although Lark Buntings fairly frequently hawk flying insects and, in the Palearctic, Crested Buntings and Corn Buntings sometimes catch flying ants in the air. When feeding on berries and other soft fruits, emberizids generally pluck these directly from the plant bearing them, but sometimes they pick them from the ground.

During the breeding season, sparrows generally forage singly or in pairs. After the young have fledged, they often form family groups, at least one parent then accompanying the fledglings for a variable period of time. Sometimes, the brood is divided between the two parents. In the non-breeding season, some species form large flocks. At this time seedeaters and grassquits sometimes gather in large aggregations of mixed composition, but during the breeding season they tend to be territorial, although they may nest locally at high density. In the Great Plains of North America, flocks containing hundreds or even thousands of longspurs are often seen in open fields and pastures during migration and in winter. In the eastern USA in winter, Lapland Longspurs, the only longspur regularly found in the east of the country, are generally present in fields near large lakes, airports or along the Atlantic coast in relatively small numbers, although occasionally in large flocks. Similarly, in England, Lapland Longspurs are found mostly along the east coast during the winter months, with fewer recorded elsewhere in that country. In southern Canada, the northern USA and central Eurasia, large flocks of Snow Buntings often gather in open country and in other open areas, such as along coastal beaches, where they feed on marram grass (*Ammophila*) or wrack, in stubble, or in other open areas not covered by snow. In agricultural areas, some species survive the winter months by feeding on seed at grain silos.

The Blue-black Grassquit feeds mainly on grass seeds. The stomach of one individual from Panama was almost completely filled with the shelled seeds of *Paspalum* and *Panicum*, which made up 98% of the contents, the other 2% consisting of the remains of ants (Formicidae) and beetles (Coleoptera). Seeds of these same grass species also form an important component of the diet of Yellow-faced Grassquits (*Tiaris olivaceus*) in Panama, and seeds of *Solanum*, *Paspalum*, pigweed (*Amaranthus*), *Panicum*, *Sporbolus*, *Carex* and *Chaetochloa* were the principal stomach contents of seven Panamanian Variable Seedeaters (*Sporophila corvina*); only one stomach of the latter contained any animal matter, a fragment of a hymenopteran.

Central American brush-finches appear to have a more varied diet. Of two stomachs of White-browed Brush-finches



Tiaris *grassquits feed extensively on seeds, particularly grass seeds, which they obtain by clinging to the stems. The family also includes a specialist on the seeding heads of bamboo, the Sooty Grassquit* (Tiaris fuliginosus). *As well as the seeds of* Paspalum *and* Panicum *grasses, the* ***Yellow-faced Grassquit*** *sometimes takes insects and berries. It also picks the tiny white protein-rich and glycogen-rich Müllerian bodies from the bases of* Cecropia *leaves. When seeds are scarce,* Tiaris *grassquits will forage high in trees, in the manner of New World warblers (Parulidae).*

[*Tiaris olivaceus pusillus*,
Valle de Antón,
Coclé, Panama.
Photo: Tom Friedel/VIREO]



A hardy sparrow, able to withstand temperatures as low as –28°C if food is available, the ***American Tree Sparrow*** *lives almost exclusively on seeds in winter, including those of pigweed* (Amaranthus), *ragweed* (Ambrosia artemisiifolia) *and beard grass* (Andropogon virginicus). *It forages on the ground, where it scratches in dried grasses, and occasionally in shrubs. It regularly visits feeders in rural areas. In the breeding season its diet can be close to 100% animal. It takes beetles (Coleoptera) and other arthropods from the ground, gleans insects from bushes and occasionally makes flycatching sallies for aerial insects.*

[*Passerella arborea arborea*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]

(*Arremon torquatus*) from Panama, one contained 45% ant material of two different species, 50% seed coverings, and 5% broken pieces of weevils (Curculionidae), whereas the other held 40% seed fragments, 30% grasshopper fragments (Acrididae) and remains of beetles (of families Calandridae, Curculionidae, Elateridae and Carabidae), and 30% hymenopteran (bee and ant) remains. Black-striped Sparrows (*Arremonops conirostris*) have a similarly mixed diet of seeds and insects, the latter including ants, beetles, lacewings (Neuroptera) and caterpillars.

Typically, Palearctic and Nearctic species that live in seasonal environments take much animal food during the summer, also feeding it to their young, and switch to a mostly plant diet in the winter. During the breeding season Lapland Longspurs feed extensively on insects, especially flies (Diptera), although they also take the seeds of grasses and low herbs. They pick invertebrates from low vegetation and sometimes from small trees, foraging as high as 2–3 m up in a tree. Furthermore, they will jump to snatch flying insects, and occasionally hawk insects. They



During the breeding season, the ***Yellow-bridled Finch*** *is found in very sparsely vegetated to grassy alpine habitats. In winter it moves down to other open habitats, including lakesides and seashores, and may mix with its congener, the Canary-winged Finch* (Melanodera melanodera), *in grassy steppes near sea-level. In early spring, pairs can be seen when foraging at the edge of melting snow in the manner of fringillid rosy-finches* (Leucosticte), *taking seeds and arthropods. Yellow-bridled Finches often feed on the petals of introduced dandelions* (Taraxacum).

[*Melanodera xanthogramma xanthogramma*, Tierra del Fuego, Argentina. Photo: Pete Morris]



The diet of the adult ***Black-headed Bunting*** *consists of seeds, including those of grasses and cereals, for much of the year. During the breeding season, when the birds generally forage singly or in pairs, they eat mostly invertebrates, which they take mainly on the ground, but also from bushes and low in trees. At the end of the breeding season they begin to congregate, and during migration are seen in flocks of 10–50 individuals. Winter flocks can be very much larger, often mixed with Red-headed Buntings* (Emberiza bruniceps), *and the two, which have very similar diets, can be found in arable fields, especially cereal stubble and fields where dung has been spread. They forage in farmyards and around grain stores only in very harsh weather, and much less so than the Yellowhammer* (E. citrinella).

[*Emberiza melanocephala*, Lesvos, Greece. Photo: Mathias Schäf]



Like grassquits, Sporophila *seedeaters feed on the seedheads of grass while clinging to the stems. The* ***Wing-barred Seedeater****, a relatively stocky seedeater with a large, short and deep bill, forages in pairs and small flocks. This species also forages in trees, taking fruits and flower buds, and possibly some insects. The Wing-barred Seedeater has been observed to feed on* Cecropia *catkins and on the protein- and glycogen-rich Müllerian bodies at the base of the petioles of* Cecropia *leaves. Outside the breeding season, some seedeater and grassquit species may gather in large mixed feeding flocks.*

[*Sporophila americana americana*, Cayenne, French Guiana. Photo: Olivier Tostain]

will feed on blowfly larvae (Calliphoridae) in animal carcasses, as well as on mosquitoes and chironomids and on lepidopteran larvae, beetles and spiders (Araneae). In the winter months, their diet consists principally of seeds, but they also take invertebrates when these become available. Young Snow Buntings are fed only with invertebrates. This species does most of its foraging on the ground. In spring and summer ice patches are important feeding areas, as large numbers of insects, carried by air currents, are left immobilized on the snow. In addition, this bunting consumes a variety of seeds and berries. In winter, eleven stomachs of Snow Buntings from Romania, in eastern Europe, contained 1322 items of plant material, of which 70% (by number) were knotweed (*Polygonum*), 13% *Celosia*, 7% *Setaria*, 7% wheat, 2% *Echinochloa* and 1% self-heal (*Prunella*); three stomachs contained some insect material, mostly grasshoppers.

Seeds account for 62% of the food taken by Dark-eyed Juncos (*Junco hyemalis*), but there is seasonal variation: in various studies, plant matter makes up 76% of the food taken during November–March, 40% in April–May, 93% in June–August, and 92% in September–October. Commonly eaten seeds include those of chickweed (*Stellaria*), pigweed, alfilaria (*Erodium*), knotweed and sorrel (*Rumex*). Grass seeds are also an important component of this species' diet. During the breeding season, Red Fox-sparrows feed extensively on beetles, fly larvae, caterpillars (Lepidoptera), ants and bees (Hymenoptera), spiders, millipedes (Diplopoda), and small molluscs, including bivalves and snails (Gastropoda), but they also eat the seeds and fruits of *Carex*, *Rubus*, *Potentilla*, *Amelanchier* and a variety of other berries. During the winter period, White-throated Sparrows (*Zonotrichia albicollis*) consume mostly small seeds and fruits, supplemented with insects when available, but in summer they feed primarily on insects, supplemented with greens and fruit.

Nectar is taken by several members of the family. Perhaps the most significant exploitation of this resource is that by the Orangequit in Jamaica, which appears to take large quantities of nectar, supplementing this with fruit of *Cecropia* and figs (*Ficus*), as well as invertebrates and seeds. This small bird has a comparatively narrow, slightly downcurved bill, which it uses also for taking tree sap at holes drilled by sapsuckers (*Sphyrapicus*). Among the other emberizids that exploit nectar as a food are the Cinnamon-breasted Bunting (*Emberiza tapahisi*), the Cinnamon-tailed Sparrow, the Grey Seedeater (*Spermophila intermedia*), the Lesser Antillean Bullfinch, the Cocos Finch (*Pinaroloxias inornata*) and some *Camarhynchus* tree-finches. The Lesser Antillean Bullfinch has been observed to rob flowers of nectar by biting a small hole at the base of the calyx.

Comparatively few details are available with regard to the diets of Neotropical emberizids. From the little that is known, it appears that they differ little from their counterparts in the Northern Hemisphere. The great majority seem to feed predominantly on seeds, with the addition of some fruits and berries. In tropical areas where there is little seasonality, or where the seasons are defined by amount of rainfall, birds of many species may adjust the timing of their breeding to coincide with seasonally available foods, such as fruits and seeds. In Costa Rica, for example, seedeaters generally do not initiate nesting until seeds are abundantly available, which is some weeks after the return of the rains, and the timing of the rains varies from year to year.

Foraging methods vary somewhat. Some species walk slowly while foraging, and then run or hop more rapidly when sighting or pursuing a food item. Some of the larger species, such as the towhees, the fox-sparrows, the *Melospiza* sparrows, the Large-footed Finch (*Pezopetes capitalis*), and some of the large *Aimophila* sparrows such as the Rusty Sparrow, search for food on the ground by using a characteristic method known as a "double-scratch", whereby the bird remains stationary while scratching backwards simultaneously with both feet. Juncos sometimes use this technique when searching in leaf litter, and in open country, when the ground is covered with snow, they will double-scratch backwards for more than 15 cm in a single effort. Savannah Sparrows and White-throated and White-crowned Sparrows, as well as juncos, hop and double-scratch, but apparently the Neotropical Rufous-collared Sparrow (*Zonotrichia capensis*), which hops, does not double-scratch. Saltmarsh Sparrows make use of the double-scratch foraging technique when searching through beach wrack; the large feet of this species seem well adapted for walking in the mud of saltmarshes, and the relatively narrow bill is used in probing into the mud for food.

Brush-finches in the genera *Atlapetes* and *Arremon* are generally found in the dense forest understorey, where they walk,

rather than run. White-browed Brush-finches and Chestnut-capped Brush-finches (*Arremon brunneinucha*) hop on the forest floor, using the bill to flick aside fallen leaves, and picking up the small invertebrates which are often concealed beneath the litter. The Orange-billed Sparrow (*Arremon aurantiirostris*) likewise forages while hopping on the forest floor, seeking food often in dark places with dense, tangled vegetation, but it apparently does not turn over leaves. Similarly, the Black-striped Sparrow hops, but does not walk, when foraging on the ground for its food of insects, small frogs and lizards, and fruits, seeds and berries. *Aimophila* sparrows usually hop when on the ground, but they will walk slowly when foraging, and sometimes run across an open area. Most *Emberiza* buntings generally hop, with the body held low, the Corn Bunting being a typical example.

An interesting adaptation is exhibited by the Reed Bunting, a polytypic species with a widespread distribution across Eurasia, its subspecies having slight differences in bill size and plumage coloration. In the winter, the large-billed races extract invertebrate larvae from inside reed stems, a foraging technique that enables them to remain all year in areas, such as western Mongolia, where the winter temperatures can drop to below minus 30°C (see also Movements).

Even those species which nest above ground, such as the Chipping Sparrow, tend to forage principally on the ground, where they move by hopping. Nevertheless, there are many species which, rather than seeking food directly on the ground, spend much of their time in perching on or clinging to stems of vegetation, especially grasses, in order to reach the seedheads. This is the commonest feeding method of most of the *Sporophila* seedeaters, for example, and is practised by many other species, ranging from buntings to grassquits. Further, many members of the family forage also in bushes and small trees, a few examples being the White-capped (*Emberiza stewarti*) and Yellow-breasted Buntings (*Emberiza aureola*) in Asia and the Golden-breasted Bunting (*Emberiza flaviventris*) in Africa. On arrival on its breeding grounds in Russia, the Yellow-breasted Bunting forages in low herbs and grass, frequently in bushes such as roses (*Rosa*), and also in larch trees (*Larix*), but rarely on bare ground. In Europe and western Asia, the Ortolan Bunting forages both on the ground and among the foliage of bushes, ascending even into the canopy of trees, especially oaks, these being particularly rich in caterpillars, an important food source for rearing the young. It also makes frequent flycatching sallies from bushes and trees. In Middle America, the Black-chested Sparrow in Mexico forages mostly in the canopy of trees, where it catches insects by foliage-gleaning in the manner of a vireo (Vireonidae) or by hover-picking, and in Costa Rica the Yellow-thighed Finch (*Pselliophorus tibialis*) often moves into the treetops to forage. Most members of the Neotropical genus *Poospiza*, the warbling-finches, are arboreal, spending much of their foraging time in trees and bushes, and many of the *Atlapetes* brush-finches tend to be more arboreal, often foraging to 5 m above the ground and sometimes climbing to 10 m. *Tiaris* grassquits will also forage at treetop height, in the manner of a parulid warbler, if seeds are scarce.

In South America, several emberizids are known to follow army ants, at least on occasion. This behaviour has been recorded for the Wedge-tailed Grass-finch (*Emberizoides herbicola*), the Great Pampa-finch (*Embernagra platensis*) and the Long-tailed Reed-finch (*Donacospiza albifrons*), and one would suspect that a number of other members of the family would associate with army ants at times.

Finally, a number of island species deserve special mention for their foraging habits. In the South Atlantic, the Gough Finch forages not only by gleaning from vegetation, including from epiphytic lichens growing on island cape myrtle trees (*Phylica arborea*) and from stems of tree-ferns, but also by using its bill and feet to pull up moss and other loose vegetation in order to expose prey, and to tear apart rotten wood; occasionally, it hawks flying insects. Moreover, it enters the breeding burrows of seabirds, and occasionally scavenges from skua (*Catharacata*) kills.

In the Galapagos Islands, in the eastern Pacific Ocean, the Woodpecker Finch (*Camarhynchus pallidus*) is highly distinctive in its foraging behaviour, which includes crawling along branches and clinging to tree trunks; this unusual finch pecks in the manner of a small woodpecker (Picidae) in order to gain access to larvae inside the timber. It is famed, however, for its ingenious and remarkable use of a tool, generally a short pointed stick, with which it pries out these larvae; observations have revealed that it will search for a short hard twig, break this to the required length, and use it as a spear with which to impale and extract concealed insect



Often perching on grass or weed stems to extract seeds which are still on the stalk, the ***Band-tailed Seedeater*** *is found on shrubby hillsides and grasslands, and also along the edges of agricultural fields and around the outskirts of towns. Generally a mountain and upland species, it may move downslope in winter. It forages on the ground and in low vegetation, with an apparent liking for the seeds of the Compositae family. The Band-tailed Seedeater has a short, conical bill as deep as it is long. Its congener the Paramo Seedeater* (Catamenia homochroa)*, a specialist on* Chusquea *bamboo seed, has a conical bill longer than it is deep.*

[*Catamenia analis analis*, Tunari National Park, Cochabamba, Bolivia. Photo: Daniel Alarcón]





The largest Darwin's finch, the ***Vegetarian Finch****, has a broad, stout bill with a strongly curved culmen, giving the bird an appearance like that of a parrot (Psittacidae). A true vegetarian, it feeds largely on leaves, flowers, buds and fruits. Of the other Darwin's finches, the warbler-finches* (Certhidea) *have a small pointed beak, like that of New World warblers (Parulidae), which they use to probe and manipulate small spiders and insects. The tree-finches* (Camarhynchus) *feed on a variety of insects, fruits and seeds, and have a triangular beak of varying depth and length for probing and gleaning. The ground-finches* (Geospiza) *are mostly granivorous and use their robust and deep bill to crush seeds. The* ***Common Cactus-finch****, however, differs from its congeners in* Geospiza *in having a long, robust, spike-like bill nearly twice as long as it is deep, with which it probes the flowers of prickly pears* (Opuntia). *These flowers account for around one-third of its diet;* Opuntia *seeds make up more than another third, and the rest consists of other small seeds, prickly pear pulp and other fruit, and a tiny proportion of arthropods. The race* intermedia *(shown here) is larger than the nominate, with a proportionately thicker and longer bill.*

[Above: *Platyspiza crassirostris*, Academy Bay, Santa Cruz, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos.

Below: *Geospiza scandens intermedia*, Santa Cruz, Galapagos. Photo: Günter Ziesler]



*The **Peg-billed Finch** has a very peculiarly shaped bill, long and fine yet thicker-based, and appearing constricted about a third of the way along. It is found in more open areas of highland forest and cloudforest, particularly with bamboo thickets. It eats mostly arthropods, but also bamboo seeds, and occasionally takes nectar, reportedly by squeezing flowers. It treats larger berries in a curious manner, piercing them with its bill and carrying them to a horizontal branch, where it squeezes the berry to obtain the juice and then discards the skin.*

[*Acanthidops bairdi*, Cerro de la Muerte, Costa Rica. Photo: Michael & Patricia Fogden]

prey. Equally renowned for its unusual behaviour is another Galapagos resident, the Sharp-beaked Ground-finch. The north-western subspecies *septentrionalis* of this ground-finch, on Darwin Island and Wolf Island, has the most extraordinary habit of drinking blood from seabirds; it pecks at the feather bases of large seabirds, often selecting a spot where a feather is growing, and then drinks the blood as it begins to flow. Apparently, this behaviour has not been recorded on other islands in the Galapagos.

Breeding

The breeding season of the Emberizidae across the Holarctic Region is generally coincident with the summer months, with a moderate degree of variation according to latitude. In the Neotropical and Afrotropical Regions, and to a large extent also in the Oriental Region, breeding is linked with the rainy seasons. In many of these areas breeding activity is at a peak towards the end of the



*Studies of the **Yellowhammer** in UK farmland during autumn and winter reveal a high consumption of cereal grain, with wheat and oats (shown here) constantly preferred over barley. The seeds of a few common agricultural weed species are also taken, in proportion to their availability and size. Yellowhammers forage almost exclusively on the ground, but are recorded also as clinging to tall foodplants, especially during snowfalls. Outside the breeding season, they feed in flocks of variable size, usually numbering tens of individuals, but occasionally hundreds. Flocks of up to 3000 have been recorded in Germany.*

[*Emberiza citrinella citrinella*, Finland. Photo: Jari Peltomäki/ AGAMI]





The end of winter and the early spring can be a lean time, with seed resources depleted and insects not yet abundant. Studies of the ***Field Sparrow*** *found that birds which bred and wintered in the same habitat patches had higher levels of fat in winter, leading to better survival, than did those which dispersed. The* ***White-throated Sparrow*** *feeds mostly on seeds and small fruits in winter, but in summer supplements its insect diet with green leaves.*

[Left: *Spizella pusilla pusilla*, Québec, Canada. Photo: Alain Hogue.

Right: *Zonotrichia albicollis*, Chicago, Illinois, USA. Photo: Rob Curtis/ The Early Birder]

main rains and often extending a little into the dry season. In regions where rainfall is lighter, or unpredictable, as, for instance in Mexico and much of sub-Saharan Africa, or in arid areas anywhere within the family's breeding range, the onset of rain normally heralds the start of breeding. In a study of Lined Seedeaters (*Sporophila lineola*) in South America, L. S. de Oliveira and colleagues found that the nesting season of this species in south-east Brazil, previously believed to cover only December to February, did in fact extend from mid-November to mid-April, a period of approximately five months. In the same region, the nesting period of the Double-collared Seedeater (*Sporophila caerulescens*) has been recorded as December–May, and the breeding seasons of the Rusty-collared Seedeater (*Sporophila collaris*) and Tawny-bellied Seedeater in north Argentina span, respectively, November to April and October to March. Thus, whereas many other birds in the region start to breed in September, at the end of the dry



The 15 species of Poospiza *warbling-finch forage at different levels and often consume quite different types of food. The* ***Black-capped Warbling-finch*** *forages largely in shrubbery, scrub and small trees. A number of other species are more arboreal. The Ringed Warbling-finch* (Poospiza torquata) *feeds largely on arthropods in the breeding season, in contrast to the sympatric Cinnamon Warbling-finch* (P. ornata)*, which relies on grass seeds. The Chestnut-breasted Mountain-finch* (P. caesar) *is more terrestrial than its congeners, foraging mostly on the ground and otherwise skulking in dense vegetation close to the ground.*

[*Poospiza melanoleuca*, Samaipata, Bolivia. Photo: Joe Tobias]



*Fruit is just one element in the diet of the **Cuban Bullfinch**, which also eats insects and seeds, and forages near the ground as well as in the canopy. Another Caribbean bullfinch, the Puerto Rican Bullfinch* (Loxigilla portoricensis), *has been observed to mandibulate mistletoe (Loranthaceae) fruit and discard the skin before swallowing the seeds. The Lesser Antillean Bullfinch* (L. noctis) *uses its foot to secure the fruits on which it feeds, stepping on the fruit to press it against the branch. Lesser Antillean Bullfinches also rob flowers of nectar by biting a small hole at the base of the calyx.*

[*Melopyrrha nigra nigra*, Cayo Coco, Cuba. Photo: Zhao Chao]

season, *Sporophila* seedeaters appear to wait until the start of the heavy rains in November/December before beginning their breeding activities.

Most emberizids are socially monogamous. This statement should, however, be accompanied by the caveat that little or nothing is known about the mating systems of most New World sparrows and buntings, and it has generally been assumed, probably for historical reasons, that monogamy is the norm. Nonetheless, most members of this family that have been studied in depth do appear to be monogamous. In other words, the general picture at any given time has been that one male and one female appear to be associated with each other and with a nest; hence, it is reasonable to assume that they are in a monogamous relationship. Molecular methods, however, have enabled ornithologists to determine, for the relatively few species studied to date, that many nests of seemingly monogamous pairs contain young from extra-pair matings, and it may be safe to assume that both males and females of many, if not most, passerine species seek extra-pair copulations. As a result, biologists increasingly refer to species as being "socially monogamous": they appear to be monogamous, but they may well not strictly be so.

A few emberizids have been found to be polygynous, and these are discussed in more detail below.

The breeding biology of the well-studied Song Sparrow can be taken as typical of that of a north-temperate, socially monogamous breeder. Polygyny by this species is rare, but microsatellites in nuclear DNA reveal that more than 15% of 200 young were not sired by the social mate. M. M. Nice's classic studies of Song Sparrows in Ohio, in the eastern USA, have served as a model for studies of the life history of songbirds; R. F. Johnston's work with the species in San Francisco Bay, in California, and the research undertaken by J. Smith and his students on the Song Sparrows of Mandarte Island, in extreme south-west British Columbia, are other thorough studies of this species, in different parts of its range. In migratory populations, the females arrive on the breeding grounds in middle to late spring onto territories already occupied by males, which arrived earlier. In the southern part of the breeding range in eastern North America, some individuals are resident and may remain paired throughout the year; otherwise, females mate with a replacement male. In the south-west, on the saltmarshes of San Francisco Bay, where they are resident, Song Sparrows may start to breed as early as the second week of February, and on Mandarte Island nesting may take place as early as late February, whereas those birds resident in the Aleutian Islands of south-west Alaska, do not breed until mid-May. Generally, nesting is initiated later at high latitudes, but the San Francisco Bay residents may nest exceptionally early, apparently to reduce the risk of flooding by high tides.

Males are territorial, and during the egg-laying period they stay close to their mates, this being a probable instance of mate-guarding. In Ohio, the first eggs are laid from the middle to the end of April; in Ontario, in south Canada, egg-laying begins in mid-April, and in Massachusetts, in the north-east USA, it commences in very late April or early May. Clutch sizes typically range from three to five eggs, with occasional records of one or six, and are somewhat larger among migratory populations. There is some latitudinal variation in clutch size, with averages of just over three eggs for a small sample in Baja California, in north-west Mexico, just over four in Ohio, and 4·17 in Alaska; second clutches average slightly larger than first clutches. The eggs are laid at a rate of one per day. Although up to seven clutches may be produced in a single year, Song Sparrows are generally double-brooded or triple-brooded, and as many as four successful clutches have been recorded. The eggs are ovate, blue or blue-green to grey-green, generally speckled over the entire surface of the shell, perhaps with some irregular large spots at the large end of the egg. The nest, which is built by the female, is a well-constructed open cup made from dry grass, plant stems, dry leaves and strips of bark, lined with soft grasses, rootlets and sometimes hair, and is generally placed on the ground under a grass tuft or shrub. Some Alaskan populations commonly build their nests 1 m up in a conifer, and nests as high as 4 m and, rarely, 9 m above the ground have been reported.

Only females develop an incubation patch and incubate the eggs. Males rarely visit the nest during the incubation period, which lasts for 12–15 days, a typical figure being 13 days, but they may bring insects to the female on the nest. Both parents feed the young, and the male assumes a larger responsibility for the feeding of the brood once they fledge, and when the female renests. On leaving the nest, after about ten days, the young disperse throughout the territory; there is some brood division, each parent assuming responsibility for one or more young. The









Geospiza *ground-finches differ in the size and shape of their bill and in their body size, but are very similar in terms of plumage. The* ***Small Ground-finch*** *has a small and dainty bill, slightly longer than it is deep and more triangular than the bill of the* ***Medium Ground-finch****, which is more round-topped and relatively thick. The* ***Large Cactus-finch*** *has a bill which is thick yet long, while the massive bill of the* ***Large Ground-finch*** *appears as deep as its entire head. Species with a large beak can eat larger and harder seeds and fruits than species with a small beak, and tend to have a more diverse diet. The bulk of the Small Ground-finch's diet is mostly small seeds. The variety of available foods, however, influences large species more than it does small species. The Large Cactus-finch and Large Ground-finch (shown here eating a* Bursera *fruit) occur only at sites where plants producing large and hard seeds and fruits are plentiful. Thanks to its intermediate bill size, the Medium Ground-finch (here eating a* Scutia *fruit) is able to eat a more varied diet and to change its diet according to availability.*

[Above left: *Geospiza fuliginosa*, Academy Bay, Santa Cruz, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos.

Above right: *Geospiza fortis*, Academy Bay, Santa Cruz, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos.

Below left: *Geospiza conirostris conirostris*, Punta Cevallos, Española, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos.

Below right: *Geospiza magnirostris*, Genovesa, Galapagos. Photo: Mark Jones/ Roving Tortoise Photos]



*This **Wing-barred Seedeater** is feeding on the nutritious Müllerian bodies at the base of a* Cecropia *leaf. These bodies appear to have evolved to provide food for ants (Formicidae), but the insects are unlikely to be the target of the seedeater's foraging activities. When the stomach contents of seven Variable Seedeaters* (Sporophila corvina)*, a closely related species, were examined in Panama, only one contained any trace of animal matter: a fragment of a hymenopteran (bee or ant). Even nestlings of these species are fed primarily with grass seeds.*

[*Sporophila americana*, Paramaribo, Suriname. Photo: Edward Vercruysse]

young become independent of their parents at 24–30 days, and may then form loose flocks of up to 20 individuals. Young males start to sing a subsong from low perches from about mid-summer to early autumn.

Although Song Sparrows are generally monogamous, up to 21% of females and 13% of males may breed in polygamous groups. In Ohio, Nice found four bigamous males in six years, representing 2·3% of observations, and in British Columbia about 3% of the males on Mandarte Island were polygynous, with males rarely mated to three females. On one small island in British Columbia where only five adults were present, one male had four mates. Polygynous groups may form when a territorial male annexes the adjacent territory and mate of a male that has gone missing; or a female "floater" may settle on the territory of an already mated male. Males generally assist in the feeding only of the first brood to hatch, suggesting that there is selection against



*Although foraging mostly on or near the ground or low in vegetation, **McCown's Longspur** will occasionally pursue flying insects. Its relatively big bill enables it to capture quite large prey, including grasshoppers (Orthoptera) and dragonflies (Odonata). In one study in the short-grass prairies of Pawnee National Grassland, in Colorado, about a third of insect prey was captured by hawking, 14% by gleaning, and the rest by stalking. Ants (Formicidae) are another significant food item. While the young are fed with insects, the bulk of the adult diet, even during breeding, is weed, grass and cereal seeds.*

[*Rhynchophanes mccownii*, Pawnee National Grassland, Colorado, USA. Photo: Roberta Olenick/ photolibrary.com]

females joining a polygynous group. Unaided females raise about half as many young as females with male help.

The mating system of the Savannah Sparrow is similar to that of the Song Sparrow, except that in some areas males are routinely polygynous. As is typical of New World sparrows, a pair-bond is formed on the breeding grounds soon after the females arrive. The female alone builds the nest and incubates the eggs. The nest is a shallow cup of woven grasses, and is generally placed in a shallow depression in the ground, often partly covered by a canopy of dead grasses or herbs, situated at the base of a small woody shrub. Once the eggs have hatched, the male actively helps to feed and tend the chicks. When the young leave the nest, both parents may accompany the fledglings, or this may be done principally by the male, while the female lays a second clutch. In the northern part of the range, for example at Churchill, Manitoba, there may be enough time only for a single clutch, or, if the first clutch is destroyed early during incubation, a replacement clutch may be attempted. If time permits more than one clutch to be produced, however, males may become polygynous. In the Canadian Maritime Provinces, perhaps particularly on islands, such as Sable Island, in Nova Scotia, and Kent Island, in New Brunswick, the summer season is long and cool. There, while the female sits on her first set of eggs, a male may attract a second mate, which also lays a clutch of eggs. When the eggs of his first mate hatch, the male helps her to feed the young, while his second mate is incubating her eggs. When the first brood leaves the nest, the male accompanies the fledglings while this mate lays a second clutch. When the eggs of the male's second mate hatch, he will help her to feed those young as well. So, by staggering the clutches, the male can be sequentially polygynous, and still assist both of his mates in provisioning the young. On Sable Island, females can produce as many as four broods in a season, and a number of the males, varying from 5% to 47% annually, are polygynous; on Kent Island, about 20% of the males are polygynous. On the other hand, at Churchill, where the breeding season is short, polygyny, although sometimes attempted, is essentially non-existent, probably because the females are highly synchronous in their laying times, and the males cannot effectively help two different females at the same time. Apparent mate-guarding occurs, but molecular studies showed that, of seven nests on Kent Island, four contained the young of extra-pair males, and about 25% of the young are produced by extra-pair copulations.

Male Nelson's Sparrows are non-territorial and both sexes are promiscuous. During the egg-laying stage of the cycle, the female mates with several different males, and the males, in turn, mate with many different females. For the most part, the female alone incubates the eggs. Males of the closely related Saltmarsh Sparrow, on the other hand, are apparently monogamous, and the male occasionally feeds the young. Smith's Longspurs do not form any pair-bond. Breeding females of this species will mate with several different males, usually two or three, sometimes more, often copulating about seven times per hour when in the laying phase, and the males mate with more than one female. In nine of twelve nests studied, the broods were found to have mixed parenthood. A dominance hierarchy is established among the male longspurs mating with a female, and the *alpha* male fathers about 67% of the chicks. Males help to feed the young, and females, by mating with more than one male, may receive help from several different males. Rising found that males of these promiscuous species tend to have larger testes in relation to body size than those of monogamous species, which presumably reflects selection driven by sperm competition. Interestingly, agonistic interactions do not occur, or at least are rare, among promiscuous species.

Lark Buntings nest in hot, sunny areas in short-grass prairie with sparse, scattered shrubs. A shaded nest-site is an important component of a male's territory, and a male having a good territory that offers more than one suitable nest-site can sometimes attract more than a single female, especially where breeding densities are high. Co-operative breeding has rarely been recorded for emberizids, but, in one study of nine Lark Bunting nests in Utah, two had male helpers; in that population there was a surplus of males, and thus many unmated individuals.

Pair-bonds formed by the Corn Bunting are not strong. The sexes are rarely together except for sexual reasons. Corn Buntings are solitary and territorial, but their territories can be tightly clumped. Males arrive on territory a considerable time before the females. Males in a single area may be a mix of unmated, monogamous and polygynous individuals. Of 75 males in a study in Lancashire, north-west England, 72% were monogamous, 19% polygynous and 9% unmated; females were not found to be pro-



*The **Chestnut-capped Brush-finch** searches for invertebrate prey in leaf litter. It turns over leaves with its bill, but, unlike many emberizids, does not scratch with its feet. These brush-finches also glean for insects and spiders in low vegetation. They forage alone or in pairs and sometimes follow army-ant (Formicidae) swarms. Stomach contents of the White-browed Brush-finch* (Arremon torquatus), *which replaces the Chestnut-capped on higher (and sometimes lower) slopes, comprised 40–50% seeds and 50–60% insects.*

[*Arremon brunneinucha frontalis*, Bellavista Cloud Forest Reserve, Tandayapa Valley, Ecuador. Photo: Tui de Roy/ Roving Tortoise Photos]



*The bill of the tiny **Lined Seedeater**, short, thick and rounded, seems quite unsuited to catching invertebrates. But these birds, which feed largely on grass seeds, have been seen to carry caterpillars and dragonflies (Odonata) to their nestlings. This bird's target could be the spider, or perhaps insects caught in its web. Others in this group may turn to small invertebrates in the dry season, when seeds are hard to come by. Three Grey Seedeaters* (Sporophila intermedia) *made "expert" sallies of 2–4 m to catch winged termites (Isoptera) emerging from a nest, and others have been seen to sally from perches in flycatcher (Muscicapidae) style.*

[*Sporophila lineola*, Intervales State Park, Ribeirão Grande, São Paulo, Brazil. Photo: Edson Endrigo]

miscuous. On North Uist, in the Western Isles of Scotland, about 24% of males were unmated, 41% were monogamous and 33% were polygynous. There, the polygynous males generally had two females, with a maximum of three; in a study in Sussex, in southern England, however, a male was found to be consorting with up to as many as 18 females, six of them simultaneously. Female Corn Buntings may arrive in groups, and build nests. The female alone incubates, but males may help with the provisioning of the young, the male contribution varying from zero to 50%. At one nest, following the disappearance of the female four days after the young had hatched, one male fed the brood on his own, with no assistance. The broods of primary and secondary females are provisioned equally by polygynous males, and mates of polygynous males may help to feed the young of other broods.

Lekking, in the usual sense of the term, is not a characteristic of this group, but a form of it in a broad sense does perhaps occur. Several emberizid species nest at high densities, a number of different males displaying next to one another at the same time. This is true of the Lark Bunting, as well as the longspurs and the two snow buntings, and also some other open-country breeders such as Cassin's Sparrow. The Blue-black Grassquit of Middle and South America is often found at high density. The males of this little seedeater display by jumping 30–45 cm up into the air, while uttering a simple song and flashing the white patch on the underwing, before dropping down to the same perch (see Voice). The unaided human eye sees only one flash, but slow-motion photography reveals that the grassquit often flashes the underwing patch several times during the total duration of the jump. This display may be repeated every few seconds for at least half an hour.

Most members of the family sing from a perch, usually an exposed one, but many species that breed in open country have elaborate aerial displays. This is true of all of the longspurs, but especially of McCown's and the Chestnut-collared Longspurs. McCown's flies up into the air and, with slow, deep, stiff wingbeats, floats down to the ground while singing. This is very like the aerial display of the Lark-like Bunting of southern Africa and the Lark Bunting of the New World. Cassin's Sparrow, similarly, rises into the air and then sings while floating back down to earth; it will also sometimes sing from a perch on a shrub or fence post. Nelson's Sparrow, a non-territorial species, takes off, uttering "pshhh'tpt" notes, climbs to 20 m, sings, and then glides forwards and downwards, singing for a second and sometimes a third time, before dropping back into the vegetation, perhaps at a spot more than 100 m from where it started. The song of the closely related Saltmarsh Sparrow is much simpler, as also is its aerial display.

Characteristically, buntings and New World sparrows and seedeaters build an open cup-nest of woven grasses and plant fibres, rootlets and similar material. These are placed on or near the ground, often low down in a small bush, and are well concealed. Some species, such as the Rock Bunting, regularly secrete the nest in a rock crevice or some similar site. In Africa, however, it is suspected that Brown-rumped Buntings (*Emberiza affinis*) nest in cavities in termitaria, although this remains to be confirmed. Chipping Sparrows, which frequent open woodlands or woodland edge and often sing from a tree, sometimes place their nests on the ground, but more commonly they select a nest-site 1–3 m up in a bush or a small tree, and occasionally as high as 19 m above the ground.

When flushed from the nest, many sparrows perform a "rodent-run" or "broken-wing" distraction display, designed to lure the human intruder away from the nest and its surroundings. This is a common behavioural device used by many ground-nesting bird species, and is particularly well developed among the shorebirds (Charadriiformes). It is interesting that sparrows are among the comparatively few passerines to adopt the technique.

Brood parasitism of Song Sparrows by Brown-headed Cowbirds (*Molothrus ater*) is common in areas where the two co-occur. The cowbirds commonly eject the Song Sparrow's eggs, and parasitized nests produce about one fledgling fewer than non-parasitized ones. This cowbird lays in the nests of many emberizids in North America. Dark-eyed Juncos are common hosts in the south of their range, and many *Ammodramus* species and a wide range of other sparrows are parasitized at times, but the fox-sparrows are only rarely victims of the





*The **Woodpecker Finch** of the Galapagos Islands has a bill approximately twice as long as its base depth, together with strong legs and large feet. Ecologically, it fills the role of a woodpecker (Picidae) or nuthatch (Sittidae), creeping along branches and probing in bark and even in clumps of dry leaves. Like a small woodpecker, it pecks through branches and trunks to get at the larvae of wood-boring beetles (Coleoptera), and uses its long bill to lever off chunks of bark. It also makes ingenious use of a tool, usually a short pointed stick, to prise out beetle larvae. Observations have revealed that it will search for a short, hard twig or cactus spine, break it to the required length, and use it as a spear to impale and extract its prey; it usually breaks off any protruding side twigs, which would prevent the "tool" from sliding into a crevice or hole. This technique enables the Woodpecker Finch to exploit a foraging substrate which is not available to any other species of Darwin's finch. Its nearest competitor is the Large Tree-finch* (Camarhynchus psittacula), *which has a bill approximately as deep as it is long, with mandibles that cross at the tips. This species collects arthropods mainly by biting through the bark of twigs and leaf petioles, rather than, as the Woodpecker Finch does, pecking through the bark of branches and trunks. It also probes dead branches, moss and bunches of dead leaves. In the dry season, the Woodpecker Finch turns to probing moss, rather than bark.*

[*Camarhynchus pallidus*, Santa Cruz, Galapagos. Photos: Tui de Roy/ Roving Tortoise Photos]



*The **Small Ground-finch** has been observed removing ticks (Ixodoidea) from marine iguanas* (Amblyrhynchus cristatus), *Galapagos land iguanas* (Conolophus subcristatus) *and Galapagos tortoises* (Chelonoidis nigra). *This behaviour, however, varies among islands. Small Ground-finches are regularly seen cleaning land iguanas on Fernandina and on Plaza Sur (off Santa Cruz), but not a single instance was reported on Santa Fe during 5200 man-hours of observation of these reptiles. Similarly, the Medium Ground-finch* (Geospiza fortis) *cleans tortoises on Isabela, but not on Santa Cruz or Pinzón, although the finch is common on both islands.*

[*Geospiza fuliginosa*, Santiago, Galapagos. Photo: Greg Lasley/ VIREO]

cowbird. Lark Bunting nests are sometimes parasitized by Brown-headed Cowbirds, but the frequency of this is very low. The Olive Sparrow (*Arremonops rufivirgatus*) is a frequent host of the Bronzed Cowbird (*Molothrus aeneus*); most of its nests in south Texas are parasitized, to the extent that the sparrow's clutches suffer a reduction of 78%. In western North America and Mexico, both the Spotted and the Canyon Towhees are parasitized not only by the Brown-headed Cowbird, but also by the Bronzed Cowbird.

In South America, it is the Shiny Cowbird (*Molothrus bonariensis*) that is the common brood parasite. This species is known to lay in the nests of a number of emberizids, and probably parasitizes others yet to be discovered. The Common Diuca-finch (*Diuca diuca*), for example, is frequently parasitized by the Shiny Cowbird, as also is the Many-colored Chaco Finch (*Saltatricula multicolor*), while the Stripe-capped Sparrow (*Rhynchospiza strigiceps*) is occasionally victimized. In its small range in north-west Peru, the Cinereous Finch (*Piezorina cin-*



*The **Gough Finch** spends about 80% of its foraging time in searching for invertebrates, but also eats fruit and grass seeds, and scavenges broken eggs and carrion. Here, a juvenile is feeding on the carcass of a petrel (Procellariidae) killed by a skua (Stercorariidae). Gough Finches also enter seabird burrows, pull up moss and other loose vegetation with the bill or feet to expose prey, rummage in beached seaweed, and tear apart rotten wood.*

[*Rowettia goughensis*, Gough Island, Tristan da Cunha Group. Photo: Tui de Roy/ Roving Tortoise Photos]





On Darwin Island and Wolf Island, in the Galapagos Archipelago, the subspecies septentrionalis *of the* ***Sharp-beaked Ground-finch*** *drinks blood from seabirds. This race has a longer, sharper and more pointed bill than the other races, which have not developed this feeding behaviour. The* septentrionalis *finches peck at the feather bases of large seabirds such as the Masked Booby* (Sula dactylatra), *often where a feather is growing, and then "lick up" the blood as it begins to flow. The boobies do their best to dislodge the "vampire" finches. Large Cactus-finches* (Geospiza conirostris) *drink blood from already wounded booby nestlings, but do not inflict the wounds themselves. (The Galapagos Masked Boobies, incidentally, are often treated as a distinct species,* Sula granti, *the "Nazca Booby".) Sharp-beaked Ground-finches also break seabird eggs two or three times their own size by bracing themselves against them and rolling them down a slope or over a ledge, a technique used by Small Ground-finches* (G. fuliginosa) *and Large Cactus-finches when moving stones in search of arthropods. The last two species are said to capture spiders by hauling them up on their own threads, using one foot to hold down each loop of thread.*

[*Geospiza difficilis septentrionalis*, Wolf Island, Galapagos. Photos: Tui de Roy/ Roving Tortoise Photos]



Rain seeps between the strata of rock in these cliffs, before evaporating, leaving behind a deposit of salts and minerals which these ***Greater Yellow-finches*** *may be consuming. The Cinnamon-breasted Bunting* (Emberiza tahapisi) *is also known to visit saltlicks. It is possible, however, that the birds are taking advantage of the water itself, a rare commodity in the high, harsh, rocky and arid terrain where they live.*

[*Sicalis auriventris*, Reserva Provincial Auca Mahuida, Neuquén, Argentina. Photo: Darío Podestá]

erea) is heavily parasitized by this cowbird, and appears sometimes to build new lining on top of its own parasitized nest. Similarly, the Pale-headed Brush-finch (*Atlapetes pallidiceps*) is a very common host of the Shiny Cowbird; at two monitored sites, the rates of brood parasitism suffered by the brush-finch were 15%–61%, and in a 2002 study success was only 0·74 young per breeding pair.

There are no cowbirds in the Old World, but there are brood-parasitic cuckoos, and these do lay in bunting nests. This is not, however, as widespread a problem as that posed by the cowbirds in the New World. In Asia, Common Cuckoos (*Cuculus canorus*) occasionally lay their eggs in the nests of Crested and Jankowski's Buntings, and in Europe there are records of similarly parasitized nests of the Yellowhammer, Lapland Longspur, and Rock, Reed and Cirl Buntings (*Emberiza cirlus*); indeed, in Bulgaria, eight out of 90 Corn Bunting nests monitored were found to be thus parasitized. In Africa, Golden-breasted Buntings are occasionally parasitized by the Diederik Cuckoo (*Chrysococcyx caprius*) and



The ***Corn Bunting*** *drinks by filling its beak and raising its head to swallow. Corn Buntings tend to avoid the company of other bunting species, but* Emberiza *species which normally flock only with their own kind may mingle with congenerics and with fringillid finches at drinking places. The Meadow Bunting* (Emberiza cioides) *and the White-capped Bunting* (E. stewarti) *visit drinking sites first thing in the morning and again in late afternoon, but the Grey-necked Bunting* (E. buchanani) *feeds from early morning until mid-morning before flying to a water source to drink, resuming its foraging in the early evening.*

[*Emberiza calandra calandra*, Extremadura, Spain. Photo: Mathias Schäf]



*The **Black-crested Finch** is a bird of the Dry Chaco, and its congener, the Grey-crested Finch* (Lophospingus griseocristatus), *lives in even more arid desert and near-desert habitats. Emberizids show a number of adaptations for coping without fresh drinking water. Studies in Chile found that total water requirements of Rufous-collared Sparrows* (Zonotrichia capensis) *from deserts were far lower than those of the same species from more humid areas. Saltmarsh-dwelling sparrows can drink saltier water than other sparrow species can tolerate.*

[*Lophospingus pusillus*, Chancaní Natural Reserve, Córdoba, Argentina. Photo: Roberto Mario Güller]

Cabanis's Bunting (*Emberiza cabanisi*) by Klaas's Cuckoo (*Chrysococcyx klaas*). Otherwise, cuckoos generally appear to have little interest in buntings as potential hosts.

Movements

Most of the buntings and New World sparrows that breed in the Northern Hemisphere are migratory. In fact, all of those breeding in Canada and Alaska migrate, although a few individual Song Sparrows can be found during the winter months in southern Canada, and the subspecies *pugetensis* and *nuttalli* of the White-crowned Sparrow are resident on the west coast of North America from south-west British Columbia south to central California. Western populations of fox-sparrows move from their highland breeding grounds to the coast in winter, as do some Bell's Sparrows in California. A similar pattern prevails in the Palearctic Region, where virtually all emberizids breeding in the northern parts migrate south in the autumn, a few individuals remaining well north, and southern breeders tend to be residents. For example, the Yellowhammer is partially migratory, most of its populations displaying some migration or dispersal. All of the northernmost breeders migrate, but they generally winter within the breeding range of the species, occupying much the same habitats as those used when breeding. In southern South America, some species undertake a northward movement during the austral autumn, but most of the Neotropical members of this family are essentially resident, or wander locally or altitudinally. The Afrotropical buntings are for the most part resident or variably nomadic.

Emberizids are both nocturnal and diurnal migrants. Flocks of, for example, longspurs and snow buntings can be observed during the day as they pass through an area, generally at low altitude and quite often within 10 m of the ground, but these and other migratory members of the family certainly move at night, as well.

It is probably usual for the northernmost breeding individuals of a population to migrate farther southwards than those members of the same species that breed in the southernmost part of the range. In North America, this phenomenon, known as "leap-frog migration", has perhaps been best demonstrated in the case of the western populations of *Passerella* fox-sparrows. Fox-sparrows that breed in the Aleutian Islands and Kodiak Island, in western Alaska, migrate south to as far as south-western California; those breeding in south-central Alaska winter from south Washington south to south-western California; populations breeding from south-western Alaska to central-western British Columbia move southward to winter quarters from western Oregon south to west-central California; and fox-sparrows that breed in the Queen Charlotte Islands, off northern British Columbia, migrate south to west-central California. A similar pattern can be seen for

*The displaying male **Blue-black Grassquit** jumps vertically from a perch, flapping his wings to expose the white patch at the base of the underwing. He may jump up to 15 times in a minute, and flashes his wing patch 5–6 times in each 30–50 cm jump. Males have larger wings and a smaller body mass than the breeding female. The peak of display activity is in the morning, and a number of males may display in a cluster, similar in appearance to a lek. Unlike true lekking species, however, the males help to build the nest and feed the chicks.*

[*Volatinia jacarina jacarina*, Concepción, NW Santa Cruz, Bolivia. Photo: Daniel Alarcón]



other populations of fox-sparrows, those in the southernmost parts of the breeding range moving to the most northerly parts of the winter range.

Differences between the sexes are sometimes apparent. For example, male Dark-eyed Juncos, on average, do not winter so far south as the females, and, as with most New World sparrows, the males tend to migrate earlier in spring than the females, arriving on the nesting grounds before the females. There is apparently no difference in the wintering ranges of male and female Savannah Sparrows or in those of male and female White-crowned Sparrows, and, because these species exhibit no sexual plumage dimorphism, it is difficult to determine whether there are any differences between the sexes in the timing of migratory movements.

In general, individual sparrows breeding at high elevations descend to lower levels in the winter, and some perhaps move southwards or, in the Southern Hemisphere, northwards, as well. Although the proximal cues to migration appear to be changes in the photoperiod, the ultimate reason for such movements is the need to have access to food. Most sparrows feed extensively on the ground, but, if the ground is snow-covered, they cannot get to their food, and as a consequence they migrate to regions with a more reliable food supply. Food, rather than temperature, seems to be the important factor to them, as well as to most other songbirds. In North America, many sparrows do not generally migrate farther south than southern Pennsylvania, Missouri and areas at similar latitude, where there is generally some ground that is not covered by snow during the winter; few fly south of central Mexico.

The Lark Bunting is a good example of a migratory North American emberizid. It breeds from south Canada southwards through the Great Plains of the USA, and it migrates to non-breeding grounds in the southern states and into the northern half of Mexico. After breeding, the adult males migrate earlier than the females or young, and the adult females appear to move south earlier than the juveniles. Although migrants are found from July, sometimes in good numbers, in southern Arizona, the species does not leave its south Canadian breeding grounds until late July and early August, which suggests that the northern populations migrate later than those farther south. In south-west Texas, passage of this species reaches a peak in early September, and in much of the breeding range migration has finished by the end of that month. Lark Buntings arrive on wintering grounds in northern Mexico by early August, larger flocks becoming more prominent by mid-August. Departure from the Mexican wintering grounds begins as early as February, but some remain in Sonora into April or even, rarely, May. The earliest migrants reach Texas in early March, but passage numbers do not increase until late April, reaching a peak in the first two weeks of May. The first individuals arrive at the northern edge of the range in late May, males approximately a week ahead of the females. Vagrants of this species are observed on both coasts in both seasons, on the west coast more often in autumn.

American sparrows are not normally long-distance migrants, and are generally scarce on the islands of the Caribbean. In contrast, many of the buntings of Europe and Asia are true long-distance migrants, some of them undertaking exceptionally long flights to and from their breeding grounds in the north of the region. Some of these movements are detailed in the following paragraphs.

One well-known example of a long-distance migrant is the Ortolan Bunting. This attractive species breeds from Fennoscandia and Germany eastwards in Asia to central Mongolia, and, in the south, from Iberia east very patchily to north Iran and south Turkmenistan. The entire population, after breeding, migrates to the northern part of sub-Saharan Africa. Most depart during the period from mid-August to mid-September, more northerly breeders often earlier, from July. Individuals that breed in western Europe probably move across the Strait of Gibraltar and along the coast of north-west Africa, and their non-breeding quarters are thought to be in the mountain ranges of Sierra Leone and Guinea, with a likely extension eastwards to Nigeria. Ortolan Buntings breeding in eastern Europe and in Asia fly around the eastern end of the Mediterranean Sea and then proceed southwards to wintering grounds in the highlands of Ethiopia, Eritrea and, probably, adjacent southern Sudan and north Yemen. Unfortunately, rather little is known of this species' non-breeding range in Africa, and the possibility that it winters right across the Sahel region requires investigation. Flocks arrive in West Africa mainly during October and November; arrival in central





*Female emberizids solicit copulation by raising the tail and fluttering the slightly drooped wings, calling as they do so. While many birds in northern Argentina start to breed in September, at the end of the dry season, the **Tawny-bellied Seedeater** waits until the start of the heavy rains in November/ December. The female **Yellowhammer** prefers to copulate with older, more colourful males. Of 123 Yellowhammer nestlings, 37% were found to have been sired by an extra-pair male.*

[Left: *Sporophila hypoxantha*, Lava Tudo River, São Joaquim Municipality, Santa Catarina State, Brazil. Photo: Márcio Repenning.

Right: *Emberiza citrinella citrinella*, Laspaules, Huesca, Spain. Photo: Rodrigo Pérez Grijalbo]





In the USA, the ***Rufous-crowned Sparrow*** *breeds in late winter and spring in California, but in summer in south-western deserts, following the rains. The female alone builds the nest, which is a bulky cup made largely from dry grass, with a lining including finer grass and animal hair. The nest is usually placed on the ground and well hidden, often by overhanging grass, at the base of a bush or on a rocky slope. More rarely, it can be placed up to 45 cm above the ground in a shrub. Nest-sites may be reused for many years. Surveys during the non-breeding season found that these sparrows stayed paired and on territories throughout the year. During periods of food scarcity, following low rainfall, Rufous-crowned Sparrows may shorten or abandon their breeding efforts. They are typically single-brooded, although pairs in California have been seen to raise two and even three broods. Similarly, the nest of the* ***Lapland Longspur*** *is built by the female. A cup of dry grass, leaves and moss is lined with hair and feathers, in particular ptarmigan* (Lagopus) *feathers. It is placed on the ground, concealed by vegetation or a tipped rock. The male guards his sexually receptive mate for about ten days, during which period he is highly aggressive towards other males which intrude into the nest area. Once incubation begins, however, he becomes tolerant of other males.*

[Above: *Aimophila ruficeps eremoeca*, Guadalupe Mts National Park, Texas, USA. Photo: Rick & Nora Bowers/ VIREO.

Below: *Calcarius lapponicus lapponicus*, Norway. Photo: Markus Varesvuo]



*The nest of the **Double-collared Seedeater** is a cup less than 7 cm in diameter and 5 cm in height, made from dry grass roots and spider webs. The walls are so thin that the eggs and young can be seen through the sides. These seedeaters seem not to favour any particular plants for nest construction. In a study of 41 nests, 18 plant species belonging to eleven plant families were used. The nests are placed an average of 2·4 m from the ground, though often less than 50 cm and sometimes as high as 6 m, in a shrub, small tree or lower vegetation.*

[*Sporophila caerulescens caerulescens*, Ubatuba, São Paulo, SE Brazil. Photo: Ivan Sazima]

Ethiopia is in early October. Migration studies in south-east Kazakhstan indicated that first-year individuals pass through before the adults, the passage reaching a peak in numbers in early September.

The return passage in spring is more conspicuous than the autumn movement. Flocks of variable size move through the western Mediterranean region from late March until the middle of May, the greatest numbers in the first half of April, and large numbers pass through the eastern Mediterranean at about the same time. The birds do not reach the far north of the breeding grounds until the second half of May and the early part of June. In areas of the Middle East, the spring passage can sometimes be very striking. In March and April, numerous loose flocks of Ortolan Buntings make their way northwards at low level, briefly taking shelter from the heat by pausing in the scattered desert shrubs, or feeding on whatever is available. These flocks are sometimes accompanied by somewhat smaller numbers of Cretzschmar's Buntings (*Emberiza caesia*), a species having a much less exten-



*There is no information on the breeding of the **Red-cowled Cardinal**, but the nest appears similar to that described for the Red-crested Cardinal* (Paroaria coronata)*, with which the Red-cowled may form a superspecies. The nest is cup-shaped, made from fibres and fine stems, and lined with rootlets and hair. Male and female Red-crested Cardinals are reported as remaining in continuous contact through vocalizations while breeding. Several* Paroaria *species favour lakeside or riverside habitats, and their nests are sometimes placed in trees or shrubs overhanging water, or in swamps.*

[*Paroaria dominicana*, Alagoas, Brazil. Photo: Anita Studer]



*The **Grassland Sparrow** is found in a variety of grassland habitats, from dry* cerrado *to* pampas *and pastures which are moist enough to have sedges (Cyperaceae). The nest, of dry grass, is placed on the ground, with a runway leading to it through the grass. Sometimes grass grows over the runway, creating a loosely covered tunnel. The nest itself is usually described as cup-shaped, although it is possible that it is sometimes roofed over.*

[*Ammodramus humeralis humeralis*, Alagoas, Brazil. Photo: Anita Studer]

sive breeding range confined to the southernmost part of the Balkan Peninsula eastwards to southern Turkey and the Levant. Despite the fact that this region has a relatively hospitable winter climate, Cretzschmar's Bunting migrates south to north-east Africa, having winter quarters mainly in Sudan.

Many other Palearctic buntings migrate long distances between their breeding and non-breeding grounds. The Black-faced Bunting (*Emberiza spodocephala*), for example, breeds in eastern Asia from about central Siberia east to Japan, with an isolated population in east-central China. It appears to be almost entirely migratory, most of the northern population flying south in autumn to south and east China, and the southern population moving to winter grounds in the foothills and lowlands from Nepal east to north Vietnam. It is rather remarkable that this east Asian species has been recorded on a number of occasions as a vagrant in western Europe as far west as Britain and France, although the possibility that some of the individuals were of captive origin cannot be ruled out. The same could be said of the Red-headed



*In the south and east of its range, the **Saffron Finch** regularly builds its nest inside the clay "oven" nest of the Rufous Hornero* (Furnarius rufus). *In Trinidad, it almost always uses the abandoned nests of the Yellow Oriole* (Icterus nigrogularis). *Artificial sites such as pipes or light fittings may also be used. The Saffron Finch's own nest is a bulky half-sphere of dry grasses, lined with softer material, including hair. Many* Sicalis *yellow-finches are cavity-nesters and will occupy kingfisher (Alcedinidae) tunnels in banks, or nest-holes made in cacti by woodpeckers (Picidae). Some excavate their own burrows.*

[*Sicalis flaveola pelzelni*, Porto Alegre, Brazil. Photo: Adriano Becker]



*The nest of the **Small Ground-finch**, a sphere with an entrance in its side, is built by the male from dry grasses and other vegetation. A study of contiguous populations of Small Ground-finches in lowland and highland habitats on Santa Cruz found that the highland birds had smaller clutch sizes and a shorter renesting interval. The highland population suffered much higher levels of nest predation, and its incubation sessions were longer, probably to reduce the number of visits to the nest and thus lower the risk of drawing the attention of predators.*

[*Geospiza fuliginosa*, Bartolomé, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos]

Bunting (*Emberiza bruniceps*), which breeds from the region of the Caspian Sea east to north-west China and western Mongolia and migrates to India. This bunting has been recorded several times on the east coast of Asia, including Japan, and, in the opposite direction, it has been found in many European countries, including Iceland. Although the records in Europe have long been considered to have involved escaped captives, a recent analysis of records in Britain, France and Italy suggests that at least some, especially those of first-winter individuals in autumn, may well refer to genuine vagrants.

Perhaps the most impressive migrant of all among the Eurasian buntings, however, is the Rustic Bunting. This handsome emberizid has a breeding range extending from Fennoscandia eastwards across Siberia to Kamchatka. Apart from a small number of individuals which spend the winter in the area of the Tien Shan in south Kazakhstan and north-west China, the entire



*The female **Savannah Sparrow** chooses the nest-site, often at the edge of or outside the male's territory. She builds the nest and incubates the eggs alone. Clutch size is 2–6 eggs, usually 4–5, and on average slightly larger at higher latitudes. The incubation period varies from nine to 15 days, but is generally around twelve days. Studies have found that yearling and older females are equally efficient incubators, suggesting that this behaviour is innate. Male Savannah Sparrows can be polygynous and may find successive mates while the earlier ones are sitting. As timing of clutches is staggered, the male can assist with the feeding of each brood.*

[*Passerculus sandwichensis sandwichensis*, Manitoba, Canada. Photo: George K. Peck]

population of the Rustic Bunting migrates to wintering grounds in east China, Korea and Japan. It seems that those breeding in north-west Europe initially head eastwards, following the southern edge of the taiga, to east Siberia, where they turn and proceed southwards through eastern Mongolia and north-east China. This journey covers a distance of 8000–9000 km or more. The Rustic Bunting has been recorded as accidental, a straggler or a vagrant in many places, and is regularly seen in several countries of western Europe and, more surprisingly, in parts of the Middle East, especially Israel. It has also been recorded on the east coast of the Pacific Ocean from Alaska and south-west Canada south to California.

The Reed Bunting presents a somewhat complicated picture. Its northern populations, those breeding from Fennoscandia south to Ukraine and east to north-east Russia and Japan, are, predictably, migratory, whereas other populations are largely resident or make only local movements. In the western part of the species European range, however, those breeding in areas where the mean January temperature is below 0°C are normally migratory, whereas individuals breeding in regions where the corresponding temperature is around 5°C are mostly sedentary. This may again suggest that, rather than the temperature itself, it is the likelihood of snowfall and a consequent lack of access to seeds on the ground that prompts the buntings to move. This is corroborated by the fact that, in the northern Black Sea region and in Central Asia, where precipitation is less common, the average winter temperature is below freezing but the Reed Buntings remain there during the winter. In this connection, it is worth remembering that the large-billed subspecies of this bunting, such as *pyrrhuloides* in Mongolia, are able to survive in winter temperatures of below minus 30°C, as their extra-large bill enables them to extract larvae from inside reed stems (see Food and Feeding).

Although most South American sparrows are resident, the southernmost populations of some tend to move northwards for the winter. For example, the widespread Rufous-collared Sparrow is resident in most areas of its range, but its southernmost subspecies, the Patagonian *australis*, migrates north in May, after breeding, returning south again in September. The whereabouts of its non-breeding grounds are not known, but it is thought to move north to as far as Bolivia.

The Cinnamon Warbling-finch (*Poospiza ornata*) breeds in central Argentina from San Juan and La Rioja south to north La Pampa and west Buenos Aires. It is a partial migrant, some individuals making post-breeding movements north to Salta, Tucumán, Córdoba and north Buenos Aires. Breeding by this species varies from year to year, being dependent on local rainfall patterns, and its breeding distribution is therefore changeable. Nevertheless, all leave east Mendoza during the autumn and winter, presumably heading northwards. They arrive back in spring and numbers increase during the summer; if the available seed supply is sufficient, the species breeds, but in dry years it may arrive in spring and then abandon the area for other possible breeding sites.

Buntings in the Afrotropical Region tend to be somewhat nomadic, the movements being governed by rainfall. The widespread Cinnamon-breasted Bunting is not only locally nomadic, but also a partial migrant and a resident. Populations in West Africa move north in the rainy season and south in the dry season. Similar movements occur in southern Africa, where populations breed in both areas: in Botswana and Zimbabwe the species is mainly a summer visitor, in December–March, but in Zambia and Malawi its numbers reach a peak in April–September, after the rains. The Lark-like Bunting is found only in southern Africa, south from southern Angola, and is generally nomadic. It migrates into more mesic parts of the Western Cape of South Africa to breed, arriving there after the winter rains have ended. Droughts can cause it to make irruptive movements into areas well to the north and east of its normal range. Drought conditions will also force Cabanis's Buntings to move, but in this case the birds shift only for short distances, the species being largely resident. Much the same applies to the Golden-breasted Bunting, which sometimes wanders in small flocks outside the breeding season, and may abandon areas during drought; this species may make a regular mid-summer movement into north Botswana from farther south, but further study is required in order to confirm this. The poorly known Somali Bunting (*Emberiza poliopleura*) is thought to be primarily resident, but the possibility of some local movement is indicated by the fact that it is occasionally attracted to lights at night in Kenya, and by an extralimital record in north-central Tanzania.



Evidence suggests that, as with its congener the Slaty Finch (Haplospiza rustica)*, the breeding of the* ***Uniform Finch*** *may be linked to bamboo seeding events. At other times, Slaty Finches are usually seen alone or in small groups on highland pastures where grasses are seeding, with no evidence of breeding. These two species may form a superspecies and have been proposed as conspecific, but they differ in their nest architecture. The Uniform Finch builds a cup-shaped nest, while that of the Slaty Finch is an elongate globe open at the side.*

[*Haplospiza unicolor*, Itatiaia, Rio de Janeiro, SE Brazil. Photo: Ivan Sazima]





*The bulky oven-shaped nest of the **Black-striped Sparrow** is built entirely by the female. The inclusion of large, coarse vegetation such as banana leaves may, in the rainy parts of this bird's range, keep the nestlings from becoming wet and chilled. The usual clutch is of two eggs, rarely one or three, and the female incubates them for 13–14 days. Darwin's finches, such as the **Small Ground-finch**, typically begin breeding 1–2 weeks after the first heavy rains; in years with no rain, breeding is forgone. The clutch is usually of four eggs.*

[Left: *Arremonops conirostris richmondi*, Costa Rica. Photo: Marco Saborío.

Right: *Geospiza fuliginosa*, Santa Cruz, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos]

Finally, when talking about the migration of buntings and longspurs, it is impossible not to recount the details of an extraordinary event that took place in March 1904 in the northern USA. In the middle of that month, reports were received from villages of Worthington and Slayton, in south-west Minnesota, that large numbers of a small brown bird had been killed during a violent storm on the night of 13th–14th March. A couple of days later, several corpses were sent to the State University at Minneapolis, which forwarded them to a local ornithologist; the birds were Lapland Longspurs. Following a telephone call to one of the towns, L. O. Dart, representing the State Natural History Survey, visited Worthington and Slayton to investigate; he studied the numbers and distribution of the dead birds and the post-mortem findings, and interviewed various residents who had witnessed the event. He visited several other places, too. A few days later, letters requesting further information were sent to the postmasters at 23 villages in south-west Minnesota, north-west Iowa and south-east South Dakota, and ten replies were received. Most of the people in the towns in question were eager to tell what they had seen and to find out what had caused what they termed "the great bird shower".

Starting on 22nd March, Dart found large numbers of dead longspurs in all the streets of Worthington, and many had already been washed away by a rainstorm on 20th. There were dead birds lying 1·5–2 m apart all over the courthouse yard, and this was said to have been the situation throughout the town on the morning after the storm. The town is flanked by two small lakes, each with a minimum area of 260 ha; winter ice was still on the lakes, but the snow had melted and then frozen again, presenting an unobstructed hard surface. Here, the dead birds were more conspicuous, and their bodies dotted the entire surface of both lakes. Dart walked out to the middle of each lake and, by measuring off a number of squares 20 feet × 20 feet (c. 6 × 6 m) in various places and counting the birds in each, was able to make a careful estimate of the total number. The figures produced a total of 374,328 birds on each lake, giving the remarkable round-figure total of 750,000 Lapland Longspurs on these two lakes alone. In addition, many live longspurs, with various injuries, were present in bushes around one of these lakes; some could not fly properly and could be picked up. These had apparently managed to survive since the storm in this sheltered, unnatural habitat. Moreover, two live longspurs, a male and a female, were seen among plants in a town windowbox, where they had been fed since being captured on 14th. From interviews at Worthington, it was apparent that on the night of 13th–14th March there was almost no wind and snow was falling steadily and quietly for part of the night; the longspurs were first noticed at about 23:00 hours, and from then until morning they were abundant; they were most numerous in the vicinity of the electric streetlamps, but "they seemed to be everywhere". One witness saw many fly against buildings and he picked them up dead, as well as hearing others crashing and dropping in the darkness. He said that the ground was in places covered with dead, wounded and apparently unhurt birds. A great many lay buried in the snow with just the head out, and some of these, when picked up, warmed and dried, flew away evidently unharmed; these appeared to him to be "bewildered" more than injured. Another witness said that at midnight the air had been full of birds, but there were more around the electric lights than elsewhere; many were captured and examined. Some, uninjured, lay in the snow and made no effort to escape. The feathers of many were soaked from the wet snow. The pathways and streets were covered with dead and live birds. Another resident reported that, on the morning after the storm, he noticed balls of snow on the roof of his barn. When these thawed in the morning sun, they were found to contain live birds; the heads appeared first, and then, shaking off the snow, the birds sat for a while in the sun, drying off and preening, before flying off. This was corroborated by a second observer. Evidently, the birds had become laden with snow, and through their efforts to rid themselves of this had rolled themselves into snowballs. Two Worthington physicians gave similar accounts, one adding that many of the birds had entered the snow head first, as though they had dived headlong, rather than fluttering down as would be likely after striking an obstacle. Dart found the situation in Slayton, some 40 km to the north of Worthington, to be very much the same; on 23rd March, nine days after the storm, dead birds were to be found everywhere, their heads, wings and tails sticking out of the mud on every street right to the outskirts of the town. The same story was repeated at other villages and towns up to 50 km from Worthington.



*The male **Cape Bunting** accompanies the female as she builds the nest, and feeds her as she incubates. In most* Emberiza *species the female incubates alone, but there are some exceptions. For example, both sexes of the Little* (Emberiza pusilla), *Rustic* (E. rustica) *and Reed Buntings* (E. schoeniclus) *incubate, although the male, which does not develop a brood patch, tends to sit for shorter stints. A male Grey-necked Bunting* (E. buchanani) *with a brood patch has been reported.*

[*Emberiza capensis capensis*, near Brandvlei, Northern Cape, South Africa. Photo: Nico Myburgh]

The results of numerous post-mortem examinations of individuals from all parts of the region were uniform: all had died from injuries of various kinds. In addition to 150 or so longspurs examined carefully in the field, 100 individuals picked up on the ice and around the village at Worthington were taken home for detailed autopsy. Many had the skull fractured and indented, leading to cerebral haemorrhage, and many more had the bones of the body variously crushed, along with extensive internal haemorrhages; in some instances the intestines, lungs or other viscera had been ruptured, and a few had the neck broken. Many also had broken wings and legs. All were very fat, and the stomachs of many were empty except for, usually, small amounts of fine gravel.

It is very clear that, on that fateful night, a huge migratory movement of Lapland Longspurs was in progress. Presumably becoming confused in the storm area by the darkness and heavy



*These **Golden-breasted Bunting** chicks are three days old and are being brooded by the female. The male feeds her while she is incubating and may continue to feed her while she broods. Both sexes feed the chicks and defend the brood vigorously, the male occasionally performing distraction displays to lure predators from the nest.* Emberiza *hatchlings are covered in grey down. In India, Striolated Buntings* (Emberiza striolata) *were brooded intensively but not fed on their first day; they were fed with regurgitated seeds from the second day until the ninth, when the parents began to bring them caterpillars. After the switch to insects, their weight tripled in just five days.*

[*Emberiza flaviventris flaviventris*, Stone Hills Game Sanctuary, Zimbabwe. Photo: J. R. Peek]



*Like other Neotropical passerines, the **Black-striped Sparrow** has longer incubation and nestling periods, up to 15 days and 14 days, respectively, than relatives from temperate regions. The chicks are fed by both parents. They are covered with natal down when they hatch, and by three days of age their wing feathers have started to break the skin; their eyes open at three days. This brood of three is said to be unusual; two is more typical in Costa Rica. The Green-backed Sparrow* (Arremonops chloronotus), *sometimes treated as conspecific with the Black-striped Sparrow, has broods of three and occasionally four. The juvenile plumage of these species differs significantly.*

[*Arremonops conirostris richmondi*,
Costa Rica.
Photo: Marco Saborío]

falling snow, they were attracted by the lights of the towns below and gathered in immense numbers over and around these places. In their bewilderment, great numbers of them flew against various obstacles and were stunned or killed, and many others sank, exhausted, to the ground. Moreover, a significant number probably became wet and snow-laden by reason of the nature of the snow and, unable to fly, were forced earthwards and dashed to death, or, if dropping from a lower elevation, stunned. The birds picked up on the ice had equally extensive injuries, and in their utter confusion they must have dashed headlong on to the lake surface from a considerable height. That the birds fell heavily or sped rapidly downwards from high in the air would seem to be the only explanation for the badly mutilated condition of the dead longspurs on the ice of the lakes. Many dead birds found in yards and fields and on roofs of buildings appeared to have been killed in the same manner.



*Both **Rock Bunting** parents feed the nestlings; this is the male. The 3–6 young are fed with insects, and particularly caterpillars. Older nestlings may also be offered seeds. The nestling period is 9–13 days and the young leave the nest before being able to fly, becoming independent three weeks later. The parents often begin a second brood about a week after the first one has fledged. Exceptionally, there may be a third brood, though reportedly more often in north Africa, where eggs may be laid from January to October and where the population is non-migratory.*

[*Emberiza cia cia*,
Huidobro, Burgos, Spain.
Photo: Joseba del Villar]



Analysis of faecal samples from ***Yellowhammer*** *nestlings on UK farmland in successive years found that unripe cereal grain was fed to most broods. Adult faecal samples held only cereal husk, but invertebrates—including spiders, butterfly and moth larvae, beetles and flies—were the major component of the nestling diet. Aphids may be fed to nestlings, and the proportion of hoverfly larvae (Syrphidae), which are aphid predators, rises in years when aphids are abundant. Increased nest failure in cold summers is likely due to the competing needs of brooding and foraging: nestlings chill faster and invertebrates are less active and harder to find.*

[*Emberiza citrinella citrinella*, Gallangos, Burgos, Spain. Photo: Joseba del Villar]

It is impossible to calculate the number of Lapland Longspurs killed in that single catastrophic event in March 1904. Even one hundred years later, with the great advances in technology made since that time, one would have difficulty in assessing a similar event. The destruction seems to have been greatest at Worthington, where, on the basis of the accurate calculation of mortality at the lake surfaces alone, a figure of about 1,500,000 deaths would be reasonable. Although there seem not to have been so many victims at other points, the grand total of deaths over the whole affected area of almost 4000 km² must have been colossal. What is even more remarkable perhaps is that all of the birds were Lapland Longspurs; not a single individual of any other bird species was found dead. It is interesting to consider also that, if the global population of the Lapland Longspur was 150,000,000, as thought at present, the massive mortality on that one night would represent a loss of 1% of the species' total numbers.

Relationship with Man

Species in the family Emberizidae are of comparatively little commercial interest to humans, with the exception of the perceived value of some as cagebirds. In addition, some are trapped and sold as food. In general, they are not disliked for any particular reason, and they are looked upon kindly by most humans. In the Caribbean region, where many birds are given a variety of colloquial names, the Orangequit, restricted to Jamaica, is known there also under the names of "Blue Baize", "Swee", "Long-month Bluequit", "Bluebird", "Blue Badas" and "Blue Gay"; on the same island, the introduced Saffron Finch (*Sicalis flaveola*) is referred to also as the "Canary". In Chile, the hooded sierra-finches are commonly referred to by the name "*cometocino*", which means "bacon-eater"; this is particularly applicable to the Patagonian Sierra-finch (*Phrygilus patagonicus*), well known for its habit of eating meat left out to dry in the sun.

In the USA, the fact that the Lark Bunting is the state bird of Colorado would imply that it is not unpopular there. Elsewhere in the world, the Yellowhammer and the Cirl Bunting are among the species introduced in New Zealand by colonists from Europe, perhaps a measure of the popularity of these birds. In Switzerland, the Cirl Bunting is a characteristic bird of vineyards. Its distribution in that country coincides extensively with that of wine-producing areas, as a result of the sunny, dry habitat, the open undergrowth, the rich structure of the vegetation, and the close interweaving of the most varied environmental elements such as vines, impoverished meadows, hedges, fruit trees and dry-stone walls.

Many members of the family are kept in captivity to some degree, and some are particularly popular because of their attractive plumage and, in some cases, pleasant songs. The Yellow Cardinal (*Gubernatrix cristata*) of Uruguay and northern and eastern Argentina is valued as a cagebird because it is pretty and has a song that is pleasing to humans, and this Endangered species has consequently been overexploited in much of its range. *Paroaria* cardinals are commonly trapped for the cagebird trade too, the Red-crested Cardinal (*Paroaria coronata*) being a good example, but this practice appears not to have had any significant effect on their numbers. In the Neotropics, the yellow-finches and the seedeaters and seed-finches are especially popular as cagebirds. The Saffron Finch is widely kept in captivity, as is the Grassland Yellow-finch (*Sicalis luteola*), and it seems that the populations of these emberizids can withstand the losses. The same cannot be said about the seedeaters, many of which are popular in captivity and several of which have suffered badly as a result. The Buffy-fronted Seedeater (*Sporophila frontalis*), Temminck's Seedeater (*Sporophila falcirostris*), Marsh Seedeater and Chestnut Seedeater are all globally threatened, largely or partly because of the effects of trapping (see Status and Conservation). The Marsh Seedeater is particularly favoured by bird-collectors because of its unique coloration.

Similarly, the seed-finches in the genus *Oryzoborus* are popular as cagebirds, and the Large-billed Seed-finch (*Oryzoborus crassirostris*) has suffered a great reduction in its numbers as a consequence of trapping. This species is now very local and scarce in most of its range, increasingly so in the Guianas, where trapping is most severe. Almost all of the Old World buntings, and especially the more colourful ones, are popular in the cagebird trade. In the past, the globally threatened Japanese Yellow Bunting (*Emberiza sulphurata*) was widely trapped in Japan, and this was partly responsible for its decline.

Most emberizids are largely granivorous, and this makes them easier to keep in captivity than insectivorous species. Many,

however, are rather drab in appearance, and there is therefore a lack of interest in keeping these as pets.

A problem not often appreciated by cagebird-fanciers is one posed by captive birds that return to the wild. In addition to possible ecological implications, individuals that escape from captivity, or are deliberately released, can cause problems for ornithological records. Many buntings and New World sparrows are migratory, and some are prone to vagrancy. In some instances, however, it has proven impossible to determine whether an emberizid seen a long way outside its normal range is a genuine vagrant or has escaped from captivity.

On the subject of vagrancy, a heart-warming episode concerns a White-crowned Sparrow that turned up in eastern England in January 2008, having come 4800 km across the Atlantic Ocean. It appeared at Cley Next the Sea, on the coast of Norfolk, and before long thousands of "twitchers" and other bird enthusiasts had made their way to the village. This was only the fourth record of the species in Britain. It has become the traditional practice at such big birding events to make a charity collection, to which all visiting observers are expected to contribute, as a way of thanking the owners of sites for their patience and understanding. In this instance, as the sparrow spent the first weeks of its stay in the garden of a retired vicar, it was decided to hold a collection to help towards the restoration of the window in the village's thirteenth-century church. In fact, the collection raised £6378, sufficient to pay the entire costs for restoration of the west window. In return, the Church of England authorities gave special consent for an image of the bird to be incorporated in the new window, and this now includes a life-size representation of the sparrow, painted by a local bird artist. The White-crowned Sparrow is thought to have been blown off course while migrating southwards from the east coast of Canada. Alternatively, it may have hitched a ride to Europe on a ship.

Emberizids are generally not eaten by people, although there are some important exceptions. In parts of Europe, the Ortolan Bunting is considered a delicacy. In France, in particular, these birds are captured and fattened up, and then drowned in Armagnac, before being roasted and served whole, the bones, as well as the flesh, being eaten. This bunting is said to symbolize the French soul, and many people in south-west France believed it to be the highest of all cuisine. Indeed, it is considered such a delicacy that the former French president, François Mitterand, had it as his last meal, an illegal act as the species, much reduced in numbers, is now protected. The culinary renown of this bunting is such that in several countries of southern Europe the name "ortolan" is often attached to any passerine caught for the pot.

Buntings in south and east Asia have traditionally been captured for food, often in large quantity. Yellow-breasted Buntings, which breed across much of the north Palearctic, migrate to south-eastern Asia; many pass through eastern China, where they have long been trapped in very large numbers, a practice known to date back at least 2100 years. In recent times, hundreds of thousands of these buntings are known to have been caught each autumn, mainly in October and November, and then sold at markets. The practice was banned in 1997, but it still persists on a large scale, especially in the south-east province of Guangdong, and also elsewhere in China. It is estimated that 1,000,000 Yellow-breasted Buntings are sold for food each year. Elsewhere in the region, thousands of buntings were killed for food during the spring migration in the 1950s and 1960s. In Cambodia and Thailand, trapping for food continues, and the birds are caught also for later release as part of religious festivals. In addition, each year, in China, thousands of male Yellow-breasted Buntings are killed, stuffed and sold as mascots, their presence in the home being believed to bring happiness to the human occupants.

In the north Nearctic, the Copper Inuit, or Kitlinermiut, a Canadian Inuit group living north of the tree-line in northern Northwest Territories and west Nunavut, included Snow Buntings as part of their diet. The tameness of these birds would have made them easy to catch. Right across the Arctic, the Inuit peoples have, for thousands of years, told of the great shaman Kiviuq, one of Canada's great heroes and, according to most elders, still alive today. Among the helping spirits that Kiviuq has is the little Snow Bunting, as well as the huge polar bear (*Ursus maritimus*) and other animals.

Of course, the importance of the Galapagos finches in inspiring Charles Darwin's theory on evolution by natural selection is well known. In September 1835, when Darwin first went ashore in the Galapagos Islands, he was about to change the world's ideas on science and evolution, although he was not aware of this at the time. During the five weeks which he spent on the



*Both **Eastern Towhee** parents feed the nestlings, but their responsibilities can change over the season. Females may begin a second nest 1–2 weeks after the young from the first have fledged, leaving the males to feed the still-dependent fledglings. Early first and second nests and replacements often have larger clutches (4–5 eggs) than later nests (2–3). In a study in California, breeding density of towhees was higher in ungrazed oak–pine* (Quercus–Pinus) *woodlands than in grazed areas. But birds in the ungrazed site, which had more nest-sites, cover and food, experienced lower reproductive success, primarily because of predation during the nestling period.*

[*Pipilo erythrophthalmus erythrophthalmus*, E Pennsylvania, USA. Photo: Dave Maslowski/ Maslowski Productions]



Of 20 ***Blue-black Grassquit*** *chicks genotyped in a study in central Brazil, ten were not related to at least one of the birds providing parental care. There were cases in which paternity was attributed solely to the male attending the nest, some broods having different chicks related to more than one female; nests in which the whole brood or some nestlings were not related to the attending male; and one case in which a chick was unrelated to either "social parent", an apparent instance of intraspecific nest parasitism. This extra-pair fertilization rate of 50% is much higher than the average of 11% found in socially monogamous birds.*

[*Volatinia jacarina jacarina*, Camaçari, Bahia, Brazil. Photo: Pedro Lima]

islands, he observed the variety of small birds present and collected specimens, but, not realizing their significance, he did not keep detailed records of these specimens and did not record where each had been collected. It was only when he returned to London that it struck him that the birds, while closely related, all differed from one another. This realization, and his own scientific reasoning, led Darwin eventually to formulate the principle of natural selection, one of the most significant scientific theories ever to have emerged. Is it possible that, had it not been for Darwin's finches, scientific thinking would have taken an altogether different direction?

Although many emberizids are granivorous, they are usually not considered to be serious agricultural pests. This is because they feed principally on spilled crop seeds and weed seeds, especially seeds of grasses. They are seed predators, and do not disperse seeds. Further, they are not important pollinators.

There are few published data on reproduction of the wild ***Red-crested Cardinal****, but a mixture of anecdotal information and reports on captive birds suggests that they may have up to three broods in a year. The male takes over care of the young when they fledge, and the fledglings remain with the parents until they gain their adult plumage. In captivity, the nestling period is said to be 2–3 weeks. Nestling periods are longer for emberizids (including* Emberiza *buntings) of hotter latitudes.*

[*Paroaria coronata*, Pantanal, Mato Grosso, Brazil. Photo: Haroldo Palo]





*Male and female **Blue Finches** feed their nestlings at a rate of about two visits each per hour. For the first three days after hatching, the female broods the young intensively. She may solicit food from the male by shaking her wings, mimicking the behaviour of the chicks. At first the parents bring small beetle larvae (Coleoptera) and other small insects; as the nestlings grow, they are offered larger insects such as crickets and grasshoppers (Orthoptera). Sometimes an insect may be too big for the chicks to cope with. This picture comes from a sequence in which the chicks fought for, and each attempted to swallow, the item; the male finally ate it himself. The young left this nest when nine days old.*

[*Porphyrospiza caerulescens*, Camaçari, Bahia, Brazil. Photo: Pedro Lima]

Status and Conservation

Most of the north-temperate species in this family are at least fairly common, and some are very common. Many breed north of extensive human habitation and in habitats that are of little economic value to people. They are, therefore, in general little affected by human activities other than those associated with mining and mineral exploration, although these can sometimes be on a massive scale. For example, the American Tree Sparrow (*Passerella arborea*) of North America breeds at the limit of trees, in dwarf trees, especially spruce and birch, and most winter in the northern Great Plains in shelterbelts, hedgerows and oldfields. Thus, its breeding habitat is of little commercial value to humans, and human activities perhaps even encourage the development of suitable winter habitat, although this habitat is increasingly being lost to urbanization and other development.

Of the 326 species currently included in the family Emberizidae, 36 are listed as globally threatened. Five of these are Critically Endangered, 14 are Endangered and 17 are Vulnerable. A further 24 species are considered Near-threatened. This means that the future prospects of as many as 60 members of the family, more than 20%, are of some concern.

In America, only three of the many emberizids that occur north of the Isthmus of Tehuantepec, in other words those that are North American in a zoogeographical sense, are believed to be globally threatened. These are Worthen's Sparrow (*Spizella wortheni*) and the Sierra Madre Sparrow, both Endangered, and the Saltmarsh Sparrow, which is Vulnerable.

Worthen's Sparrow is a rare and very local species with an extremely small range and population, both thought to be decreasing. Until recently it was known to breed at just three places in north-east Mexico, namely Las Esperanzas, in Nuevo León, and two sites in Coahuila. In 2006, however, two further breeding localities were discovered in Nuevo León, at La Carbonera and San Rafael, and one in Coahuila, at San José del Alamito, and the species was thought to be breeding also at a additional Nuevo León site, at El Erial–La Casita. This sparrow's global population may number no more than 100–120 mature individuals. The main problem appears to be habitat loss, more particularly the conversion of desert scrub to agriculture or livestock grazing, and there is an urgent need for all of its breeding areas, as well as suitable habitat elsewhere in its range, to be fully protected. The species seems also to have a very low reproductive success, but it is not known what effects this may be having on the population as a whole. In the past, Worthen's Sparrow had a more extensive range, reaching northwards into the south-west USA and southwards in Mexico to at least Puebla, but it was last seen at the southern limit at the end of the nineteenth century. The poorly known subspecies *browni*, confined to west Zacatecas, has not been recorded since 1961 and may well be extinct.

Also in Mexico, the Sierra Madre Sparrow appears to fairly common within its very small range. Even so, it is also apparently declining at a fast rate, and most of the population is confined to one site. A recent survey revealed that the species survives at just two sites. One of these is centred around La Cima and Milpa Alta, near Mexico city, where the population in 1997 was estimated at 5380–6150 adults; the other locality is Ejido Ojo de Agua–El Cazador, in south Durango, where the total population probably does not exceed 50 individuals. Like the previous species, the Sierra Madre Sparrow was once more widespread, being found at four sites in south Durango and extending into north Jalisco and to the Morelos border. Overgrazing by domestic livestock is a major problem, as also are fires, and uncontrolled burning of bunchgrass meadows to create new pasture for sheep and cattle has destroyed large areas of the species' preferred habitat. Much of the tillable habitat in the area of La Cima has been ploughed, and most of the suitable habitat in Durango has been lost to logging and cultivation. At the sparrow's main site, the area of suitable habitat has approximately halved in the decade since the end of the twentieth century. Furthermore, mycotoxins from contaminated grain have caused some mortality, and heavy predation, possibly exacerbated by habitat fragmentation, causes frequent nesting failure. Monitoring of the remaining populations of this species is considered essential, and effective protection of surviving habitat fragments is vital. In addition, local inhabitants should be encouraged to develop appropriate grassland-management strategies and to ensure that contamination by mycotoxins is prevented.

The Saltmarsh Sparrow has been declining because of modification of its coastal marshland habitat. Its range extends in a narrow coastal band over about 20,000 km², from south Maine to

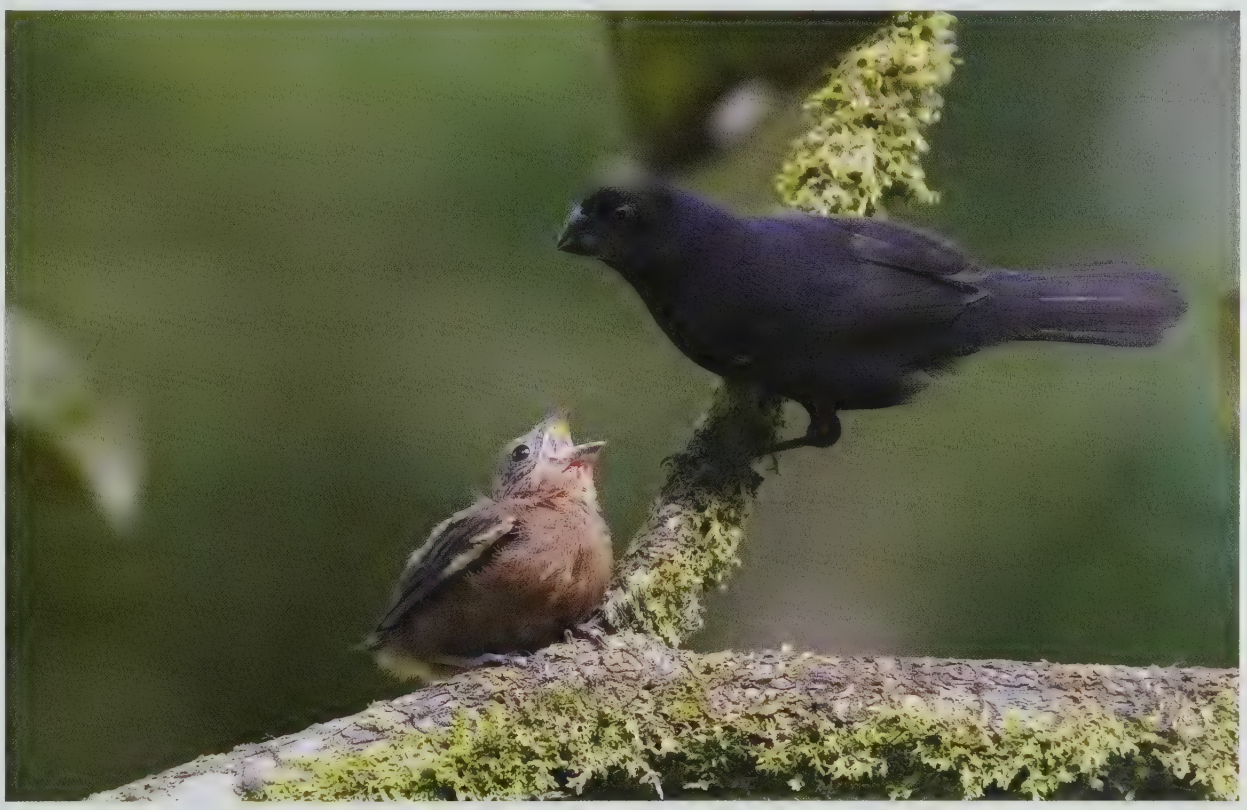


*This male **Rock Bunting** is removing a faecal sac from the nest. For the first few days the parents may eat the faecal sacs, but when the nestlings are older (and their digestive systems more efficient) the parents carry them away before dropping them at a distance. Some emberizids, such as the Golden-breasted Bunting* (Emberiza flaviventris)*, may allow the sacs to accumulate on the nest rim when the chicks are larger. Young Striolated Buntings* (E. striolata) *in India continued to produce faeces in gelatinous sacs until the day before they left the nest, but from fledging onwards their faeces were loose and "freely splashed hither and thither".*

[*Emberiza cia cia*, Navarrete del Río, Teruel, Spain. Photo: Rodrigo Pérez Grijalbo]

south New Jersey, but suitable habitat within this is greatly fragmented, such that the area occupied by the sparrow is less than 2000 km². Although its estimated global population was put at some 250,000 individuals in the early years of the present century, the true figure, based on density estimates, is probably in the range 50,000–100,000 individuals, and probably at the lower end of that range. Continuing loss, degradation and fragmentation of marshlands as a result of urban development is a major concern for this sparrow, as also are invasive species such as *Phragmites* reeds, which render the habitat completely unsuitable for it. On top of this, chemical pollution of marshes is a problem in some places, and a rise in sea levels caused by climatic warming could potentially pose a serious threat.

Disregarding vagrants, altogether 35 emberizid species are found in the Palearctic Region, most of them in the genus *Emberiza*. Several are threatened. The very rare and local Jankowski's Bunting is currently known to breed at just five sites in north-east China, four in Inner Mongolia and one in west Jilin,



*The juvenile **Thick-billed Seed-finch** has pale greyish-brown body plumage and loosely textured feathers. The genders are similar, but some juvenile males have slightly duskier flight-feathers. Complex plumage sequences occur in the Emberizidae, especially in the Neotropics, and the moult patterns of the Thick-billed Seed-finch are different from those of others in its genus. The adult male is all black, but some second-year and third-year males may have a tawny wash on the belly, and even third-year males may retain dusky-washed juvenile feathers.*

[*Oryzoborus funereus salvini*, Limón, Costa Rica. Photo: Boris Nikolov]

and has a maximum known population of about 100 mature individuals. It is listed as Endangered. Its range formerly extended into extreme south-east Russia and extreme north-east Korea, and was more extensive in China, covering wider parts of west Jilin, with breeding also in east Jilin and south Heilongjiang; it was locally common in Heilongjiang in the first half of the twentieth century. In west Jilin, there were 350 breeding pairs in 1994 but none in 2005 at Huichin, and 100 individuals in 2001 but only two in 2008 at Baicheng, where it is now extinct; at Dagang Forest Farm, the population dropped from 60 pairs in 1999 to just ten in 2010. In Inner Mongolia, habitat destruction at Tumiji grassland resulted in numbers falling from about 50 birds to only seven by 2010; of two recently discovered sites in this province, one held 53 individuals, 29 of them males, and the other 13 individuals, of which nine were males, in 2010. The main problem for this rare bunting is that it has very specialized habitat requirements. The dry grasslands that it needs have been widely destroyed by cutting for winter animal fodder, and further losses have been caused by extensive accidental or intentional burning, as well as conversion to agriculture and forestry. Moreover, this species is a ground-nesting bird and its nests are vulnerable to predation and to trampling by domestic animals and humans. Its semi-colonial nesting habits, successful breeding being dependent on the close proximity of other pairs, could be a further restricting factor. Although the Xianghai Nature Reserve gives some protection in China, grassland destruction has occurred even inside reserve areas. This species' future would seem to depend on the creation of a network of surviving grassland patches and much stricter protection from human activities.

Two other Palearctic buntings are listed as Vulnerable. One, the Yellow-breasted Bunting, is fairly common, and even locally abundant, but is declining significantly. Its present global population has been estimated at up to 1,000,000 mature individuals, although the accuracy of that figure seems perhaps doubtful. At the beginning of the twentieth century this bunting spread westwards, colonizing Finland during the period from 1910 to the 1920s, with a further sustained wave of immigration from the 1940s to the 1960s producing a more stable population; numbers began to decline, however, in the 1980s. It was once one of the most numerous breeding passerines across much of Siberia, and is still common in a few regions, but severe declines have been noted in most parts of the breeding range, and local extinctions have occurred since 1990. It has not bred in Finland since the mid-2000s, and its range in Kazakhstan has contracted northwards by 300 km since 1990. A rapid decline has been recorded in the Moscow and Baikal regions of Russia, and severe declines noted in north Japan and Mongolia. Moreover, this species is no longer seen in big numbers at migration watchpoints such as Beidaihe, in north-east China, and populations at wintering sites throughout the range have decreased rapidly over the last 20 years. The main reasons for the marked decline of the Yellow-breasted Bunting are thought to be hunting on the wintering grounds, especially in China, and the conversion of suitable habitat to agricultural use. Its numbers even on pristine breeding grounds have dropped very rapidly, and the foremost cause is probably excessive trapping at migration sites and, especially, wintering sites. Flocks roosting in reedbeds are flushed, caught in mist-nets, cooked and sold as food; previously confined to a small area of south China, this practice has become more widespread, and the hunters now need to travel widely in order to find sufficient birds. Although the practice is now illegal in some areas, it is estimated that more than 1,000,000 individuals are killed and sold annually (see Relationship with Man). Further problems faced by Yellow-breasted Buntings in the non-breeding areas are agricultural intensification, including the shift to irrigated rice production and a consequent loss of winter stubble, which has reduced the amount and quality of the habitat, and the destruction of reedbeds, which has led to the loss of many roosting sites. On the breeding grounds, habitat quality has suffered in some parts of the range; for example, changes in the flow pattern of rivers resulting from dam construction have caused the drying-out of damp meadows, an important breeding habitat. An intensive range-wide survey is required in order to determine the true extent of decline of this species and to assess what conservation measures are required for it.

The other Vulnerable bunting in the Palearctic is the Japanese Yellow Bunting, which breeds in Honshu and migrates to the Philippines. Although there are no reliable population estimates for it, this species is uncommon and appears to have declined. It has become rarer in its traditional breeding areas, and has suffered a significant drop in numbers during the twentieth century. It has been adversely affected by habitat degradation and loss, primarily through agricultural intensification, but more



Snow Buntings *leave the nest at 13 days, but at 16 days of age the fledglings are still relatively immobile, with a very short tail. At 20 days they make short flights in pursuit of their parents and attempt to feed themselves. By the end of the second week after fledging, the wings and tail are similar in length to those of adults. From this point, the chicks spend most of their time in feeding themselves, often in the company of a parent, and the frequency and success of begging behaviour are reduced.*

[*Plectrophenax nivalis insulae*,
Iceland.
Photo: Markus Varesvuo]



In South America, the Shiny Cowbird (Molothrus bonariensis) *is a known brood parasite of many emberizids. The* ***Rufous-collared Sparrow*** *is heavily parasitized in Brazil and Argentina. In one sample of 40 nests, 29 contained cowbird eggs. The Shiny Cowbird lays both plain white and spotted eggs, but Rufous-collared Sparrows accept both. The colour of the young cowbird's mouth is, apparently, irrelevant to the sparrow's parental behaviour. Just three of the 29 parasitized nests were successful, but success was low overall: only 13 sparrows fledged from the 40 nests. Four cowbirds fledged from 59 eggs.*

[*Zonotrichia capensis subtorquata*, São Carlos, São Paulo, Brazil. Photo: Haroldo Palo]

especially by trapping for the cagebird trade. In the past, the latter activity was not uncommon in Japan, but nowadays trapping is most serious in southern China, where, as with the preceding species, significant numbers are caught in the passage and wintering areas. The use of pesticides seems also to be a factor in this species' decline; pesticides have caused similar problems in several Asian countries, and are linked with the rapid decline of small passerines in rural areas of south China.

Only one of the nine Afrotropical buntings is at risk. This is the Socotra Bunting (*Emberiza socotrana*), found only on the island of that name lying off the north-east tip of Somalia, in the north-west Indian Ocean. It total population has been estimated at 1400 individuals, representing about 300 pairs, and is thought to be stable. Nevertheless, this bunting may be under threat from increasing grazing pressure and also introduced predators, especially feral cats, black rats (*Rattus rattus*) and small Indian civets (*Viverricula indica*). Because of these factors, coupled with its tiny global range of about 310 km², within which it is patchily distributed at low density, this species is listed as Vulnerable.

Five emberizids are Critically Endangered, three of them restricted to islands. In the South Atlantic archipelago of Tristan da Cunha, the Gough Finch is rare to locally fairly common, with a breeding population estimated at 400–500 pairs, and a total population of some 1050–1350 individuals. It is the only passerine resident on Gough Island, where it was once abundant. Since at least the middle of the twentieth century, however, its numbers have decreased, especially in the lowlands, apparently as a result of nest predation by the introduced house mouse (*Mus domesticus*). Predation by mice has driven this species away from coastal areas and into suboptimal upland habitat, and is causing a very rapid decline in its numbers; the species is now rare at lower elevations in fernbush. The number of territory-holding finches in immature and juvenile plumages has increased, which suggests that, as the population shrinks, many territories become vacant; the proportion of juveniles in the whole population has at the same time decreased considerably, a sign of reproductive failure and an ageing population. Significantly, the finch is still abundant on Penguin Island, a mouse-free offshore stack. Plans are being formulated with the aim of ridding the island of the mice, which are major predators also of seabird chicks on Gough; the early results from a feasibility study appear promising. Gough Island is a nature reserve and a UNESCO World Heritage Site; the human population consists merely of a small number of staff at a meteorological station.

Two of Darwin's finches in the Galapagos Islands, both in the genus *Camarhynchus*, are at serious risk. The Medium Tree-finch (*Camarhynchus pauper*), found in the highlands of Floreana Island, in the south of the archipelago, is uncommon and local. It has a tiny global range of about 23 km², within which its esti-

Most buntings and New World sparrows that breed in the Northern Hemisphere migrate, and at least 22 emberizids in central and southern South America move north during the austral autumn. Nine Sporophila *species are known to be migratory. They include the* ***Black-bellied Seedeater****, which arrives on its breeding grounds in south-east Brazil in October–November and migrates north as far as Goiás and Minas Gerais in February–March. Non-breeding males moult into a female-like plumage. The photo is of two males on the breeding grounds; the bird on the left is not yet showing the black cheeks and flanks of full breeding plumage.*

[*Sporophila melanogaster*, Lava Tudo River, São Joaquim Municipality, Santa Catarina State, Brazil. Photo: Márcio Repenning]





Most of the global population of the restricted-range ***McKay's Bunting*** *breeds on the 309 km² St Matthew Island and 16 km² Hall Island, in the Bering Sea. The total population has been put at 6000 mature individuals, but a recent study estimated the combined populations on Hall and St Matthew at more than 31,000. Although its numbers and range are thought to be increasing, McKay's Bunting is considered Near-threatened. Reindeer* (Rangifer tarandus) *introduced on St Matthew destroyed much of the native vegetation before they died out, and breeding densities are still lower than on Hall.*

[*Plectrophenax hyperboreus*, St Matthew Island, Alaska, USA. Photo: Spectrum Photofile/ AGAMI]

mated population in 2008 was at most 1660 individuals, a reduction of more than 60% since 2004. The greatest numbers are found around the base of the Cerro Pajas volcano, where the species' preferred nesting tree, *Scalesia pedunculata*, is dominant; here, the bird's density fell from 154 birds/km² in 2004 to 60 birds/km² in 2008, and this species is now significantly less common than it was 50–100 years ago. The rapid decrease has been caused by habitat degradation, introduced predators and, especially, the effects of the introduced nest-parasitic botfly, *Philornis downsi*; the adult flies lay their eggs in the nests of the finches, and the maggots feed on the blood of the chicks. This fly seems to be responsible for large-scale decreases in nesting productivity; the situation is not helped by the fact that this tree-finch's only habitat is adjacent to cleared agricultural land with fruiting trees favoured by the adult fly. In addition to this, avian pox infects a significant proportion of individuals. The island has several introduced predators and herbivores, such as pigs, cats, dogs and rats, and suffers extensive habitat destruction and degradation from agriculture and free-ranging domestic livestock; moreover, invasive plant species have led to habitat alteration. The tree *Scalesia pedunculata*, favoured by this species, is now itself endangered on Floreana, surviving only in fragmented patches with a total extent of less than 4 km²; the number of visiting tourists to *Scalesia* habitat have increased more than ten-fold since 2004. Although the Galapagos Archipelago is a World Heritage Site and a national park, the agricultural zone of Floreana, which was this tree-finch's prime habitat, is excluded from protection. Efforts to eradicate the goats and donkeys on Floreana, begun in 2006, have considerably reduced the populations of these grazing mammals. Methods to control or eradicate *Philornis downsi* are currently being tested.

Even more parlous is the situation of the Mangrove Finch (*Camarhynchus heliobates*), which has a global population of 80–120 mature individuals, all within a range of just 1 km² on the north-west coast of Isabela Island. This species used to be present in at least six patches of mangrove on Fernandina Island and on the east, south and west coasts of Isabela. It is probably now extinct on Fernandina, where it was last reported in 1971, and where recent surveys failed to locate it. On Isabela, breeding populations were found in 1997 and 1998 in only two areas, both on the north-west coast, with 37 pairs at Playa Tortuga Negra and 21 pairs at Caleta Black; subsequent surveys reported estimated populations at these sites of, respectively, 36 and 16 pairs in 1999, 24 and 14 pairs in 2007, and, in possibly the most thorough survey, a combined total of about 40 pairs in 2009. Elsewhere on the island, 3–5 territories with probable breeding birds were located in fairly extensive mangroves on the south-east coast. In 2008, several other historical sites on Isabela were searched, as also was Punta Espinoza, on Fernandina, but this finch was found at only one site, Bahia Cártago, on the coast of Isabela, where perhaps four or five pairs were present. Although it is likely that this species has never been common, its range and population have contracted greatly in recent decades, largely because of the introduced black rat, a major cause of nesting failure, having destroyed 70% of the finch's nests in 2007. Other potential threats include feral cats and Smooth-billed Anis (*Crotophaga ani*), both predators. As with the tree-finch on Floreana, a significant additional threat is the muscid fly *Philornis downsi*, found to be present in all nests and at an average infestation rate of 42 per nest. In addition, habitat degradation has probably contributed to the species' decline. Mangroves used by it appear structurally different from those where it is absent, which suggests that it has subtle habitat preferences; it appears to favour mangrove with tall trees, relatively low canopy cover, and plenty of leaf litter and dead wood. The leaf litter is a preferred foraging area of this finch, and, to prevent it from being washed away, it is essential that the mangrove trees are not linked directly to the sea. Because of the Mangrove Finch's very small population, studies of its breeding biology have been undertaken and blood samples analysed, the preliminary results appearing to indicate serious inbreeding. The feasibility of translocating individuals is being assessed, and possible sites for reintroduction on Isabela investigated. A three-year programme involving the taking of ten young annually from the Tortuga Negra colony and releasing them into mangroves on the east coast has begun, and yearly monitoring is continuing. As with the Medium Tree-finch, control of invasive predators and a study of methods to control *Philornis downsi* are underway.

Both of the remaining Critically Endangered emberizids have been described only recently. The Carrizal Seedeater (*Amaurospiza carrizalensis*), discovered on the island of Carrizal, on the River Caroní, in the Venezuelan state of Bolívar, was described as new to science in 2003. It is nowhere common, its global range



Not recognized as a species until the 1990s, the ***Sao Francisco Sparrow*** *has a patchy distribution over a wide area of central Bahia and north Minas Gerais, in Brazil. It has been listed as Near-threatened because its range was thought to be small and its* caatinga *habitat to be suffering rapid degradation and loss. Surveys in 2010, however, gave an estimated extent of occurrence of 56,100 km², and it is now thought that the population is unlikely to be below 10,000 mature individuals. It may warrant downlisting to Least Concern.*

[*Arremon franciscanus*, Chapada Diamantina National Park, Bahia, Brazil. Photo: Andy & Gill Swash/ WorldWildlifeImages.com]

appears to be tiny, and it, not surprisingly, very poorly known. Since the initial describing of this species, it has been found at a further seven sites in the lower Caroní Basin. The entire habitat at the type locality was destroyed by flooding during the building of the Guri Dam, which in addition destroyed other potentially suitable habitat in the vicinity. This seedeater, which must have a very small population, is thought to be declining because of the continuing destruction of habitat. The main threat to the surviving populations is the total clearance of forest. It is possible, or even probable, that the extreme scarcity of records is due in part to the difficulties of surveying the species' habitat. After the habitat at the type locality had been destroyed, three conservation-oriented organizations, together with a hydro-electric company, set up a two-year project to identify and survey potential habitat for this seedeater. The spiny bamboo in which it was first discovered is a most dangerous habitat in which to carry out surveys of any kind, and, because it lies beneath the forest canopy, this habitat cannot be detected by aerial survey. The effective protection of potentially suitable habitat is considered essential for the future survival of the Carrizal Seedeater.

The Antioquia Brush-finch (*Atlapetes blancae*) may already be extinct. It was described in 2008 on the basis of museum specimens from San Pedro, in the central Andes of Antioquia, in Colombia. It is currently known only from museum specimens, three of which exist, all from the type locality, two undated and the third dated 1971. All specimens were collected on a small plateau known as Llano de Ovejas, at 2400–2800 m. Expeditions to San Pedro in 2007 and 2008 failed to find the species. It is thought likely that this brush-finch lived in forest, most of which in this region has already been destroyed for cattle-ranching and commercial flower-growing. Further investigation of its potential distribution is required, followed by intensive targeted searches.

A further emberizid has been listed as Critically Endangered. This is the Hooded Seedeater, known only from the holotype, collected in the 1800s in south-central Brazil. It is considered likely, however, that this was a variant of the Yellow-bellied Seedeater or a hybrid (see Systematics).

In addition to the aforementioned Gough Finch, the three other Tristan da Cunha finches are at risk. The Inaccessible Finch is widespread on Inaccessible Island, with an estimated 10,000 pairs. In the past it was also present on the main island of Tristan, but it vanished within 50 years of the human colonization of the island, probably exterminated by introduced house mice and feral cats. Although this species is abundant within its tiny range, and appears not to be declining, the possible arrival of invasive species could bring about a steep decline in its numbers, perhaps followed shortly by its extinction, as happened on Tristan. Since the establishment of a fisheries patrol vessel, based at Tristan, Inaccessible Island has become more accessible and the risk of accidental introduction of mammalian predators is far greater. In-

Prized for its singing ability, the ***Great-billed Seed-finch*** *has vanished from parts of its former Brazilian range because of trapping for the cagebird trade. Some Brazilian ornithologists report that they have been unable to find it in the wild in recent years. It has a very disjunct range and is found also, very locally, from eastern Venezuela east to French Guiana.* The IUCN Red List, *which includes the race* occidentalis *of the Large-billed Seed-finch* (Oryzoborus crassirostris) *in this species, considers it to be Near-threatened.*

[*Oryzoborus maximiliani maximiliani*, Das Emas National Park, Goiás, Brazil. Photo: Edson Endrigo]





*The **Socotra Bunting** breeds in the highlands of the island of Socotra, in the north Indian Ocean, and may descend to the coast outside the breeding season. Although it has been discovered at several new localities since the late 1990s, its global range is thought to be no more than about 310 km², and even within this tiny area it is patchily distributed and local. The population is thought to be 300–500 pairs. Although apparently not declining, it is at risk from introduced predators because of its small range and probable ground-nesting habits, and is listed as Vulnerable. Well-established invasive mammals such as feral cats, rats* (Rattus) *and civets* (Viverricula indica) *may already be limiting the population.*

[*Emberiza socotrana*, Socotra.
Photo: Peter Ryan]

vasion of the introduced New Zealand flax (*Phormium tenax*) into areas of island cape myrtle (*Phylica arborea*) woodland is a further threat, as it results in habitat degradation. This species is, therefore, considered Vulnerable.

Nightingale Island is the sole home of the two other *Nesospiza* finches. The Nightingale Finch, listed as Vulnerable, has a global range of no more than about 4 km² and an estimated population of some 5000 pairs, of which at least 4000 pairs are on main island and the remainder on two tiny offshore islets. Wilkins's Finch is restricted to an area of probably no more than 2 km² on the main island of Nightingale, where its population is at most 100 pairs. It is Endangered. Both species face the same potential dangers as those threatening the other Tristan da Cunha finches. The risk of accidental introduction of mammalian predators such as rats and mice is of serious concern on all of the islands. For Wilkins's Finch, which seems to be dependent on island cape myrtle, the destruction or degradation of this woodland could be disastrous. Accidental introduction of certain invertebrates or pathogens which could adversely affect these trees, and the fact that a black fungus-like growth, although not yet present on Nightingale, has previously been transported from Tristan to Inaccessible Island is worrying.



Island species, being commonly restricted to a very small range and often adapted to certain conditions, are frequently at risk. In the Caribbean, the St Lucia Black Finch is uncommon to rare within its tiny global range, with a very small population in the range 250–999 mature individuals. It appears to be in slow decline because of continuing habitat loss and degradation, especially the clearing of undergrowth in timber plantations, which makes these areas wholly unsuitable for it. The species' breeding success is compromised by introduced mongooses (Herpestinae) and rats, which prey on both the nest contents and the adults. This finch occurs in two forest reserves and perhaps some other protected areas on St Lucia, efforts are being made to ascertain the species' present distribution and population, and to halt the clearing of undergrowth in wooded areas. This emberizid is regarded as Endangered.

To the south of Costa Rica, the Cocos Finch is the most common landbird on the island of that name. Moreover, it appears able to survive well in disturbed habitats, and habitat degradation may not have any major effects on it. Nevertheless, this species' global range covers no more than some 25 km², and it is therefore vulnerable to chance catastrophic events. Further, introduced rats and cats are potential predators, and grazing by feral deer, pigs and goats could perhaps be an adverse factor, while increasing tourism is a further potential problem. Although the entire island is protected as a national park, and the species is numerous, with an apparently stable population, and is a generalist in habitat preferences, its tiny global range is sufficient for it to be considered Vulnerable.

*Despite a global population estimated at up to one million mature indivduals, and a global range of almost 16 million km², the **Yellow-breasted Bunting** was listed as Vulnerable in 2008. Formerly one of the most numerous breeding passerines in much of Siberia, it has suffered severe declines and has disappeared from parts of its range. Habitat conversion may be a factor, but numbers have plummeted even on pristine breeding grounds. Trapping on the wintering grounds in China is blamed. Each year, more than one million are caught in mist-nets, cooked and sold as "rice-birds".*

[*Emberiza aureola aureola*, Voskresensk, Moscow, Russia.
Photo: Pavel Parkhaev]

*The geographical range of the **Saltmarsh Sparrow** extends in a narrow coastal band over 20,000 km², but suitable habitat is greatly fragmented and it occupies an area of less than 2000 km². Urban development is the major cause of habitat loss. Chemical spills are a threat, and invasive* Phragmites *reeds render saltmarsh habitat completely unsuitable for this species. Saltmarsh Sparrows are found in many coastal protected areas, but sea-level rise owing to climate change could further reduce its habitat, since the extent of urban development means that there is no room for marshes to migrate inland. IUCN raised the Saltmarsh Sparrow's threat status from Near-threatened to Vulnerable in 2004.*

[*Ammodramus caudacutus diversus*, Maryland, USA. Photo: George M. Jett]

Species with limited ranges are always, in a sense, "threatened", even if, at present, they are common in their preferred habitat. The Zapata Sparrow, for example, is confined to Cuba, where it is found as three distinctive populations, which differ in their ecology. The nominate race is isolated in a small area of the Zapata Swamp and numbers more than 250 individuals; its numbers are apparently stable or increasing in response to efforts to preserve suitable habitat. It is threatened, however, by dry-season burning and drainage. The subspecies *sigmani*, restricted to a small section of coastal thorn-scrub, dry forest and cactus stands in south Guantánamo, has a population of perhaps 600–700 individuals, although it was, until recently, thought to have an even smaller range and to number only 110–200 individuals. The habitat of this subspecies is threatened by burning and the subsequent colonization by grasses, followed by fencing for sheep-rearing. The third subspecies, *varonai*, appears to be numerous and very common within its very restricted range on Cayo Coco, in the Camagüey Archipelago, where it occupies dry to semi-wet open forest; unfortunately, Cayo Coco is now being further developed for tourism. This species is believed to be slowly declining, chiefly because of habitat loss and degradation. It is listed as Endangered.

Another emberizid with a very small range is the Yellow-green Finch (*Pselliophorus luteoviridis*), found only in west Panama. This is a poorly known species which has been recorded at few localities. It is probably scarce to locally fairly common, but its estimated population of 10,000–19,999 mature individuals is thought to be decreasing. Its range extends along the Serranía de Tabasará in Chiriquí and Veraguas, and probably also reaches Bocas del Toro and Coclé. The main threat to this species is habitat loss. In east Chiriquí, forest remains only in isolated patches, and the Serranía de Tabasará generally is threatened by clearance for coffee-growing, as well as by grazing, pesticides and fires. The core of the species' distribution, around Cerro Santiago, in the Ngöbe-Buglé indigenous homeland, is undergoing rapid deforestation through subsistence agriculture and cattle-rearing, and the forest clearance is now spreading to the higher elevations which this finch favours. Even within protected areas habitat continues to be destroyed. The Yellow-green Finch is, therefore, Vulnerable.

Likewise Vulnerable, and for much the same reasons, the Tanager Finch (*Oreothraupis arremonops*) has a patchy distribution in the undergrowth of montane forest in the western Andes of Colombia and north-west Ecuador. It is often found in mossy cloudforest at up to 2700 m. It appears to be rare and very local, and has been recorded at only a handful of localities, these generally under land-use pressures. Its population is believed to be decreasing. It is possible that this species' apparent rarity is in part due to the inaccessibility of its habitat, which is wet and has steep, dangerous slopes. Nevertheless, it is certain that much habitat has been lost in recent decades, primarily through human colo-



*The apparent rarity of the **Tanager Finch** may be due in part to the inaccessibility of its habitat, in the undergrowth of steep, wet forest at 1200–2700 m. Patchily distributed in the west Andes of Colombia and north-west Ecuador, this is a restricted-range species of the Chocó Endemic Bird Area. It is known from only a few localities, and these are mostly under pressure from logging, settlement, cattle-ranching, coca cultivation and gold-mining, but a nest with one egg has been found in disturbed forest in Pichincha, in Ecuador. Because of a suspected ongoing decline, it is listed as Vulnerable.*

[*Oreothraupis arremonops*, Jardín, Colombia. Photo: David Fisher]





*The **Black-masked Finch** has suffered extensive loss of its grassland habitats in Peru, Brazil, Bolivia, Paraguay and Argentina, and is likely to be in rapid decline. First said to be "Threatened" in 1988, it has been listed as Vulnerable since 1994. Now rare and local, it seems to be extinct in Chapada dos Guimaraes, in Mato Grosso, but elsewhere in Brazil potentially significant populations occur in some large national parks. A 2009 review found recent records from 14 protected areas in Brazil, four in Argentina, two in Bolivia and one in Paraguay, and the authors suggested that there were grounds for optimism for the prospects of the Black-masked Finch.*

[*Coryphaspiza melanotis melanotis*, 30 km from Santa Ana de Yacuma, Beni, Bolivia. Photo: Daniel Alarcón]

nization following road-building, coupled with extensive logging concessions; in Colombia, the construction of the Cali–Buenaventura and Pasto–Tumaco highways in, respectively, Valle del Cauca and Nariño have had a major impact. The rate of deforestation is increasing, mainly through logging, human settlement, livestock grazing, the cultivation of coca, and gold-mining. Montane forest in the region is not as severely threatened as is that in the lowlands, but some upland habitat has already been destroyed: rarely, areas of cloudforest are illegally burnt, for example, during severe drought, in order to provide grazable land. This species is present in some protected areas, and its population in Munchique National Park, in Colombia, is estimated at 1000 mature individuals.

South America contains a number of emberizid species, in addition to the Tanager Finch, that are globally threatened or rare, most of these having a limited range. They include three Endangered *Atlapetes* brush-finches, besides the Critically Endangered Antioquia Brush-finch, detailed above. The Yellow-headed Brush-



*Like other bamboo-seed specialists, **Temminck's Seedeater** is nomadic, following the irregularly timed seeding events of* Guadua *bamboo. Clearance of forest has reduced the number of such seeding events and increased the distance between them, leading to longer intervals between nesting attempts. The population is thought to be small and rapidly declining, and Temminck's Seedeater is listed as Vulnerable. It is found in a number of national parks, but its unpredictable movements, often involving absences of several years, make it and other bamboo specialists challenging to conserve through the protected-area system.*

[*Sporophila falcirostris*, Intervales State Park, Ribeirao Grande, São Paulo, Brazil. Photo: Edson Endrigo]



The only one of Darwin's finches not found in the Galapagos Islands, the ***Cocos Finch*** *has a very restricted range of no more than 25 km² on Cocos Island, 550 km south of Costa Rica. Present in almost every terrestrial habitat on the island, and highly tolerant of degraded and disturbed habitats, it is common to abundant and the population appears stable. There are no known threats to the island, which is a national park, uninhabited except for the park rangers. But the very small range makes the Cocos Finch susceptible to chance catastrophes, and it is classified as Vulnerable.*

[*Pinaroloxias inornata*, Cocos Island, Costa Rica. Photo: Tui de Roy/ Roving Tortoise Photos]

finch (*Atlapetes flaviceps*) has a very small range in the Colombian Andes, in north Tolima, where its estimated global population is put at 680 mature individuals. For a long time it was known from only three specimens, all from the type locality in the Toche Valley, until, in 1967, it was captured at a site farther south, in La Plata Vieja Valley, in Huila. For many decades little more was known about this brush-finch, but it has now been found to be be locally common at the type locality; unfortunately, there have been no further records from Huila. Continuing habitat degradation is evident within its range, and the species is thought to be in a steady, slow decline. The Black-spectacled Brush-finch (*Atlapetes melanopsis*) was not discovered until 1996, in the Andes of south-central Peru, since when it has been found at only a few localities. It seems to be local and uncommon, and its total population is estimated as lying in the range 2500–9999 mature individuals. The burning of early regenerating natural vegetation in order to maintain and create available pasture is a widespread practice in this species' range, except in steep, rocky

Uplisted from Vulnerable to Endangered only in 2010, ***Jankowski's Bunting*** *is declining so rapidly that by 2011 a status of Critically Endangered already seemed more appropriate. Populations numbered in hundreds in the 1990s are disappearing from their few known breeding places between one season and the next. The species' dry-grassland habitat has been largely destroyed by cutting for animal fodder, burning and conversion to agriculture. Although protected in Russia and North Korea, it no longer occurs in either country. None has been seen at China's Xianghai Nature Reserve since 2003, and numbers at Baicheng fell from 100 in 2001 to two in 2008.*

[*Emberiza jankowskii*, Baicheng, China. Photo: Pete Morris]





*The global range of the Endangered **Sierra Madre Sparrow** has been reduced to two separated sites in central Mexico totalling 42 km², of which it may occupy just 9 km². At one site around La Cima and Milpa Alta, near Mexico city, the population was estimated at 5380–6150 adults in 1997. At the other, recently rediscovered site, in south Durango, at least three breeding pairs occupied an area of 0·5 ha within an 80-ha marsh, with a total population of probably no more than 50. Uncontrolled burning of bunch-grass meadows to create pasture has destroyed much of the species' preferred habitat. Rock extraction at La Cima may open up the last unploughed grassland to cultivation.*

[*Xenospiza baileyi*, La Cima, Distrito Federal, Mexico.
Photo: A. Greensmith/ardea.com]

areas and ravines. This constant threat to its remaining habitat suggests that the species' is in continuing decline.

Previously listed as Critically Endangered, the Pale-headed Brush-finch has recently been downgraded to Endangered because its numbers appear to be increasing. It has been found in just one small area in south-west Ecuador, and census data in 2009 suggested a global population of about 220 adults. Within its range, which lies in the upper Jubones Valley, particularly in the vicinity of Girón and Oña, in south Azuay, its habitat of low arid scrubby woodland with patches of grassland has been decreasing for many decades, but concerted conservation action in more recent years has led to an increase in its population. The most significant event was the purchase of the Yunguilla Reserve especially for the protection of this brush-finch. The grazing activity of goats and cattle is a particular problem and seems to diminish the quality of the habitat, while fire and, especially, brood parasitism by the Shiny Cowbird are additional threats. In 2002, some 61% of Pale-headed Brush-finch pairs in Yunguilla Reserve were parasitized, prompting a programme of trapping and removal of the cowbirds; after seven years, the brush-finch population had increased markedly, from fewer than 40 pairs to more than 100 pairs, this aided by habitat restoration. Yunguilla Reserve is vital for this emberizid, holding 98% of known brush-finch territories within its 150–200 ha. There are plans for further land purchases, with the hope that a second reserve can be set up into which, once the present population has risen to 200 pairs, it should be possible to translocate some individuals.

The little-known Grey-winged Inca-finch (*Incaspiza ortizi*), which has a limited range in northern Peru, is listed as Vulnerable. It is known from just four sites, one in extreme north-east Piura, two in Cajamarca and one in La Libertad, and its preferred habitat is dry scrub, especially on hillsides. At the northernmost site, near Huancabamba, the slopes have been extensively cleared for agriculture and pasture, and there appears to be no other suitable habitat in the general vicinity;'if this hilltop were to be burnt, the species would surely be lost from this locality. Farther south, it survives at heavily disturbed sites on steep slopes. Nothing is known of the current size of the population or its trends, but the species seems to tolerate disturbed habitats, and there is no evidence of any decline. Further fieldwork is needed to determine if any undiscovered populations exist elsewhere in the region.

Three of the warbling-finches are globally threatened. Two of these, both confined to Peru, are Endangered. The Plain-tailed Warbling-finch (*Poospiza alticola*) has a fairly small range in the upper Marañón Valley, within which its remaining area of suitable habitat of montane scrub, shrubby areas and low woodland is decreasing and its population is severely fragmented. It is rare to locally uncommon, with an estimated global population in the range 1000–2499 individuals. The cutting of woodland for firewood, combined with the prevention of regeneration because of burning and intensive grazing, reduce the extent of mixed *Polylepis–Gynoxys* woodlands, this species' preferred habitat. Further adverse factors include the shift from camelid-farming to the farming of sheep and cattle, and soil erosion and degradation caused by agricultural intensification, as well as road-building. Moreover, afforestation projects have often been inappropriate, as exotic tree species, instead of native ones, have been planted. Even within the protected area of the Huascarán National Park, in Ancash, where this species is present, habitat degradation continues. Similar problems afflict the Rufous-breasted Warbling-finch (*Poospiza rubecula*), which is also Endangered. This emberizid lives at a few isolated sites at 2500–3800 m on the west slope of the Peruvian Andes, inhabiting bushy undergrowth in mixed dry Andean woodlands dominated by *Oreopanax*, *Myrcianthes* and *Escallonia*, and montane scrub, as well as dry scrub at the edge of *Polylepis* forests. It occurs also in thick scrub on slopes, where it is most closely associated with the composite shrubs *Eupatorium* and *Gynoxys*. Predictably, it is little known and probably very rare, with an estimated 250–999 individuals. Only six individuals have been recorded in Zárate Forest, in Lima, but this is more than at any other locality. Having already suffered extensive habitat loss, this species faces continuing degradation and destruction of its habitat caused by the same activities and actions as those affecting the Plain Warbling-finch, and the rates of loss and degradation have increased in recent years. It is recorded within the Huascarán National Park but even here the habitat is continually being degraded. The effective protection of Zárate Forest is a conservation priority, and surveys to determine the species' precise distribution are required.

The third threatened member of this genus is found in interior southern Brazil. This is the Cinereous Warbling-finch (*Poospiza*





Thanks to intensive conservation efforts, the ***Pale-headed Brush-finch*** *was downlisted from Critically Endangered to Endangered in 2011. Its remaining 27 ha of suitable habitat were purchased in 1999 and securely fenced to remove grazing pressure; brood-parasitic cowbirds* (Molothrus)*, the main threat, were removed. The Endangered* ***Yellow-headed Brush-finch*** *is found only at one site in Colombia, the Toche valley (Tolima); it is still locally common, but declining because of habitat loss.*

[Left: *Atlapetes pallidiceps*, Yunguilla, Ecuador.

Right: *Atlapetes flaviceps*, near Líbano, Colombia. Photos: Jon Hornbuckle]

cinerea), which is uncommon to rare, locally distributed, and listed as Vulnerable. There are recent records of the species from eight sites in Minas Gerais, four in Goiás and one in Distrito Federal; it has not been seen in Mato Grosso since 1904 and in São Paulo since 1901, and is possibly extinct in both regions. Although this emberizid has probably always been rather scarce, the extent of habitat loss that it has suffered suggests that it has probably undergone a significant reduction in its numbers. Since around the middle of the twentieth century, much of the *cerrado* that it needs has been destroyed or severely modified, and government land reform has encouraged the conversion of this unique habitat to eucalypt (*Eucalyptus*) plantations and the growing of exportable crops. Recent reports do, however, suggest that it is able to tolerate, and perhaps even favour, degraded areas, such that it may be more numerous than was previously believed; it seems to be extending its range towards degraded areas in eastern Minas Gerais.



The three races of ***Zapata Sparrow*** *occur in widely separated areas in Cuba, each in a different habitat type, and the three may differ in their ecological requirements. The nominate race has a stable population of more than 250 in the Zapata Swamp, which is affected by drainage and dry-season burning. The race* varonai *is numerous in its very restricted range on Cayo Coco, off the north coast. The race* sigmani*, confined to a small stretch of the south-eastern coast in Guantánamo, may number 600–700. None of the three races is officially protected, but each has been found in a protected area. Suspected of a slow decline due to habitat loss, the Zapata Sparrow is listed as Endangered.*

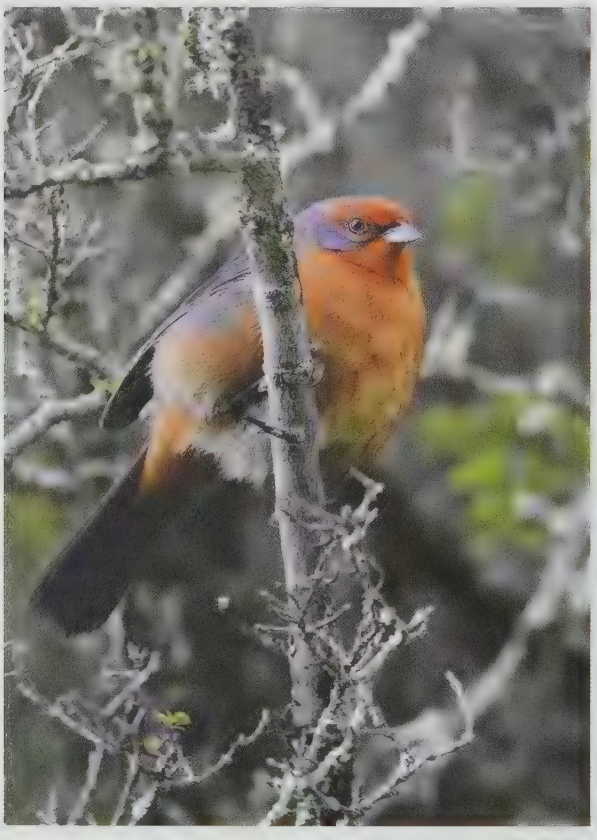
[*Torreornis inexpectata inexpectata*, Zapata, Cuba. Photo: Zhao Chao]



The genus Nesospiza *is confined to the Tristan da Cunha Group.* ***Wilkins's Finch*** *has a breeding range of no more than 2 km² on Nightingale Island, and a population of at most 100 pairs. It is at risk from the introduction of alien predators and pathogens; invasive plants are already reducing its habitat. Although the population is stable, it is listed as Endangered. Both the Nightingale Finch* (Nesospiza questi) *and, on Inaccessible Island, the Inaccessible Finch* (N. acunhae) *are abundant within their tiny ranges, but are subject to the same threats and are listed as Vulnerable.*

[*Nesospiza wilkinsi*, Nightingale Island, Tristan da Cunha Group. Photo: Peter Ryan]

Both of the mountain-finches in the genus *Compsospiza*, are globally threatened. In Bolivia the Cochabamba Mountain-finch (*Compsospiza garleppi*) was thought to be restricted to Cochabamba, but in 2005 it was discovered in Potosí, where further site records were made in 2008. The species, although locally frequent in Potosí, is thought to be declining at a rate of 10–19% over ten years, and it is considered Endangered. From recent fieldwork, it would appear that this species is tolerant of small-scale habitat alteration and destruction, but it seems to be absent from highly degraded areas devoid of native vegetation. Contrary to earlier reports, it is not a *Polylepis* specialist, but it does require a mosaic of habitats of which *Polylepis* is one. It can do well in agricultural and other sites modified by humans, but only so long as native shrubbery is present. It occurs in Tunari National Park, in Cochabamba, but a large proportion of this has already been converted to exotic pine stands, and the park's future is by no means assured. The replanting of a variety of native shrub species could be the best management strategy for this species. To the south, in the Andes of extreme south Bolivia and north-west Argentina, the Tucuman Mountain-finch (*Compsospiza baeri*) has a fairly small and fragmented range, within which its population is thought to amount to only a few thousand individuals. It is listed as Vulnerable. It was not discovered in Bolivia until 1999, when two individuals were recorded at Estancia Waykhu, in south Tarija. In Argentina, this mountain-finch has been found at comparatively few sites, a total of nine localities in Jujuy, Salta, Tucumán, Catamarca and La Rioja. At all sites it occurs at low densities. As is so often the case, natural habitat in the region has been destroyed by human settlers and their accompanying goats and cattle; the remaining habitat is threatened in some areas by expanding agriculture, and there is the danger that fires in nearby grasslands could spread into ravines occupied by this species. In Tucumán, the El Infiernillo Reserve was created especially for this species, and it has been recorded recently in a couple of other protected sites.



Until 2005, the ***Cochabamba Mountain-finch*** *in Bolivia was thought to be restricted to Cochabamba. A second population was then discovered, in Potosí. It appears tolerant of small-scale habitat alteration and destruction, but seems to be absent from highly degraded areas without native vegetation. Recent visits to most known sites revealed no more than one or two pairs per locality, though more were seen in Tunari National Park, the site of this photo. With no recent information, the population is put at 400–4000, and, because habitat loss is likely to be causing a slow to moderate decline, it is considered Endangered.*

[*Compsospiza garleppi*, Tunari National Park, Cochabamba, Bolivia. Photo: Daniel Alarcón]

Despite its reasonably wide range in central South America, the Black-masked Finch (*Coryphaspiza melanotis*) is everywhere uncommon to rare, very local, and evidently in rapid decline. It requires tall-grass habitat with scattered, low shrubs, and such grasslands are being destroyed at a fast rate by intensive cattle-ranching, mechanized agriculture, afforestation, invasive grasses, excessive use of pesticides and annual burning. In Bolivia, and no doubt elsewhere, the burning of grassland is now a major problem, and is often the result of uncontrolled fires. This finch occurs in a few reserves, but its future is not assured and it is considered Vulnerable. The Endangered Yellow Cardinal, also rare and local, has declined rapidly not only because of extensive habitat loss, but also, and predominantly, because of trapping for the cagebird market. It has a wide range, extending from north and central Argentina eastwards to extreme south-east Brazil and Uruguay, but its global population in 2007 was thought to number only 1500–3000 individuals. It was formerly very common throughout Uruguay, but no more than 300 or so individuals now remain, concentrated in the north-west of the country. Similarly, it used to be widespread and common in Argentina, but has now apparently disappeared entirely from the north-west. In south-east Brazil, where there were always far fewer records, the species may well be extinct. The remaining populations of this striking species are small and fragmented, with the stronghold probably in south-central Argentina. It requires old-growth *Prosopis* forest, or other larger tree species in thorny woodlands, and is absent from areas that are too degraded or young. Some of the habitat loss suffered by this species is due to wood extraction for furniture-making; the replacement of native woodland with exotic eucalypts is not helpful to this and many other species. Large numbers of this finch have been trapped for commercial purposes, not only because of its attractive appearance, but also because it has a musical song. Captive-breeding programmes are being established in Uruguay and Brazil, largely with birds seized from poachers.

The last of the globally threatened members of this family are five *Sporophila* seedeaters, a species-rich genus virtually confined to the Neotropics, although one species occurs as far north as extreme southern Texas, in the USA. Many of these tiny seedeaters are popular as cagebirds, and are consequently often subjected to intensive commercial trapping. This appears to be a major problem in Trinidad, Brazil and Argentina, and has led to the serious decline of several species. The five which are now at risk are the Buffy-fronted, Temminck's, Black-and-tawny (*Sporophila nigrorufa*), Marsh and Chestnut Seedeaters. All are Vulnerable except for the Marsh Seedeater, which is Endangered. The Buffy-fronted Seedeater was formerly locally common in rice fields and at bamboo flowerings in south-east Brazil, with a



*Excessive trapping over many decades is probably the main factor in the rapid decline of the **Yellow Cardinal**, which is highly prized as a cagebird. It was formerly widespread and common throughout much of Argentina and Uruguay, but is now rare except very locally. In Brazil, where it was occasionally recorded as a non-breeding bird, it is probably now extinct. In 2007, the global population was estimated at 1500–3000 birds, and it has for long been considered Endangered. It occurs in a number of protected areas in Argentina, and captive-breeding programmes are being established in Uruguay and Brazil, largely with birds seized from poachers.*

[*Gubernatrix cristata*, Espinilho State Park, Barra do Quaraí, Rio Grande do Sul, Brazil. Photo: Edson Endrigo]

few records from adjacent areas of Paraguay and Argentina, but its numbers have been greatly reduced by deforestation and trapping; it is rare to locally and erratically uncommon. Temminck's Seedeater is a bamboo specialist with a similarly limited range extending from coastal south-east Brazil inland to east Paraguay and north-east Argentina; this rare species has suffered as a consequence of both trapping and habitat destruction, as have other bamboo specialists. The Black-and-tawny Seedeater is known from five areas in extreme eastern Bolivia and adjacent south-west Brazil, where it is at risk as a consequence of habitat destruction; it is rare, and virtually nothing is known about its biology. Marshes and grasslands in extreme south-east Paraguay, north-east Argentina, south-east Brazil and Uruguay are home to the Marsh Seedeater, which is now rare and very local as a result especially of habitat loss and widespread capture for the cagebird trade. It is highly valued as a cagebird because of its unique coloration. Finally, the Chestnut Seedeater, with a range and habitat similar to those of the preceding species, has suffered a rapid decline, and its population is believed now to be small and fragmented; once again, the main causes are large-scale capture for the cagebird trade and degradation and loss of habitat. The two last-mentioned species migrate north after breeding, reaching to as far as south-central Brazil.

Illegal trapping has clearly led to a great reduction in the numbers of these seedeaters in the wild, and alteration or loss of habitat has merely compounded the problem. Indeed, almost all of the *Sporophila* species have suffered from trapping, and this continues today, even though it is banned in many places, including Brazil.

As already noted, some 24 members of Emberizidae are currently listed as Near-threatened. Not surprisingly, most of them have problems with habitat degradation and/or loss. The Cinereous Bunting (*Emberiza cineracea*), for instance, has lost much of its habitat in south-east Europe and west Turkey through development for tourism, and dam construction in south-east Turkey has led to destruction of habitats not only because of flooding of the land, but also through resettlement of displaced villagers and their livestock to hitherto thinly populated areas. The Ochre-rumped Bunting (*Emberiza yessoensis*) breeds from extreme eastern Mongolia east to extreme south-eastern Russia and Japan, and is scarce and declining throughout its range. All indications are that this decrease is related to continuing loss of wetlands across its breeding range and destruction of coastal marshes on the wintering grounds, mainly in east China. In addition, the recently discovered breeding area in Mongolia is threatened by overgrazing and drought.

Some of the Near-threatened species are potentially at risk because of habitat loss combined with trapping. One such example is the Coal-crested Finch (*Charitospiza eucosma*), uncommon and local in east-central Brazil; its moderately small global

*Drainage or overgrazing of its wet grassland breeding habitat is probably the main cause of the decline of the **Marsh Seedeater**. Heavy trapping for the cagebird trade has also extirpated this species in parts of Argentina and threatens populations in the Río Uruguay basin. It is protected in both countries, but the law is not effectively enforced. With 1000–2499 birds surviving at fewer than ten known sites, it is listed as Endangered. It breeds at Potrerillo de Santa Teresa Reserve, in Uruguay, and Iberá Provincial Reserve, in Argentina. Emas National Park, in Brazil, is possibly an important wintering site, and the species is studied in San Rafael National Park, in Paraguay.*

[*Sporophila palustris*, Espinilho State Park, Barra do Quaraí, Rio Grande do Sul, Brazil. Photo: Márcio Repenning]



population is likely to be declining owing to habitat loss caused by conversion of *cerrado* to agriculture, as well as effects of trapping for cagebird trade. Others have a limited range, as does, for example, the Slender-billed Finch (*Xenospingus concolor*), which is confined to a few scattered river valleys and coastal lagoons in the Pacific lowlands from central Peru south to northern Chile, although it is fairly common at least in the southern part of its distribution.

Importantly, some species are not "officially" at risk or potentially so, but may give cause for concern, sometimes at a local level. Some of the seedeaters have suffered substantial losses because of the cagebird trade. This seems to be the case with the Grey Seedeater and Chestnut-bellied Seed-finch (*Oryzoborus angolensis*) in Trinidad, where the latter, in particular, is highly prized as a cagebird because of its song. Both species are often trapped in Trinidad, and are now rare there as a consequence.

In north-west Europe, and especially in Britain, many buntings have declined greatly in recent decades. Indeed, the Cirl Bunting almost became extinct in Britain in the 1980s, at the end of which decade there were just a little more than 100 pairs left, all in a small area of south Devon, in south-west England. At the turn of the previous century, this had been a very common species right across the southern third of England, where it was a familiar sight in villages and around the edges of towns. The near-demise of this bunting had been caused, it seems, by changes in agricultural practices which led to a lack of available food in the form of grain and weed seeds, the species' staple winter diet. After two decades of attempted persuasion, conservationists finally managed to convince farmers and other landowners that it was possible, by leaving a small area of their land "wild", to redress the balance and provide sufficient weed seeds for the buntings to survive. Moreover, by planting spring barley and leaving the stubble over the winter, the farmers were able to ensure that the birds had a plentiful supply of food through the winter months. This strategy worked, and by 2011 the Cirl Bunting population had recovered to almost 1000 pairs and was beginning to expand into nearby areas.

Similarly, the Corn Bunting has suffered a major drop in numbers in Britain, apparently for similar reasons to those which first depressed the Cirl Bunting's population, and the Yellowhammer, too, has exhibited signs of a significant decrease in recent years. It appears fairly indisputable that changes in agricultural practice are the problem, as removal of the buntings' food source was the chief cause of winter mortality. This can be compensated for, however, by the provision of grain, large-seeded grasses and other broad-leaved weeds, particularly in late winter and early spring, which has been found to improve the adult survival rates considerably.

Due to their intrinsically limited ranges, all species and populations confined to one or a few small islands are potentially at risk. The "Ipswich Sparrow", race *princeps* of the widespread and common Savannah Sparrow, breeds only on Sable Island, in Nova Scotia, and winters along the Atlantic coast of North America, primarily in the USA from Maine south to Cape Hatteras, in North Carolina, almost exclusively in marram grass on coastal dunes. Although the Ipswich Sparrow is common on Sable Island, fewer than 2000 individuals breed there. The population has remained stable in recent time, but the island itself is a low sand spit in the North Atlantic, and rising water levels or a bad storm could destroy it. Further, parts of the sparrows' wintering habitat are being developed for cottages, and, although the area is generally north of the hurricane zone, a major storm could do severe damage. The Ipswich Sparrow is a well-marked and distinct population and might ultimately be recognized as a separate species. The San Benito Sparrow, a close relative of the Savannah Sparrow, is resident on Islas San Benito, three small islands off the west coast of Baja California, in north-west Mexico. It is abundant but mice, possibly deer mice (*Peromyscus*), have been introduced to one of the islands, and an effort is being made to eradicate the mice by poisoning them, after which it is planned to boost the sparrow populations. Both of these island taxa are vulnerable because of their severely limited ranges.

The Guadalupe population of the Dark-eyed Junco, subspecies *insularis*, sometimes recognized as a distinct species, is confined to that island, about 280 km west of Baja California, and was once common there. It appears to be catholic in its habitat requirements, being found in Guadalupe cypress (*Cupressus guadalupensis*), Monterey pine (*Pinus radiata*) and island oak



*The **Gough Finch** is the only passerine resident on Gough Island, the most southerly of the Tristan da Cunha Group. Its numbers have decreased since at least the mid-20th century, apparently a result of nest predation and competition for food by the introduced house mouse* (Mus musculus). *The density of territorial pairs roughly halved between 1990 and 2007, and the number of territory-holders in immature and juvenile plumages has increased. At the same time, the proportion of juveniles has decreased greatly, indicating reproductive failure, and the species is listed as Critically Endangered. Survivors have been driven into suboptimal upland habitat, though the finch is still abundant on Penguin Island, a mouse-free offshore stack.*

[*Rowettia goughensis*, Gough Island, Tristan da Cunha Group. Photo: Tui de Roy/ Roving Tortoise Photos]





Two Galapagos finches are Critically Endangered. The ***Mangrove Finch*** *is now thought extinct on Fernandina, and 80–120 birds, in perhaps two viable populations, remain on Isabela. Predation by introduced black rats* (Rattus rattus) *is the main problem. The main threat to the* ***Medium Tree-finch*** *is the nest-parasitic fly* Philornis downsi*; in 2004–2008, only 4–8 % of nests produced fledglings. Methods to control the fly are being tested.*

[Left: *Camarhynchus heliobates*, Black Turtle Beach, Isabela, Galapagos. Photo: Greg Lasley/VIREO.

Right: *Camarhynchus pauper*, Cerro Paja, Floreana, Galapagos. Photo: Tui de Roy/ Roving Tortoise Photos]

(*Quercus tomentella*), and it is now found in stands of tree tobacco (*Nicotiana glauca*) on the beach. The junco's numbers have been depressed as a consequence of predation by feral cats and overgrazing by goats. Apparently, most of the cats have died of starvation, and 20,000 goats were removed in 1990. In the late 1980s, it was estimated that there were perhaps 100 juncos on the island.

In summary, habitat destruction, both by humans and through natural causes, has probably little affected numbers of north-temperate or African emberizids, but it has had a significant negative effect on many South American taxa, which tend to have smaller ranges. In South America, the trapping of wild birds for the cagebird trade has had an adverse impact on many species, especially the seedeaters and the Yellow Cardinal. Equally, the trapping of buntings for trade and for food has been carried out on a massive scale in eastern Asia, resulting in the serious depletion of some species' populations.

On the positive side, however, there are many conservation programmes in place in various parts of the world, and it has been amply demonstrated that these can help threatened species to recover. With the future prospect of climate warming and the many and varied changes which this could bring to habitats everywhere, there is a greater need now than perhaps ever before for conservationists, wildlife enthusiasts, government bodies, landowners and all interested parties to work together to ensure that the Emberizidae, no less than other taxa, continue to thrive on the planet. These are delightful species, and they will surely continue to delight and intrigue humans for a long time to come.

General Bibliography

Abzhanov (2010), Abzhanov *et al.* (2004), Alström *et al.* (2008), Amadon & Eckelberry (1955), Anon. (1998), Antonov *et al.* (2006), Armani (1985), Bangs (1931), Beadle & Rising (2002), Beecher (1953), Bent & Austin (1968), Binford (1989), Bledsoe (1988), Bock (1994), Bowman (1961, 1983), Burns (1997b), Burns & Naoki (2004), Byers, Olsson & Curson (1995), Campbell, B. & Lack (1985), Campbell, R.W. *et al.* (2001), Carson & Spicer (2003), Chesser & Zink (1994), Collar *et al.* (1992), Cozzani *et al.* (2008), Cramp & Perrins (1994), DaCosta *et al.* (2009), Dávalos & Porzecanski (2009), Davis, J. (1953, 1960a), Di Giacomo, A.S. *et al.* (2010), Dickey & van Rossem (1938), Dickinson (2003), Dodge *et al.* (1995), Dunning (1993b, 2008), ffrench (1991), Freeland & Boag (1999), Fry & Keith (2004), Gabrielson & Lincoln (1959), García-Moreno & Fjeldså (1999), García-Moreno, Ohlson & Fjeldså (2001), Garrido & Kirkconnell (2000), Gill *et al.* (2009), Grant, B.R. & Grant (2003), Grant, P.R. (1999), Grant, P.R. & Grant (2008), Grapputo *et al.* (2001), Greenlaw (1977), Greenway (1958), Grinnell (1915), Griscom (1932), Groth (1998), Harper (1958), Hellmayr (1938), Herrel *et al.* (2010), Hilty (2003), Hilty & Brown (1986), Höhn (1984), Howell & Webb (1995), Hubbard (1972a, 1975, 1977), Hubbard & Crossin (1974), Johnston (1954, 1956a, 1956b), Jones (2003), Jønsson & Fjeldså (2005), Klicka & Banks (2011), Klicka & Spellman (2007), Klicka, Burns & Spellman (2007), Klicka, Johnson & Lanyon (2000), Klicka, Zink & Winker (2003), Lack (1947), Land (1970), Lopes *et al.* (2010), Mainardi (1957), Maley & Winker (2010), Marshall, D.B. *et al.* (2003), Marshall, J.T. (1957, 1960), Matsuoka & Johnson (2008), McPeek (1994), McWilliams & Brauning (2000), Meyer de Schauensee (1984), Miller (1941), Monroe (1968), Murray (1968), Navarro-Sagüenza *et al.* (2008), Nice (1937, 1943), Norment (1992), Olson (1981e), Parkes (1957, 1959a, 1974a, 1974b), Patten & Fugate (1998), Paynter (1964a, 1964b, 1970a), Peterjohn (1989), Petren *et al.* (1999a), Pitelka (1947), Pyle (1997), Raikow (1982), Remsen & Graves (1995a, 1995b), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Ridgway (1901), Rimmer (1986), Rising (1991, 2001), Rising & Beadle (1996), Rising *et al.* (2009), Robbins, J.D. & Schnell (1971), Robbins, M.B. *et al.* (2005), Robbins, S.D. (1991), Rojas-Soto *et al.* (2008), Rowley (1962), Russell (1964), Russell & Monson (1998), Sánchez-González & Navarro-Sigüenza (2009), Sanderson (2000), Sato, O'hUigin *et al.* (1999), Sato, Tichy *et al.* (2001), Selander & Giller (1959), Sharpe *et al.* (2001), Sibley, C.G. (1950, 1970, 1996), Sibley, C.G. & Ahlquist (1990), Sibley, C.G. & Monroe (1990, 1993), Sibley, C.G. *et al.* (1988), Skutch (1954), Smith, J.N.M. *et al.* (2006), Stallcup (1954), Steadman (1982), Steinheimer (2004), Steinheimer & Sudhaus (2006), Stiles & Skutch (1989), Storer (1955), Sulloway (1982a, 1982b), Swarth (1920, 1929, 1931), Tallman *et al.* (2002), Taylor (2003), Tordoff (1954), Tryjanowski *et al.* (2001), Urban (1959), Voous (1983), Webster (1959a, 1959b), Webster & Webster (1999), Wege *et al.* (1993), Wetmore *et al.* (1984), Williamson & Peyton (1962), Wolf (1977), Yuri & Mindell (2002), Zink (1982, 1986, 1991, 1994), Zink & Avise (1990), Zink & Dittmann (1991, 1993a), Zink, Dittmann *et al.* (1991), Zink, Rising *et al.* (2005).



PLATE 39

inches 3
cm 8

Genus *CALCARIUS* Bechstein, 1802

1. **Smith's Longspur**

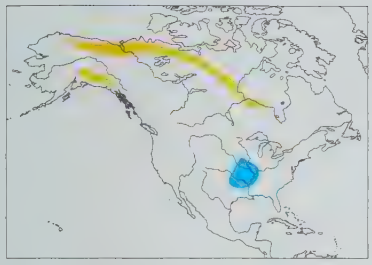
Calcarius pictus

French: Plectrophane de Smith **German**: Goldbauch-Spornammer **Spanish**: Escribano de Smith

Taxonomy. *Emberiza* (*Plectrophanes*) *picta* Swainson, 1832, Carlton House, on banks of the Saskatchewan River, Saskatchewan, Canada.
Molecular studies indicate that genus is basal to both the New World and the Old World emberizids, and closely related to *Plectrophenax*; has been suggested that these two genera and *Rhynchophanes* be placed in a separate family, Calcariidae. Monotypic.

Distribution. Breeds NE & EC Alaska and NC Canada from extreme N British Columbia E across N Yukon and N & EC Mackenzie to S Nunavut, NE Manitoba and extreme N Ontario. Winters in S USA from SC Kansas, Oklahoma and N Texas E to Arkansas (especially NW), W Tennessee, Mississippi and N Alabama (rare).

Descriptive notes. 14–17 cm; 21–32 g. A fairly large bunting, with white in tail, relatively large head and short tail; sexes differ in coloration. Male breeding has forehead and crown dark brown or black, often flecked with white towards back of crown; supercilium, lores and supraloral spot white; white patch on ear-coverts, boldly outlined by wide black postocular area and moustachial stripe, and boldly edged black towards neck; white submoustachial stripe; nape bright buffy; upperparts black, feathers edged bright buff (appears streaked); upperwing brown, lesser upperwing-coverts mainly white, outer ones mostly black, median and greater coverts narrowly edged buffy-



white at tips, often only narrowly on greater coverts (forming one or two indistinct wingbars); tail dark, lateral two pairs of rectrices mostly white; throat and underparts uniformly warm ochraceous buff; iris brown; bill dusky, brownish-yellow base of lower mandible; legs brown. Male non-breeding has similar pattern, but black on head replaced by streaky brown, throat whitish and median and greater upperwing-coverts more distinctly tipped white; breeding plumage obtained through wear. Female is patterned like non-breeding male, but crown dark brown, flecked with buff, supercilium, lores and ear-coverts light buffy brown, boldly edged with dark brown, upperparts dark brown with buffy feather edges. Juvenile is like non-breeding adult, but perhaps more heavily streaked on throat and breast; apparently completes post-juvenile moult on breeding grounds. VOICE. Song "tat a tee twe twe twee-werr-tee we chew", with ending syllables emphasized, somewhat like song of Chestnut-sided Warbler (*Dendroica pensylvanica*). Call a staccato rattle, "tic-tic-tic-tic"; also gives sneezy "tseu" call.

Habitat. Breeds in moist tundra at edge of tree-line, where found in sedges (*Carex*) and grasses interspersed with heather and small trees, chiefly Lapland rhododendron (*Rhododendron lapponicum*), tamarack (*Larix laricina*) and spruce (*Picea*). On migration and in winter may be found in fallow fields, but more common in short-grass prairie, often with three-awn grass (*Aristida*); typically likes areas with ankle-high grass or alfalfa (*Medicago*). Sea-level to 1200 m.

Food and Feeding. In summer feeds young with grasshoppers (Orthoptera), emergent dragonflies (Odonata), adult dipteran flies (of families Tipulidae, Chironomidae, Calicidae) and Lepidoptera. In winter feeds mainly on seeds, especially of *Aristida*. Forages principally on or near ground or low in vegetation. In non-breeding season in flocks, which can be rather secretive and difficult to see in grass habitat; compared with other longspurs, this species prefers the tallest grass and tends to be the most difficult one to spot, in this respect being reminiscent of a pipit (*Anthus*).

Breeding. Start of egg-laying varies depending on local weather conditions, e.g. at Churchill, in Manitoba, first eggs from as early as 9th Jun to as late as 21st Jun; in most seasons clutch initiation tends to occur after second week of Jun; double-brooding rare. Polygynandrous; no pair-bond formed, but female mates with 1–3 males, and males, in turn, mate with several females. Nest built by female, taking 3–4 days, a woven cup of dry grasses and sedges, lined with hair, lichen or wool, but most often with ptarmigan (*Lagopus*) feathers, placed on ground in depression in relatively dry hummock, near rhododendrons or dwarf birches (*Betula glandulosa*), or among sedges. Clutch 4–6 eggs (usually 4), pale green or greyish with darker purplish spots, dark lines or splotches; incubation entirely by the female, period 11–13 days; chicks fed by both sexes, nestling period 7–9 days; young usually cannot fly until at least 12 days old, in early stages they run quickly through the grass.

Movements. Migratory. Males arrive on breeding grounds before females, and apparently also migrate S earlier. Migrates in flocks which are usually monospecific, but occasionally found with *C. lapponicus* and *Plectrophenax nivalis*. Compared with *C. lapponicus*, present species migrates earlier in autumn and later in spring, arriving 1–2 weeks later than former in areas of breeding sympatry. Migration begins late Mar, most moving N in Great Plains and Midwest into early May, and arrives in Canadian Prairie Provinces by mid-May; arrival on breeding grounds such as Churchill (Manitoba) in late May, but peak in early Jun, with some weather-related variation (e.g. in very cold spring of 2000 arrival at this site not until middle to late Jun). Autumn departure mainly from Aug to mid-Sept, reaching wintering grounds in Oct to early Dec; leaves Yukon late Jul to Aug, rarely remaining to early Sept, and departs from Churchill mid-Aug to early Sept; passage through Canadian Prairies during late Aug to mid-Sept; in USA migrates through Great Plains and Midwest (E to W Indiana). In winter commonest in SC Kansas and NC & NE Oklahoma. A rare migrant in W Great Lakes region; casual vagrant as far as both coasts, primarily in autumn and winter.

Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Generally uncommon, but locally common in appropriate habitat. Estimated global population fewer than 75,000 individuals. This species' breeding habitat has been little affected by human activities. Possible future impact of climate change not yet assessed.

Bibliography. Alderfer (2006), Anon. (1998), Beadle & Rising (2002), Briskie (1992, 1993a, 1993b, 1999, 2009), Briskie *et al.* (1998), Cooke (1911), Dunn & Dunn (1999), Hellmayr (1938), Howell & Webb (1995), Irving (1960), Jehl (1968, 2004), Jehl & Hussell (1966), Kemsies (1968), Kemsies & Randle (1964), Kessel & Gibson (1978), Klicka *et al.* (2000), Lebbin *et al.* (2010), Littlefield & Pakulak (1969), Martin *et al.* (1981), Ormston (2000), Peck & James (1987), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Sage (1976), Sinclair *et al.* (2003).

2. Lapland Longspur

Calcarius lapponicus

French: Plectrophane lapon **German**: Spornammer **Spanish**: Escribano Lapón
Other common names: Lapland Bunting

Taxonomy. *Fringilla lapponica* Linnaeus, 1758, Lapland.

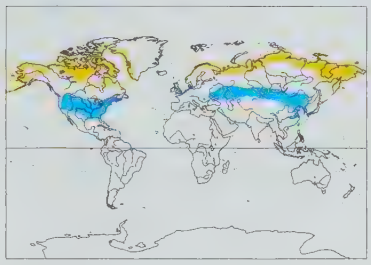
Molecular studies indicate that genus is basal to both the New World and the Old World emberizids, and closely related to *Plectrophenax*; has been suggested that these two genera and *Rhynchophanes* be placed in a separate family, Calcariidae. Geographical variation appears to be mainly clinal; proposed race *subcalcaratus* (described from Greenland) is treated as a synonym of nominate and *kamtschaticus* (E Kamchatka) as a synonym of *coloratus*. Three subspecies recognized.

Subspecies and Distribution.

C. l. alascensis Ridgway, 1898 – breeds Pribilof Is, N & W Alaska (including St Lawrence I, Nunivak I, Aleutian Is, Kodiak I and Middleton I) and NW Canada (N Yukon and NW Northwest Territories); winters in extreme S Canada (S British Columbia) and USA (W Montana and S South Dakota S to NE California, N Arizona and N Texas, casually S to C California and E to Ohio).

C. l. lapponicus (Linnaeus, 1758) – breeds N Canada (S to C Nunavut, N Ontario, N Quebec and N Labrador) and W & S Greenland, and from W & N Fennoscandia E across N Siberia (including S third of Novaya Zemlya, New Siberian Is and Wrangel I) to Bering Strait; winters in USA (Colorado E to Wisconsin, S to N Texas, Tennessee and Delaware, casually Louisiana and Florida) and SE Canada (S Ontario, Vermont and C Nova Scotia), and in Palearctic on S North Sea shores, CE Europe and E across C Asia to Russian Altai, Mongolia and N China.

C. l. coloratus Ridgway, 1898 – breeds E Siberia around N portion of Shelekhova Gulf, on Kamchatka Peninsula and Commander Is; winters in E China S to R Yangtze (and occasionally Sakhalin I, Korea and Japan).



Descriptive notes. 15·5–17 cm; 22·5–35 g. A fairly large and stocky emberizid with relatively short tail, deep-based, short and triangular bill, long wing (long primary extension), and white edges of tail. Male nominate race breeding (plumage acquired through feather wear) has black crown and side of head to throat and upper breast; pale buffish to white supercilium from above eye (often faintly in front of eye) to rear of ear-coverts, where it meets white band that extends diagonally across side of head to side of breast; nape rufous, upperparts blackish-brown, streaked sandy buff, rump a little paler and greyer; upperwing-coverts blackish, lesser coverts with pale sandy edges, medians with buff-white edges, greaters with broad chestnut edges and whitish tips, flight-feathers dark brown, secondaries broadly edged rufous-buff, outer webs of tertials with broad chestnut edge; tail dark brown, outer two feather pairs with white at edge and tip; underparts from side of upper breast pale buffish to white, black band from breast extending as broad streaks down flank; iris brown; bill pale yellow to orange, small black tip; legs brown to black. Male non-breeding has dark crown with sandy median crownstripe, rufous on nape veiled with buff, distinctive face pattern of warm buff outlined by black along edge of ear-coverts; entire upperparts streaked, appearing much more brown and rusty than in breeding plumage, upperwing more extensively rufous, with obvious rufous panel on greater coverts, these and median coverts more distinctly tipped white to buffish (in contrast to rufous of rest of greaters), tertials brightly edged rufous and tipped whitish; throat whitish, upper breast with variable blackish (often forming breastband), rest of underparts white, some brownish streaking on flanks; bill dull brownish. Female breeding is like non-breeding male, but plumage more worn, thus head paler and with blacker lateral crownstripe, eyestripe, moustachial stripe and malar, nape often more rufous, often has whitish rear supercilium and whitish area behind ear-coverts, generally less black on breast. Female non-breeding resembles non-breeding male, but generally duller and somewhat paler, nape browner or greyer (not rufous), little or no black on breast; bill dull pinkish-brown. Juvenile is similar to non-breeding adult, but darker, duller and more streaky-looking, having nape dark-streaked buffish with no rufous, breast and flanks yellowish-green to buffish with prominent dark streaking, contrasting white belly. Race *alascensis* is paler than nominate, streaking above narrower, black on flanks reduced, supercilium more ochre-tinged, bill larger; *coloratus* is larger than others, much darker above, with edges of greater coverts and tertials bright rusty. VOICE. Song, usually in flight, also from ground, a pleasant warble, e.g. "vree didi vreer di vridi viidiu". Distinctive "tew" call and a dry rattle both given in flight; in this respect resembles *Plectrophenax nivalis* (congeners do not give "tew" calls interspersed with rattles).

Habitat. Breeds in tundra at edge of tree-line, where found in sedges (*Carex*) and grasses (Poaceae) interspersed with heather and small trees such as Lapland rhododendron (*Rhododendron lapponicum*), tamarack (*Larix laricina*), spruce (*Picea*) and willow (*Salix*); avoids thickets and forest, and, unlike *Plectrophenax*, generally not found in rocky habitats. In Greenland, more often found inland than on coast; prefers wet swampy land in a low carpet of heath, with crowberry (*Empetrum*) and dwarf birch (*Betula glandulosa*). On migration and in winter found in open areas and farmland, including fallow fields, dunes and coastal grassland, also in short-grass prairie, steppe and desert-steppe, and at golf courses and airports. From sea-level to 500 m; in E Asia, higher in winter, e.g. up to 1500 m in Mongolia; in Norway, breeds up to 1300 m.

Food and Feeding. In breeding season, mainly invertebrates (especially Diptera), especially craneflies (Tipulidae) in Alaska. Opportunistically feeds on larvae of blowflies (Calliphoridae) on carcasses; also takes larval Lepidoptera, Hymenoptera and beetles (Coleoptera), as well as spiders (Araneae) and earthworms (Lumbricidae). On Devon I, in N Canada, 92·7% of items fed to nestlings and fledglings were adult insects. In winter feeds mainly on seeds, including those of *Aristida*, oats (*Avena*), *Poa*, foxtail (*Chaetochloa*), millet (*Setaria*) and wheat, also dock (*Rumex*), *Polygonum*, chickweed (*Stellaria*), shepherd's-purse (*Capsella*), plantain (*Plantago*) sedges (Cyperaceae), and rushes (Juncaceae). Contents of 600 stomachs from USA (Kansas) in Jan–Feb included 96% vegetable matter and 4% animal. Forages principally on or near ground or low in vegetation; has peculiar habit of foraging with legs crouched, often giving impression that belly is touching ground, with legs hidden below. Runs or walks from tussock to tussock. Often picks small arthropods from ground or from flowers (commonly *Rubus*, *Dryas*). Singly or in small groups during breeding season. In non-breeding season often in larger flocks, sometimes of hundreds and very occasionally thousands of individuals; mixes freely with other buntings, finches (Fringillidae) and larks, especially Horned Lark (*Eremophila alpestris*) and also Eurasian Skylark (*Alauda arvensis*).

Breeding. Median dates for start of egg-laying range from 30th May to 27th Jun, depending on locality (and at any given site clutch initiation tends to be closely synchronized within population); first-egg dates generally later at higher latitudes, but throughout Alaska and the Yukon laying c. 13 days earlier than in rest of Canadian Arctic; double broods rare, and probably not successful. Monogamous. Male arrives on breeding grounds c. 3–6 days before females, and advertises territory by performing parachuting song flight as he drops with outstretched wings. Nest built by female, a cup of dry grass, leaves and moss, lined with hair and feathers, in particular ptarmigan (*Lagopus*) feathers, placed on ground, usually near clump of vegetation (e.g. *Rhododendron lapponicum*), occasionally under tipped rock, and generally concealed in vegetation. Clutch is 1–8 eggs (usually 4–6), variable in colour from pale greenish, bluish or greyish, with varying amounts of rusty or brownish spotting and scrawls; incubation by female alone, period 10·5–13 days; chicks fed by both parents feed the young about equally, nestling period 8–11 days; young initially unable to fly, run in grass, flying abilities stronger at 13–15 days.

Movements. Migratory, moving both diurnally and nocturnally. Spring migration from early Feb to early Mar in North America, with arrival on breeding grounds in late May and early Jun. Leaves wintering range late Feb to early Mar, moving through N states and S Canada during late Mar to early May. Alaskan breeders move N along apparently three different routes during first half May (Pacific coast of British Columbia and Alaska; mountain valleys in British Columbia and S Yukon; and from prairies of Alberta and E British Columbia to upper R Yukon drainage), peak flights in Brooks Range lasting for c. 10 days starting 11th–20th May; in Manitoba (Churchill) arrives in

On following pages: 3. Chestnut-collared Longspur (*Calcarius ornatus*); 4. McCown's Longspur (*Rhynchophanes mccownii*); 5. Snow Bunting (*Plectrophenax nivalis*); 6. McKay's Bunting (*Plectrophenax hyperboreus*).

mid-May, peak during late May and early Jun, in warmer years most have passed by 7th Jun, but in cold years many remain into late Jun. Arrival on breeding grounds in Alaska varies, in SW and Aleutian Is from as early as late Apr to early May, but farther N on W coast arrives during first two weeks of May, while in extreme N (in Barrow and the North Slope) arrives late May; similarly, in arctic Canada reaches S extreme of range by mid-May and N limit by mid-Jun. Autumn migration starts late Aug to early Sept in Alaska, some remaining into Oct, and birds arrive on US wintering grounds in Kansas and Arkansas in early Nov; on islands of Nunavut departure begins mid-Aug, most are gone by late Sept, and small minority may remain until mid-Oct; farther S, migrants occur on N shore of L Superior between middle of Sept and late Oct, with peak in early Oct, and in S Ontario passage peaks between late Oct and mid-Nov, some still moving S into early Dec; in N California peak movements are from first two weeks of Oct into Nov. Migrates singly or in small flocks; often associates at stopover sites with Horned Larks, and occasionally with other longspurs and *Plectrophenax nivalis*. In Greenland, departure largely from mid-Aug to mid-Sept, minority remaining until early Nov. In Palearctic, arrival of autumn migrants in Britain and other parts of W Europe as early as Sept. Spring migration occurs in Feb through May, with most passage in N Germany and Denmark in mid-Apr; arrival in Greenland in May and early Jun. At foot of Mongolian Altai: spring migration mid-Mar to May (exceptionally to early Jun); autumn migration late Sept to late Dec. Ringing recoveries suggest that most Greenland breeders winter in North America, although some may head to Europe for non-breeding season. Strong evidence for facultative migration during winter, in particular during strong snowfalls, when this species may move farther S, including during night.

Status and Conservation. Not globally threatened. Abundant or very common in appropriate habitat. Has extremely large circumpolar range, within which total population estimated as being as high as 150,000,000 mature individuals. Recently bred for first time in Iceland. In North America, breeding density apparently has decreased in S parts of range, but this probably reflects climatic change. Breeding habitat has been little affected by human activities. In winter feeds in agricultural lands, and occasionally many have been killed with pesticides designed to combat insect pests. Large numbers have been killed by flying into fixed objects during migration. Unusual mortality includes an estimated 1,500,000 individuals killed during a snowstorm in SW Minnesota and NW Iowa on 13–14 Mar 1904.

Bibliography. Anon. (1998), Beadle & Rising (2002), Bennike & Dyck (1986), Boal & Andersen (2005), Brewer *et al.* (2000), Busche & Dierschke (2004), Castell & Castell (2009), Cramp & Perrins (1994), Fox, Francis, Madsen & Stroud (1987), Fox, Francis, McCarthy & McKay (1992), Francis *et al.* (1991), Gabrielson & Lincoln (1959), Gierow & Gierow (1991), Glutz von Blotzheim & Bauer (1997), Hellmayr (1938), Howell & Webb (1995), Hussell (1972), Hussell & Montgomerie (2002), Irving (1961), Jehl & Smith (1970), Kenyon (1961), Klicka *et al.* (2000), Liang Gang *et al.* (2008), Madsen (1982), McLaughlin & Montgomerie (1985), McNair *et al.* (2008), Peck & James (1987), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Roberts (1907), Salomonsen (1950), Sedinger (1986), Sutton & Parmelee (1955), West *et al.* (1968), Williamson (1968), Williamson & Emison (1971).

3. Chestnut-collared Longspur

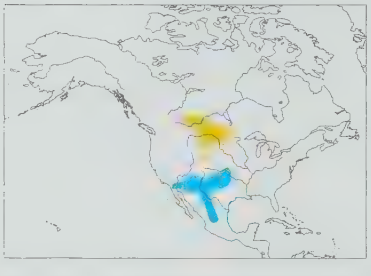
Calcarius ornatus

French: Plectrophane à ventre noir **Spanish**: Escribano Collarejo
German: Gelbkehl-Spornammer
Other common names: Chestnut-colored Longspur

Taxonomy. *Plectrophanes ornata* J. K. Townsend, 1837, prairies of Platte River = near forks of Platte River, western Nebraska, USA.

Molecular studies indicate that genus is basal to both the New World and the Old World emberizids, and closely related to *Plectrophenax*; has been suggested that these two genera and *Rhynchophanes* be placed in a separate family, Calcariidae. Present species has hybridized with *Rhynchophanes mccownii*. Monotypic.

Distribution. Breeds in S Canada (from S Alberta, S Saskatchewan and SC Manitoba) S in Great Plains to NE Colorado, W Nebraska, N (locally also E & SC) South Dakota and W Minnesota; winters from S USA (S California and Arizona E to N Colorado, C Kansas, C Oklahoma and N Louisiana) to NC Mexico (Sonora and W Coahuila S to Zacatecas and Aguascalientes).



Descriptive notes. 13·5–16·5 cm; 17–23 g. The smallest longspur, medium-sized and with much white in tail. Male breeding has black crown with white spot in middle; long white supercilium, black eyestripe behind eye joining with black line on rear ear-coverts; lores, side of face and throat pale yellow-ochre; nape bright chestnut; upperparts brown, feathers broadly to narrowly edged pale buff; upperwing brown, greater coverts and tertials broadly edged buff, lesser upperwing-coverts mainly black, innermost ones of lowest row white; tail with outer two feather pairs mostly white, adjacent pairs white with blackish tip, amount of black increasing towards central pair, which is wholly black (in flight, looks white with dark central triangle); chin and throat pale creamy; breast, belly and flanks black (rarely, admixed chestnut), lower belly and undertail-coverts whitish; iris brown; bill dark brown to black along culmen and also underside of lower mandible, otherwise pale bluish-grey; legs dull pink to brown. Male non-breeding is like breeding male, but black areas on head and underside and chestnut on neck obscured by brownish or dull buffy feather tips; breeding plumage acquired through wear. Female breeding has crown beige, thinly streaked with brown, supercilium and lores pale buff, side of face brown; nape brown, may be tinged with chestnut; upperparts brown, thinly streaked darker brown; tail pattern as on males, but paler and browner; upperwing brown, greater upperwing-coverts and tertials broadly edged with buff, lesser coverts mainly dark greyish-brown, innermost ones of lowest row white; throat, breast, flanks and belly buffy to buffy grey, thinly streaked with brown, usually with varying amounts of dark brown or blackish feathers; undertail-coverts buffy; bill similar to that of male but generally showing slightly less contrast; legs dull to pale brown, feet darker. Female non-breeding is like breeding female, but feathers tipped with buff. Juvenile resembles non-breeding adult, but may have dark brown back and crown; bill grey-brown, legs and feet flesh-coloured. VOICE. Song, often in flight, a musical warble generally lasting for 2–3 seconds, contains 7–8 phrases, each composed of several notes, and has qualities of Western Meadowlark (*Sturnella neglecta*) song. Flight call a distinctive "til-lip", first syllable accented; call a whistled "wheer" or rattling "trip-ri-rip" or "tzip".

Habitat. Breeds in arid short-grass or mixed-grass prairie that has been recently grazed, burnt or mowed; prefers areas where litter accumulation minimal; dominant plant species include rough fescue (*Festuca scabrella*), blue grama grass (*Bouteloua gracilis*), needlegrass (*Stipa*) and wheatgrass (*Agropyron*), interspersed with sage (*Artemisia*), cactus (*Opuntia*), snowberry (*Symphoricarpos*) and American silverberry (*Eleagnus commutata*). Nests also in pastures with domesticated grasses and mowed areas, such as airstrips, but prefers native prairie. Where sympatric with *Rhynchophanes mccownii*, present species usually occupies more mesic areas with denser and often taller grass. On migration and in winter, generally found in native grasslands, xeric grasslands where most vegetation less than 0·5 m tall, often interspersed with shrubs. In Texas (in winter), often uses cultivated fields, and winter flocks tend to be found around isolated sources of water. Sea-level to 2500 m.

Food and Feeding. Diet in breeding season in Colorado 28% seeds (mainly of grasses), 51% crickets and grasshoppers (Orthoptera), 19% beetles (Coleoptera, especially of families Curculionidae and Chrysomelidae), and small numbers of spiders (Araneae) and leafhoppers (Homoptera). On migration and in winter feeds mainly or entirely on seeds, including those of wheat (*Triticum*), sunflowers (*Helianthus*), *Aristida* and pigweed (*Amaranthus*). Forages principally on or near ground or low in vegetation; generally by walking and picking up insects and seeds, but also gleans insects from vegetation, and rarely makes flycatching sallies. In non-breeding season forms small to medium-sized flocks.

Breeding. Season early May to early Aug; often double-brooded, occasionally three broods. Monogamous; partners sometimes remain together for consecutive breeding seasons. Male–male and female–female aggression common, as are extra-pair copulations. Males arrive on breeding grounds 1–2 weeks earlier than females, at first in small flocks, but soon begin to sing and defend a territory; male sings in flight display, while descending with wings spread. Nest built by female alone, sometimes taking only 4 days, a cup made largely from dry grass, lining may include hair and feathers, placed on ground under grass clump, often adjacent to a pat of cattle dung. Clutch 3–5 eggs, rarely 2–6 (67% of more than 400 nests studied had 4-egg clutches), variably whitish, greyish or pale buffy, marked with scrawls, splotches or spots in brown, purplish or brick-red; incubation by female, period 10–12·5 days (in cold summer can take up to 15 days); chicks fed by both parents, leave nest at 9–14 days (commonly 10 days); unable to fly, but may walk quickly through grass, acquire ability to fly c. 2 days after leaving nest. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).

Movements. Migratory; moves mainly through W & C Prairies and Great Plains to non-breeding grounds from S USA S to Zacatecas region of Mexico (occasionally S to Puebla, Veracruz and México). Spring migration from Feb through Apr or early May. Vacates wintering areas in Mexico by early Apr, although N-bound migration begins at least by early Mar, if not late Feb; in S Arizona peak N passage in Mar, some remaining into May, and timing similar in New Mexico, but in Texas peak spring movement in mid-Apr; farther N peak through Oklahoma and Kansas in Mar. In Colorado and Wyoming peak arrival in mid-Apr, in Saskatchewan and Manitoba mid-Apr through early May; males migrate earlier than females. Leaves breeding grounds mid-Sept through early Oct, peak passage in Canadian Prairies and in N USA during middle or late Sept, and arrival on wintering ground Oct to early Dec. Rare but regular migrant in California from Aug through mid-Dec, peak late Oct. Migrates singly or in flocks; sometimes during stopover found with Horned Larks (*Eremophila alpestris*) and occasionally with other longspurs. Vagrants recorded NE to Newfoundland, mainly during Apr (perhaps when easiest to detect, in summer plumage); also in Pacific Northwest.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Classified as "Declining" in the USA (Yellow WatchList priority species for conservation). Often common or very common in appropriate habitat. Estimated global population 5,600,000 mature individuals. Has suffered significant decrease since c. 1970, with 68·8% decline over 40 years. Historic breeding range in USA extended S through Kansas, Nebraska and Minnesota, but now only very local in those states; change in distribution appears to reflect destruction of native grasses. This species does not nest in cultivated fields. Breeding densities much higher in grazed pastures than in ungrazed ones, but overgrazing may reduce its numbers. On migration generally found in native grasslands, and contraction of wintering range in Texas may reflect a general decrease in abundance and/or degradation of habitat.

Bibliography. Anon. (1998, 2010c), Bailey & Niedrach (1938), Baumgartner & Baumgartner (1992), Beadle & Rising (2002), Butchart & Stattersfield (2004), Contreras & Herlyn (2005), Davis (2003), Davis *et al.* (2002), DuBois (1935, 1937), Fairfield (1968), Harris (1944), Hellmayr (1938), Hill (1998), Hill & Gould (1997), Howell & Webb (1995), Klicka *et al.* (2000), Lebbin *et al.* (2010), Lynn & Hayward (2003), Lynn & Wingfield (2008), Lynn, Hayward *et al.* (2002), Lynn, Hunt & Wingfield (2003), McCarthy (2006), Miller *et al.* (1957), Oberholser (1974), O'Grady *et al.* (1996), Phillips *et al.* (1964), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Salt & Salt (1976), Snyder & Bly (2009), Thompson & Ely (1992).

Genus *RHYNCHOPHANES* S. F. Baird, 1858

4. McCown's Longspur

Rhynchophanes mccownii

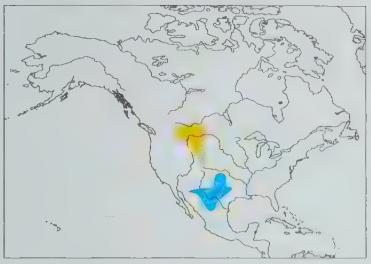
French: Plectrophane de McCown **Spanish**: Escribano de McCown
German: Schwarzbrust-Spornammer

Taxonomy. *Plectrophanes mccownii* Lawrence, 1851, high prairies of western Texas, USA.

Sometimes placed in genus *Calcarius*, and has hybridized with *Calcarius ornatus*, but apparently is closer in affinities to *Plectrophanax*. Has been suggested that those two genera be placed with present genus in a separate family, Calcariidae. Monotypic.

Distribution. Breeds from S Canada (SE Alberta and SC Saskatchewan) S in USA to C Montana, extreme SE Idaho, E Wyoming, NE Colorado and NW Nebraska. Winters in SE California (rare), C & SE Arizona, C New Mexico, WC Kansas and C Oklahoma and W & SC Texas, and N Mexico (S to N Durango, occasionally Zacatecas).

Descriptive notes. 14–16 cm; male average 26·7 g, female average 24·7 g. Medium-sized short-tailed longspur with extensive white in tail, large conical bill. Male breeding has forehead and anterior part of crown black (depending on wear), face whitish, whitest on eyelids and supercilium, ear-coverts grey, often with some black forming a postocular stripe, black submoustachial stripe; nape grey with some brownish streaks; mantle, scapulars and back brown with pale edges, rump and uppertail-coverts greyish with darker centres, uppertail-coverts long (extending half-way down tail); tail with central feather pair brown, outermost pair white, others white with brown tips; lesser upperwing-coverts grey, median coverts chestnut, greater coverts brown with paler edges and whitish-buff tips, tertials dark brown with pale edges; chin and throat white; breast with crescent-shaped black patch, flanks greyish-white, undertail-coverts white; iris brown or black; bill black; legs grey, light brown or flesh-coloured. Male non-breeding has black areas on head and breast concealed by brown feather tips; breeding plumage acquired by wear. Female breeding has crown greyish-brown with indistinct brown streaks, supercilium whitish-buff, eyestripe and submoustachial



stripe greyish-brown; ear-coverts whitish-buff, becoming brown towards neck; mantle and back brown with dark brown feather centres (giving streaked appearance), rump and uppertail-coverts brown; tail pattern as on male; upperwing brown, varying amounts of cinnamon in lesser and median coverts (apparently varies with age), inner webs of flight-feathers whitish; throat buffy to pale grey, breastband greyish with pale flecking, belly pale; bill horn-yellow to pale, dull pinkish with some dusky, often on tip and culmen. Female non-breeding is similar, but paler. Juvenile is like non-breeding female, but distinctly streaked on breast and flanks. Voice. Male territorial song, generally given in display-flight, sometimes from perch on fence or rock, a distinctive warbling, musical "see see see mee see me hear me hear me see". Flight call a dry rattle, "chip-pur-r-r-r"; call note a distinctive "pink", reminiscent of calls of Bobolink (*Dolichonyx oryzivorus*).

Habitat. Breeds in sparse, arid short-grass prairie, typically in mix of short-grass species (e.g. *Bouteloua*, *Buchloe*) interspersed with cactus (*Opuntia*) and some taller grasses (e.g. *Aristida*, *Agropyron*, *Stipa*) and shrubs; sometimes found in fallow fields. In winter, typically in overgrazed short-grass prairie mixed with other grasses (vegetation height less than 0·5 m). Sea-level to 2500 m.

Food and Feeding. On breeding grounds in Saskatchewan seeds of various sorts (e.g. *Chenopodium*, *Carex*, *Avena* and *Triticum*) make up bulk of diet, augmented with ants (Formicidae) and grasshoppers (Orthoptera), which account for 23% of diet in Aug. Primarily granivorous in winter. Forages principally on or near ground or low in vegetation. Runs and hops; stalks, gleans and occasionally hawks larger insects such as grasshoppers.

Breeding. Season May–Jul; second brood often attempted, may be started as early as late Jun. Monogamous; rarely bigamous. Males arrive on breeding grounds in small flocks, soon begin to display and defend a territory; male has elaborate, stiff-winged song flight during which he parachutes down with wings held up in V-shape (flight display distinctive, even from a distance). Female chooses nest-site, male will work to expand his territory if site slightly outside it; female constructs nest, work may require 2 days, nest cup-shaped, made from dry grass stems, twigs or lichen, lining includes softer grasses, hair and feathers, placed in depression on ground usually adjacent to clump of grass or other vegetation such as cactus (*Opuntia*) or shrub e.g. rabbitbrush (*Chrysothamnus*) or horsebrush (*Tetradymia*). Clutch 2–5 eggs (usually 3 in S part of range, 3–4 in N), whitish to pale olive, marked with brown, chestnut, rust-coloured or purplish scrawls, spots or splotches, sometimes evenly, sometimes concentrated on wide end; incubation by female, period 12 days; nestling period 10 days; young run about through grasses, require further 2–3 days before able to fly a short distance. Nests parasitized very rarely by Brown-headed Cowbird (*Molothrus ater*), and no known case of successful raising of cowbird young.

Movements. Migratory, moving through Great Plains. Spring migration from late Feb through Apr; males migrate up to 2 weeks earlier than females. Departure from wintering grounds begins as early as mid-Feb, with peak in early Mar; timing seems to be relatively constant throughout winter range, although departure may be slightly later in Texas than in New Mexico and Arizona; some may linger in wintering areas into Apr or, exceptionally, early May. Arrival on breeding grounds by late Mar in Colorado, peak in early Apr; in Canadian Prairies later, from mid-Apr, with peak early May. In autumn, leaves Saskatchewan from early Aug through Sept, some remaining into early Oct, and departures farther S (in Colorado) are from early to middle Oct; reach wintering grounds as early as late Sept in New Mexico, early to late Oct in Arizona and Texas, and Nov in N Mexico. Recorded as casual N & W to S British Columbia, Idaho, Nevada, N Arizona and Utah, and E to S Manitoba, Minnesota, Indiana, Missouri and E Texas; accidental in Michigan, New York, Massachusetts and Louisiana. Migrates in flocks, at stopover sites often with Horned Larks (*Eremophila alpestris*) and occasionally with other longspurs.

Status and Conservation. Not globally threatened. Locally common. Has reasonably large range, within which population estimated at 1,100,000 mature individuals. Although locally common in appropriate habitat, this species' range size and population numbers have decreased as a result of habitat destruction. In winter range, has declined in numbers in Arizona, but can still be found in SE part of that state.

Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), DuBois (1923), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Klicka *et al.* (2000), McCarthy (2006), Mickey (1943), Miller *et al.* (1957), Oberholser (1974), Phillips *et al.* (1964), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Salt & Salt (1976), Snyder & Bly (2009), With (1994a, 1994b).

Genus *PLECTROPHENAX* Stejneger, 1882

5. Snow Bunting

Plectrophenax nivalis

French: Plectrophane des neiges **German**: Schneeammer **Spanish**: Escribano Nival

Taxonomy. *Emberiza nivalis* Linnaeus, 1758, Lapland.

Molecular studies indicate that genus is closely related to *Calcarius*, and also appears to be a sister-taxon to *Rhynchophanes*; has been suggested that these three genera be placed in a separate family, Calcariidae. Often considered conspecific with *P. hyperboreus*, but juvenile plumages differ; also, interbreeding between the two is minimal, latter arriving on restricted breeding grounds earlier and apparently occupying most/all of suitable breeding sites. Geographical variation not well understood and complicated by high degree of individual variation; ranges listed below tentative, and review desirable. Nominate race intergrades with *townsendi* in E Aleutian Is. Four subspecies recognized.

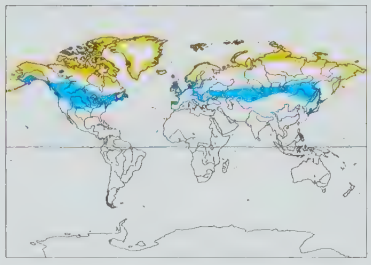
Subspecies and Distribution.

P. n. nivalis (Linnaeus, 1758) – breeds in N North America from St Lawrence I and coast of Alaska (including E Aleutian Is) E across N Canada (S to N Yukon, NW Mackenzie, C Northwest Territories, C Nunavut, Southampton I, Belcher Is, N Quebec and N Labrador) to coasts of Greenland, and N Scotland, Svalbard, and mountains of W & N Fennoscandia E to Kola Peninsula; non-breeding from SW Alaska and S Canada (NW British Columbia E to Manitoba, Ontario, S Labrador and Newfoundland) S in USA to NW California, Utah, N New Mexico, Kansas, Ohio and Virginia (occasionally farther S on Atlantic coast) and, in Palearctic, British Is and N France E to S Scandinavia, Germany, Poland and S European Russia (occasionally S to Mediterranean and E to Asia Minor).

P. n. insulae Salomonsen, 1931 – Iceland, possibly also N Scotland; non-breeding occasionally S to Faeroe Is and Shetland Is.

P. n. vlasowae Portenko, 1937 – breeds NE European Russia E through Siberia (including Severnaya Zemlya, New Siberian Is and Wrangel I) to Bering Strait and S to N Shelekhova Gulf and E Kamchatka; non-breeding in C & E Asia S to N Caspian region, Altai, Mongolia, Transbaikalia, NE China, Sakhalin I, Kuril Is, occasionally to N Japan (Hokkaido) and Korea.

P. n. townsendi Ridgway, 1887 – Commander Is, Pribilofs, and Aleutian Is.



Descriptive notes. 14–18 cm; 18–56 g. A large emberizid with large conical bill and relatively short, notched tail. Male nominate race breeding has head, neck and entire underparts white, sometimes some black in crown; upperparts black, back sometimes mottled with brown, rump and shorter uppertail-coverts white, central rump sometimes mottled with black; three outer pairs of rectrices white, thinly tipped black on outer web, three central pairs black with pale fringes; most of upperwing white, alula feathers black, primaries black with white bases, tertials black; iris dark brown; bill black; legs dark grey or black. Male non-breeding has white areas washed with rusty brown, particularly on nape, crown, ear-coverts and breast, black feathers on back edged with frosty brown, bill yellowish; breeding plumage acquired mostly through wear (although has limited pre-breeding moult). Female smaller than male; in breeding plumage has crown and rear of head usually more dusky than male, upperparts duller, often brownish, dark feathers of upperparts with pale fringes, and somewhat less white in wing; in very worn plumage resembles male. Female non-breeding is similar to non-breeding male. Juvenile (Jul–Aug) has head and breast greyish-brown, throat sometimes paler, pale eyering and narrow moustachial stripe, upperparts olive-grey, back streaked darker grey, upperwing dark grey to blackish, coverts tipped white (male with white more extensive), inner primaries with white at bases, secondaries white with dark tips (white more extensive on male), lower underparts whitish with pink to greyish-buff wash, bill yellowish; first-winter male like adult, but juvenile wing, greater coverts and tail feathers retained; first-winter female like adult, but with duller secondaries, buffier head and browner underparts. Races vary mainly in coloration of feather fringes (fresh plumage), extent of black, and size, but differences not great: *insulae* is darker than others, has more extensive black in wing; *vlasowae* is somewhat paler than nominate, has more white on rump; *townsendi* is similar to previous, but a little larger and with longer bill. Voice. Song, often in flight display, a short, musical "turee turee turee turiwee". Call notes a descending "cheeew" and "tweet"; buzzing "trr" from flocks; also a soft short rattle.

Habitat. Treeless, uncultivated barren rocky terrain, often near snow, also sea cliffs; often nests near or even in human settlements. In winter found in open fields, shingle beaches, saltmarshes, sand dunes, and stubble fields. Sea-level to 2300 m.

Food and Feeding. Mainly seeds, but in breeding season also small arthropods. Young fed only with invertebrates, including variety of insects e.g. or orders Plecoptera, Orthoptera, Dermaptera, Hemiptera, Lepidoptera, Trichoptera, Diptera (e.g. Tipulidae) Coleoptera and others, also worms (Oligochaeta) and spiders (Araneae). Stomachs of birds from North America (Hudson Bay and Pribilof Is) contained 29·6% animal items and 70·4% vegetable matter. Generally forages on or near ground or low in vegetation. Walks, runs, and occasionally hops; will sally to catch flying insects. Sometimes perches in trees or on fences, and burrows into snow. In non-breeding season in flocks of tens to hundreds of individuals, but also singly and in twos and threes; sometimes associates with other species, e.g. Horned Lark (*Eremophila alpestris*).

Breeding. Pair formation by late May in Greenland, breeds from mid-May through Jul in Iceland, begins breeding in late May in Scotland, and pair formation in early Jun in Canada (Nunavut); timing of arrival, pairing and egg-laying dependent on weather conditions, and sometimes significantly later in years with cold spring; may be double-brooded (varies geographically and from year to year), but mostly single-brooded in Arctic. Monogamous. Males arrive in breeding area as much as 3–4 weeks before females, remain in flocks for two weeks before breaking out into territorial defence. Male has elaborate aerial display during which he rises to 15 m, then glides into wind with wings held in a "V" above body while singing. Both sexes search for nest-site, only female builds nest, a thick cup of dry grass and moss, lined with finer grasses, fur and feathers, commonly those of ptarmigan (*Lagopus*), placed in variety of places, commonly in crevice or crag in rocks, but will also use artificial site such as building, nestbox, tin can, grave, human skull and the like. Clutch 2–8 eggs, most commonly 5, white to pale green or pale blue and marked with brownish, purplish or reddish spots, scrawls and splotches (usually concentrated at large end); incubation by female, often fed on nest by male, period 10–15 days, most commonly 12–13 days; nestling period 13 days.

Movements. Most populations migratory; females move farther S than males. Males move N in spring considerably (3–6 weeks) earlier than females, older males earlier than young males. Much of the migration not well known (occurs far to N, where few observers), although ringing studies reveal that those breeding in W & SE Greenland winter in North America, migrate across Davis Strait, down coast of E North America, and then W along St Lawrence R; in contrast, those breeding in E Greenland winter in Eurasia, and NE Greenland birds winter on steppes in Russia, staging in N Norway. Migration in C North America thought to occur along broad front, with no particular concentration points as birds move N; little known about W coast migrants. Arrival in low Arctic in mid-Mar and high Arctic in early Apr, although great variation from year to year depending on weather conditions; delays in arrival in Greenland as long as one month in particularly cold springs. Departure from breeding grounds in Sept to early Nov, arrival in wintering areas from as early as mid-Oct, while S wintering sites may not be reached until Nov. In Palearctic, most birds move S to winter in coastal areas, some reaching N England, N Germany, etc.; some birds winter in N mountains; some Greenland breeders move to Iceland and N coasts of Ireland. Nominate race recorded as accidental in Hawaiian Is, S USA (NW Arizona, Texas), Bahamas and N Africa. Migrates in loose flocks, sometimes with Horned Larks (*Eremophila alpestris*) and *Calcarius* species.

Status and Conservation. Not globally threatened. Common or very common in appropriate habitat. Has extremely large circumpolar range, within which total population of mature individuals estimated at 40,000,000. Appears to have suffered some decline during last 30–40 years, but still very common. In Europe, noticeable decrease in numbers wintering in coastal areas of S North Sea since c. 1970 believed due to destruction of saltmarshes (preferred foraging habitat of the species) caused by huge embankment projects combined with intensification of grazing; from 1990s onwards, grazing greatly reduced and no further embankment projects planned, and numbers of this and other species in S North Sea have begun to recover.

Bibliography. Abe (1968), Armani (1985), Banks *et al.* (1989, 1991), Beadle & Rising (2002), Bunyard (1931), Castell & Castell (2009), Cramp & Perrins (1994), Creutz (1988), Dierschke (2001), Dolman (1995), Ehrich (1997),

Ekman (1983), Espmark (1995, 1999), Falconer *et al.* (2008), Gabrielson & Lincoln (1959), Glutz von Blotzheim & Bauer (1997), Haarhaus (1968), Hagvar *et al.* (2009), Hansson & Andersson (2008), Heck (2010), Hellmayr (1938), Henry (2009), Hietakangas & Tenovuo (1965), Hofstad *et al.* (2002), Hoset, Espmark, Lier *et al.* (2009), Hoset, Espmark, Moksnes *et al.* (2004), Hussell (1972), Johansson (1980), Jukema (1992, 2005), Jukema & Fokkema (1992), Kirwan *et al.* (2008), Klicka *et al.* (2003), Lyon & Montgomerie (1985, 1995), Maley & Winker (2007, 2010), Marjakangas (1981), McCarthy (2006), Meltofte (1983), Natorp (1931), Nethersole-Thompson (1966), Orlowski & Gebski (2007), Parmelee (1968), Popovkina (2004), Pyle (1997), Ridgway (1901), Ringleben (1993), Rising & Beadle (1996), Romero *et al.* (1998), Salomonsen (1950), Sandberg & Pettersson (1996), Sandberg *et al.* (1998), Sealy (1969), Smith (1992, 1996), Smith & Marquiss (1995), Smith *et al.* (2009), Snow & Perrins (1998), Staples & Harrison (1949), Straka (1991), Stresemann & Stresemann (1970), Tinbergen (1939), Watson (1996), Yésou (1998).

6. McKay's Bunting

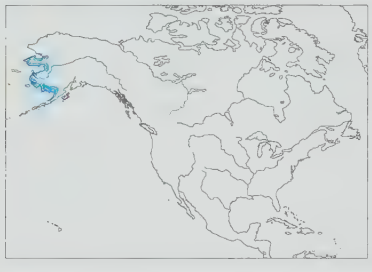
Plectrophenax hyperboreus

French: Plectrophane blanc **German**: Beringschneeammer **Spanish**: Escribano de McKay

Taxonomy. *Plectrophenax hyperboreus* Ridgway, 1884, St Michael Island, south shore of Norton Sound, Alaska, USA.

Molecular studies indicate that genus is closely related to *Calcarius*, and also appears to be a sister-taxon to *Rhynchophanes*; has been suggested that these three genera be placed in a separate family, Calcariidae. Often considered conspecific with *P. nivalis*, but juvenile plumages differ; also, inter-breeding between the two is minimal, present species arriving on restricted breeding grounds earlier and apparently occupying most/all of suitable breeding sites. Monotypic.

Distribution. Breeds on islands of Bering Sea, mainly on Hall I and St Matthew I, rarely St Paul (Pribilofs) and St Lawrence I; non-breeding on coast of W & SW Alaska.



Descriptive notes. 15–19 cm; c. 38–62 g. A large bunting with large bill and relatively short, notched tail. Male breeding is entirely white, except for partly black tertials, tips of primaries and tips of central two pairs of rectrices (often centres of some scapulars also black); iris dark brown to black; bill black; legs dark brown or black. Male non-breeding is similar, but slightly washed with rusty brown, especially on crown, ear-coverts and breast. Female is smaller than male; breeding plumage similar, but crown speckled dusky, back streaked with black, alula black, more black on central rectrices (dusky to base), other rectrices sometimes dusky on inner webs. Female non-breeding is like non-breeding male, but perhaps darker. Juvenile (Jul–Aug) has head to breast greyish, paler on throat and moustachial stripe, upperparts blackish with broad buffish feather edges, white in wing and tail as on adult but less extensive, flanks pinkish, belly white, bill yellowish; first-winter male like non-breeding adult, but more rusty on upperparts and tertials, a little more black in wing and tail; first-winter female like adult, but darker and duller, with less white. Voice. Song a low warbling; calls include soft rattle and whistled descending "cheew"; apparently very like voice of *P. nivalis*.

Habitat. Breeds on beaches and rocky talus slopes, and on shores of tundra pools; sea-level to 490 m. In winter primarily on coast.

Food and Feeding. Little known. Probably eats seeds in winter, and insects and other invertebrates when available. Generally forages on or near ground or low in vegetation. In small groups; in flocks of 50–60 individuals in non-breeding season.

Breeding. Little known. Pair formation occurs during May, nest-building and laying by late Jun, young hatch by start of Jul (sometimes end of Jun), and fledglings present by mid-Jul or a little earlier; perhaps double-brooded on occasion. Probably monogamous. Nest usually placed in crevice or space under or between rocks, but sometimes in artificial site, including in whale mandible and even in woodpecker (Picidae) hole in driftwood on beach. Clutch 3–5 eggs, commonly 4, pale greenish with brown spots. No other information.

Movements. Migratory; winters mainly in W & SW Alaska. Leaves breeding grounds by early Oct, heads E and may stop at Nunivak I, before continuing to coast of mainland Alaska; disperses S & E along coast. Some fly through Pribilof Is on passage to and from Alaskan Peninsula. Returns to nesting islands in early Mar (an earlier migrant than *P. nivalis*), but many remain in wintering areas into early Apr; some may make stopover in spring at Hooper Bay, on W Alaskan coast directly E of breeding islands. Recorded casually S to Aleutians and S coastal Alaska; also in Chukotka Peninsula, in extreme NE Russia. Vagrants recorded S to NE USA (Washington and Oregon).

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Restricted-range species: present in Eastern Bering Sea Islands Secondary Area. Abundant within its limited breeding range. Breeding range tiny: St Matthew I is c. 350 km², and Hall I only c. 16 km² in extent; species breeds only rarely on other islands. Global population has been put at c. 6000 mature individuals. In recent careful study, however, combined populations on Hall and St Matthew estimated as totalling more than 31,000 individuals. Could be vulnerable to accidental/deliberate introduction of invasive predators such as rats (*Rattus*), foxes (*Vulpes*) or weasels (*Mustela*), or to deliberate introduction of reindeer (*Rangifer tarandus*); reindeer introduced on St Matthew in 1944 destroyed much of the native vegetation before they died out, and current breeding densities of this bunting still lower on St Matthew than on Hall. Potential threats also include oil development, contaminants, and effects of climate change. Both Hall I and St Matthew I are protected within Alaska Maritime National Wildlife Refuge; the species non-breeding range includes parts of Yukon Delta and Togiak National Wildlife Refuges.

Bibliography. Anon. (2010c), Armani (1985), Beadle & Rising (2002), Butchart & Stattersfield (2004), Gabrielson & Lincoln (1959), Hellmayr (1938), Klicka *et al.* (2003), Lebbin *et al.* (2010), Lyon & Montgomerie (1995), Maley & Winker (2007, 2010), Matsuoka & Johnson (2008), McCarthy (2006), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Rogers (2005), Sealy (1967, 1969, 1972), Stattersfield & Capper (2000), Winker *et al.* (2002).

PLATE 40 ➤



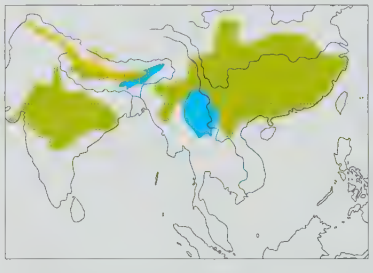
Genus *MELOPHUS* Swainson, 1837

7. Crested Bunting

Melophus lathami

French: Bruant huppé **German**: Haubenammer **Spanish**: Escribano Crestado

Taxonomy. *Emberiza lathami* J. E. Gray, 1831, Guangzhou, Guangdong, China.
No obvious affinities. Recent molecular studies suggest that genus is very close to *Emberiza*, and may be better subsumed within it; on the other hand, striking plumage features, especially of male, favour retention of a monotypic genus. Quite marked difference between shiny blue-black and rusty-chestnut males in W part of range (India) and dull brownish-black and orange-rufous males in E China, but extensive intervening areas inhabited by intermediates; Indian populations sometimes separated as race *subcristata* (described from the Deccan, in SC India), but delimitation of any clear races is difficult. Monotypic.
Distribution. S slopes of Himalayas from NE Pakistan (Murree) E to NE India (Assam, Meghalaya and Manipur), also C India (from E Rajasthan, S Gujarat, SW Maharashtra, N Andhra Pradesh and E Madhya Pradesh E to S Bihar), and S China (from Red Basin of Sichuan E, chiefly S of 30° N, to Anhui and Zhejiang, S to Yunnan, Guangxi and Guangdong) S to Myanmar, N & C Laos and N Vietnam (Tonkin). Also W & NW Thailand in non-breeding season.
Descriptive notes. 16 cm; 20–26 g. Distinctive, elongate bunting with prominent crest and plain, almost round-tipped tail; rufous wings in all plumages. Male breeding has elongated forecrown feathers (can be erected into prominent crest); entire head and body shiny black or brownish-black, may have some rusty-rufous on thigh, uppertail- and undertail-coverts; wing and tail bright rusty-rufous, flight-feathers usually with dusky tips; iris dark brown; bill sometimes almost wholly pink in breeding season, but often with grey culmen or upper mandible, or wholly black; legs light pinkish-brown to dark purplish-brown. Male non-breeding (fresh plumage) has buffish-grey fringes on black body feathers. Second-winter male is much as adult, but with black tips on primary coverts. Female has distinctly shorter crest than male, overall body coloration dull buffy-olive, diffusely streaked darker, streaking boldest on breast, mantle and scapulars, finest and most intense on head; pale buffy eyering; rufous in wing and tail (particularly on more exposed outer webs) tends to become faded with wear, but such individuals exhibit brighter rufous in flight (as normally concealed rufous of inner webs revealed). Female non-breeding (fresh plumage) is sandy brown, with streaking bolder and more defined, belly weakly washed with pale yellow, which becomes cinnamon-buff on undertail-coverts. First-winter female resembles adult, but duller, with only weak rufous colour in wing, and more coarsely streaked overall. Juvenile of both sexes resembles adult female, but crest very short and inconspicuous, breast more boldly streaked, and overall colour tones buffer.



Voice. Simple song, from prominent perch such as very top of tree, bush, rock outcrop or roof of building, a repeated series of 2–3 pairs of notes, starting with a couple of subdued grating ones, followed by a pair of lower, mellower notes, with variable finish of 2 or 3 often descending notes, has been transcribed as "tsri-tsri-tsi-tsu-tsu", another version as "which which which-whi-wheee-which" with emphasis on the "wheee"; these variable little phrases can be repeated *ad nauseam*. Typical call a soft, slightly squeaked "tip", "pink" or "tlip", given somewhat more forcefully in flight.
Habitat. Open dry grassy or rocky hillsides and terraced cultivation with scattered bushes and rock outcrops, from foothills to 2440 m in summer. Most descend lower in winter, then favouring grasslands, both in cultivated areas and amid dry scrub-jungle down to edge of plains.
Food and Feeding. Chiefly small grass seeds of various kinds, including fallen grains and some weed seeds. Also, has been observed to practise flycatching during emergences of alate ants (Formicidae). Nestling diet includes insect larvae. Feeds on ground. Particularly fond of feeding at roadsides and in cart tracks through grassland, especially where grassland has been burnt over; flies up when disturbed, perching near top of tall grasses, or bush, dropping back down when potential danger has passed. Carriage on ground normally rather upright, with tail pressed down; male also adopts rather flat-backed, horizontal stance with tail slightly raised and spread at tip. Generally quite confiding. In pairs or in small parties of up to ten individuals; groups may assemble temporarily at drinking locations in dry weather or for winter roosts. Rarely found in large flocks (unlike some other buntings in winter), but flocks of up to 150 individuals reported. Roosts in dense thickets, in hedges, and in stands of "elephant-grass" (collection of several species of tall

grass, rather than a specific one); often shares roost thickets with other small birds such as munias (*Lonchura*) and Olive-backed (*Anthus hogdsoni*) and Tree Pipits (*Anthus trivialis*).
Breeding. Season varies, coinciding with local wet seasons: egg-laying late Apr to Jun in E China, Jul–Aug in Pakistan and NW India and Jun–Jul in W India (Rajasthan); Apr repeatedly quoted for C Nepal, but this seems early for W populations and requires confirmation; single-brooded. Monogamous. Solitary nester. Nest built by female, male bringing some materials, a cup of fine rootlets, animal hair, mosses and dried grasses, placed in hollow on ground, under rock or in crevice near foot of bank or stone wall, typically concealed by clump of ferns or grasses; very rarely low down, not protected by bank, in *Lantana* thicket. Clutch 3–5 eggs (mean 3), white with greenish tinge and with speckles and blotches in red, brown and purple, mainly at broad end; incubation by female, male helps in feeding young; no information on duration of incubation and nestling periods. Nest occasionally parasitized by Common Cuckoo (*Cuculus canorus*).
Movements. Resident and altitudinal migrant. Resident in low-lying hills over much of range, merely withdrawing into sheltered valleys in winter. In Himalayan region (e.g. Nepal) a summer visitor above 1200 m, arriving in breeding areas during Apr and May, returning to lower elevations by Oct. Recorded in Taiwan as vagrant or, possibly, escaped cagebird.
Status and Conservation. Not globally threatened. Common to abundant, though somewhat localized, over most of extensive range. In Pakistan and Kashmir decidedly uncommon; occurrence in Bangladesh remains to be proven; elsewhere it seems reasonably numerous. Benefits from man's activities, finding terraced cultivation and deforested hillsides much to its liking. Unlikely to cause agricultural damage, as not known to strip out ears of corn.
Bibliography. Ali (1949, 1962), Ali & Ripley (1974), Alström *et al.* (2008), Armani (1985), Bates & Lowther (1952), Bhardwaj *et al.* (2008), Byers, Olsson & Curson (1995), Dharmakumarsinhji (1972), Grimmett *et al.* (1998), La Touche (1925–1930), MacKinnon & Phillipps (2000), Roberts (1992), Shivrajkumar (1954), Smythies (1986), Stuart Baker (1926), Tell (1983), Ticehurst (1932).

Genus *LATOUCHEORNIS* Bangs, 1931

8. **Slaty Bunting**

Latoucheornis siemsseni

French: Bruant bleu **German**: Blauammer **Spanish**: Escribano Azul
Other common names: Fukien Slaty Bunting, Blue Bunting, Chinese/Fukien (Blue) Bunting, La Touche's Bunting

Taxonomy. *Junco siemsseni* G. H. Martens, 1906, Mia River region, Fuzhou, Fujian, China.
Originally described in genus *Junco*, male plumage superficially resembling that of "slate-coloured" populations of *Junco hyemalis*, but was soon placed in a monotypic genus. Recent phylogenetic analyses, however, indicate that this species is, surprisingly, a sister-species of *Emberiza elegans*. Differs from *Emberiza* in unstreaked male plumage and very rufous female plumage, very small bill, and strangely shaped tail feathers, but recent molecular studies indicated that differences from that genus are minor and that present genus could well be merged with *Emberiza*. Monotypic.
Distribution. Breeds in C China in S Gansu and S Shaanxi (from Taibai Shan) S to W Sichuan (Nan Chuan range and valleys at E edge of Tibetan Plateau; probably also in NE Sichuan); probably also farther E, in Anhui (Huang Shan). In non-breeding season widely recorded at lower elevations in Sichuan, W Hubei, Anhui, Yunnan, Guizhou, Fujian and N Guangdong.



Descriptive notes. 13 cm; c. 20 g. Highly distinctive plumages; tail feathers unusual, relatively broad towards tip, but tapering to narrow base, bill comparatively small and neat, and hind claw relatively strongly arched. Male is almost wholly dark slate-blue, with diffuse dusky lores and relatively inconspicuous white centre of belly and undertail-coverts; upperwing darker, having blackish feather centres (most apparent on tertials) and dark blue fringes, bases of inner webs of secondaries white (sometimes visible in flight); tail dark blue, extensive white on inner web of outermost feather; iris dark brown; bill black, in winter often with whiter cutting edges or lower mandible (significance of which unclear); legs flesh-pink. First-winter male is similar to adult, but when plumage fresh body feathers have narrow olive-brown fringes and greater upperwing-coverts white tips (forming narrow bar). Female has whole head and foreparts of body brownish-rufous, brightest rufous on crown, shading into olive-brown on mantle and uppertail-coverts, with rump greyer; breast rufous with inconspicuous fine pale shaft streaks, shading into olive-brown on flanks, becoming white on central belly and undertail-coverts; upperwing dull brown with darker feather centres, tertial centres darkest; fringes and tips of wing-coverts rufous (two inconspicuous wingbars), bases of inner webs of secondaries white; tail dark brown, extensive white on inner web of outermost feather; bare parts as for male. First-winter female is similar to adult, but when plumage fresh has more clearly streaked mantle and scapulars, contrasting with paler rump and darker uppertail-coverts; tips of wing-coverts paler rufous, forming two narrower, paler bars than when adult. Juvenile is similar to first-winter female, but head and throat duller rufous, inconspicuously finely streaked darker, ear-coverts somewhat paler and greyer, outer webs of tertials contrasting buffy white, tips of greater coverts and (less obviously) median coverts pale buff (forming narrow bars), white of central belly and undertail-coverts obscured by greyish mottling. Voice. Song rather high in pitch and variable in content, containing parid-like phrases and snatches recalling song of Tree Pipit (*Anthus trivialis*): most frequent type begins with high-pitched whistled notes, before breaking into a twitter and terminating in another high-pitched note, has been transcribed as "ziii-ziiiu-tzittzittzittzit hee"; another song a less varied "siii tsiu zhiu zhiu zhiu zhiu", and others beginning with a rapid trill have been transcribed as "ze-ze-ze-ze-swee twiitwit" and "tze-tze-tze tze teez, teez, teez". Typical call a sharp "zick" or doubled "zick-zick".
Habitat. Breeds in subtropical valley forests in hills and mountains, chiefly between 1500 m and 2100 m; favours vicinity of bamboo thickets in secondary forest and scrubby cover of degraded forest. Descends to foothills in winter, then found at 500–1700 m, where takes advantage of human activities by foraging about villages, and even city parks.
Food and Feeding. Few data. Seemingly chiefly small invertebrates, certainly so in breeding season, when recorded as taking small beetles (Coleoptera), ants (Formicidae), cicadas (Cicadidae) and their larvae, as well as some small plant seeds. In non-breeding season small parties recorded in vicinity of villages, gathering to feed on kitchen waste. Forages on ground, keeping very much under cover.
Breeding. Virtually undocumented. Nest-building reported in early Jun in Sichuan, but perhaps begins as early as early May in some areas; singing individual in Dabie Shan (NE Hubei/SW Anhui) in mid-Apr was probably on its breeding grounds. Presumed to be monogamous. Observation of pair carrying nesting materials indicated that nest was c. 1·5 m from ground in shrubby riverside bushes.
Movements. Altitudinal and short-distance migrant. Post-breeding descent to much lower elevations than those occupied during breeding season.
Status and Conservation. Not globally threatened. Restricted-range species: present in Central Sichuan Mountains EBA. Despite being relatively little studied, this bunting is not considered to approach thresholds for even threatened status. Has extensive range in Sichuan, and evidently breeds elsewhere (S Shaanxi, and in Huang Shan of Anhui). Preference for degraded secondary forest and no obvious decline in wintering numbers suggest stable population. No doubt easily overlooked because of its relatively skulking habits and high-pitched simple song.
Bibliography. Alström *et al.* (2008), Armani (1985), Bangs (1931), Boyd *et al.* (2008), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Cheng Tsohsin & Stresemann (1961), Fu Tongsheng *et al.* (1998), Koblik (1993), La Touche (1925–1930), Lewthwaite *et al.* (1996), Liang Gang *et al.* (2008), MacKinnon & Phillipps (2000).

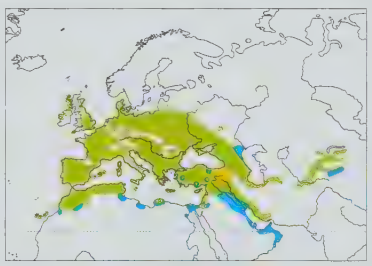
Genus *EMBERIZA* Linnaeus, 1758

9. **Corn Bunting**

Emberiza calandra

French: Bruant proyer **German**: Grauammer **Spanish**: Escribano Triguero
Other common names: Common Bunting

Taxonomy. *Emberiza calandra* Linnaeus, 1758, Sweden.
Often separated in monotypic genus *Miliaria* on account of lack of sexual dimorphism, different moult strategy (the only bunting to have complete post-juvenile moult), and differences in bill structure and tertial pattern; recent molecular studies, however, suggest that genetic differences are so small that placement in monotypic genus not warranted. Geographical variation complicated by local conditions that affect plumage colour tones and intensity of streaking; *clanceyi* tentatively recognized, as its plumage features seem surprisingly constant. Other named races include *thanneri* (described from Tenerife, in Canary Is), *kleinschmidti* (from Malaga, in E Spain), *algeriensis* (from Bône, in Algeria), *graeca* (from Calamata, in Greece), *volhynica* (from Volodymyr-Volynskyi, in NW Ukraine), *sarmatia* (from Askania-Nova, in Kherson Oblast, in S Ukraine) and *ignobilis* (from near Tbilisi, in Georgia), all synonymized with nominate. Species may be better treated as monotypic. Three subspecies tentatively recognised.
Subspecies and Distribution.
E. c. clanceyi R. Meinertzhagen, 1947 – W Scotland (Hebrides) and W Ireland.
E. c. calandra Linnaeus, 1758 – Britain (NE Scotland and parts of England), Denmark, extreme S Sweden and S Latvia S, somewhat patchily, to Iberia and Mediterranean (including most islands), and E to Belarus, Ukraine and S Russia (S to Caucasus region), NW Caspian Sea, Turkey (except SE) and coastal Lebanon and Israel; also N Africa (Morocco E to NW Libya) and Canary Is.
E. c. buturlini H. E. Johansen, 1907 – SE Turkey S to N Israel, E across Syria, Iraq and W & N Iran to Turkmenistan and N Afghanistan, also N through Tajikistan, SE Uzbekistan and Kyrgystan to S Kazakhstan and extreme NW China (extreme W Xinjiang).



Descriptive notes. 17–19 cm; c. 32–67 g. A heavily built, streaky, dull brownish bunting, distinctive in lacking conspicuous white in outer tail and in having bold dark streaking on both upper and underparts; bill stout, mandibles with curving S-shaped cutting edges, strong pale legs. Nominate race has crown, nape and ear-coverts grey-brown to olive-brown, finely streaked darker, ear-coverts slightly warmer brown, paling towards centre; lores and supercilium indistinctly paler, whitish submoustachial stripe also finely streaked; upperparts grey-brown to warm brown with blackish streaking, streaking on rump and uppertail-coverts diffuse and greyer (in flight, weaker streaking makes rump and tail appear distinctly lighter brown than rest of upperparts); upperwing feathers dark brown, edged and tipped buffy or whitish-grey, tertials evenly edged pale (unlike other members of genus, on which pale edge widens towards tip); tail brown, outermost tail feathers with indistinct whitish tips; chin and throat whitish, bordered by narrow dark malar stripe; lines of bold dusky streaks extend from chest over most of whitish or pale buffish underparts, sometimes including undertail-coverts, streaks often coalescing to form blackish blotch at centre of breast; iris dark brown; bill pale yellowish, grey culmen ridge; legs yellowish-pink to light brown. Sexes similar, male significantly larger than female. Juvenile is very like adult, but warmer buff ground colour overall, crown darker at side and paler at centre, giving surprisingly strong pattern, legs clear pinkish or yellowish-pink; this plumage short-lived. Races differ mainly in general plumage tone and in thickness of streaking: *clanceyi* is warmer brown above and quite noticeably washed yellowish-buff on underparts; *buturlini* is decidedly grey-brown and whitish, with less extensive streaking than nominate. Voice. Song a bouncing jumbled outburst, sometimes likened to sound made by jangling of a bunch of keys, 2 or 3 notes followed by hurried discordant delivery of remainder, "tik tik zreeississ", varying in length. In regions where this species has become rare, isolated individuals may sing perfect renditions of *E. citrinella* and even *E. hortulana* songs. Often flies with fluttering wingbeats, legs dangling, between songposts. Typical call a distinctive, clipped click, "pit", rather subdued, most apparent when rapidly repeated 5–6 times; also a fuller "quip".

On following pages: 10. Yellowhammer (*Emberiza citrinella*); 11. Pine Bunting (*Emberiza leucocephalos*).

Habitat. Open rolling grasslands, both in natural steppe and in agricultural land; tolerates scattered bushes, but avoids extensive bushy cover. Locally, found also in heathland and even, as in Germany, around abandoned sewage works and the like. In non-breeding season, often in fallow fields and stubble fields, and roosts often in *Phragmites* reeds. Chiefly in lowlands; reaches 2600 m in subalpine meadows in parts of C Asia.
Food and Feeding. Omnivorous, but chiefly plant seeds. In breeding season especially, diet includes high percentage of invertebrates, primarily small insects, including butterflies (Lepidoptera), also small spiders (Araneae), millipedes (Diplopoda), slugs, snails (Gastropoda) and earthworms (Oligochaeta). Extensive variety of seeds recorded in diet, from those of weeds and grasses, grains of wheat, barley and oats, to winged sycamore (*Acer*) seeds. Typically, feeds on ground, progressing in short hops; has been reported as picking over animal dung, also clumsily flycatching during emergences of flying ants (Formicidae). Sociable, may form flocks of several hundreds, occasionally more than 1000 individuals, outside breeding season in some parts of range. Tends to avoid close proximity of other bunting species; sometimes with *E. citrinella*, but, unlike that species, usually not closely associated with farming settlements in winter.
Breeding. Season often protracted, laying starting relatively late, from late May or early Jun, in NW of range, earlier in S; lowland populations in Israel commence late Feb, whereas those at higher elevations in same part of world begin laying in mid-Mar; one or two broods over most of range, regularly two or three in S England. Usually polygamous, males having up to as many as 18 females in territory, but often monogamous; bond between sexes not close. Nest built entirely by female, a loose construction of grasses, lined with finer grasses and rootlets, placed on ground amid clump of tangled grasses, brambles and arable weeds, or in depression in soil of arable field. Clutch 1–7 eggs, chiefly 4–6, white with light blue to buffish tinge, with diffuse dark speckling and some prominent blotches and scrawls; incubation by female alone, period 12–14 days; chicks fed by female, though male often in attendance, nestling period 9–13 days; young often leave nest before able to fly.
Movements. N & W populations mainly sedentary, as are those of Mediterranean Basin and Canary Is. Otherwise partially migratory, some of those breeding in C & E Europe moving S or SW to N Italy, S France and Spain, some reaching N Africa (Morocco, Libya and Egypt); farther E, C Asian birds move S, reaching Oman, S Iraq, S Iran and W Afghanistan. Autumn migration protracted, but complicated by wandering flocks which move only when cold weather sets in. In Israel two influxes reported, with through passage late Oct to mid-Nov, and arrivals mid-Nov to early Dec primarily of wintering birds. Vagrants have reached Faeroes, Norway (where last bred 1928), Finland, W Saudi Arabia, Pakistan, NW India, coastal Mauritania and NW Senegal.
Status and Conservation. Not globally threatened. Widespread and abundant in much of range. No longer breeds regularly in Norway, Latvia, Estonia and Lithuania; race *clanceyi* virtually extinct in W Ireland, and survives only on the Hebrides, in W Scotland. Has decreased in most European countries since 1930s, decline most apparent since mid-1960s in many places, late 1970s in others. Decrease considered due to intensification of agriculture, including changes in land use, earlier cutting of hay meadows, loss of hedgerows, more extensive use of pesticides, and climate change. Following estimates for W Palearctic populations (territories or pairs): in British Is 75% drop to 20,000 territories during 20 years to 1991; in Ireland sharp drop to fewer than 30 territories by 1993; in Sweden formerly common in S, but fewer than six territories by 1993; 11,000–120,000 pairs in Denmark in 1987 (decrease since then); 100,000–1,000,000 pairs in France in 1970s, stable but some local decreases; 3000–5500 pairs in Belgium in 1990, and decreasing; 20–200 pairs and decreasing in Luxembourg; in Netherlands long decline to 1100 pairs in 1975, 100–200 by 1989; in Germany 21,000–31,000 pairs in 2005, decrease marked, e.g. in Schleswig-Holstein 3000–4000 pairs in 1955 had dropped to 40 by 1987, but recent recolonization (155 pairs in 2010); 50,000–200,000 pairs in Poland; in Czech Republic marked decrease since 1960s, 700–1400 pairs in late 1980s; in Slovakia 4000–8000 pairs in early 1970s, decrease since; in Hungary 8000–12,000 pairs during 1980s; in Switzerland marked decrease to 200–250 pairs by early 1990s; marked decrease in many areas in Austria; in Italy 200,000–600,000 pairs, slight decrease; 100,000–1,000,000 pairs in Croatia; 1000–2000 pairs in Slovenia; 100,000–1,000,000 pairs in Bulgaria; 50,000–60,000 pairs in late 1980s in Romania; 1000–10,000 pairs in European Russia; 100–1000 pairs, stable, in Belarus; 4000–7000 pairs and decreasing in Ukraine; in Moldova 1500–3000 pairs in 1988, some decrease; in Spain 1,440,00–4,300,000 pairs, slight increase; in Canary Is present on most islands, declining; 100,000–1,000,000 pairs in Portugal; 70,000–100,000 pairs in Albania; in Greece 300,000–500,000 pairs, some decrease; in Malta 400–600 birds, decreasing; in Cyprus 40,000–60,000 pairs, stable; 1,000,000–10,000,000 pairs in Turkey; common locally in Azerbaijan; a few thousand pairs in Israel; very few in Jordan, first bred 1990; in Syria common in NW, fewer in E; in Morocco, Algeria and Tunisia common in N, stable. No indication of a decrease in the C Asian populations, but information sparse.
Bibliography. Antonov *et al.* (2006), Bernard & Broyer (1995), Bezzel (1993), Brambilla *et al.* (2009), Bright & Kirby (2008), Busche (1989), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Donald & Evans (1994, 1995), Donald & Forrest (1995), Donald *et al.* (1994), Fry & Keith (2004), Gliemann (1973), Glutz von Blotzheim & Bauer (1997), Grützmann *et al.* (2002), Hagemeijer & Blair (1997), Harper (1995), Holloway (1996), Hustings *et al.* (1990), Jonsson (1992), Kajtoch (2008), Lee, Richardson & Bradbury (2001), Lees-Smith & Madge (1982), Perkins, A.J. *et al.* (2008), Ryves (1934a, 1934b), Schepers *et al.* (1992), Tucker & Heath (1994), Ward & Aebischer (1994), Watson *et al.* (2009), Weisshaupt & Vilches-Morales (2010).

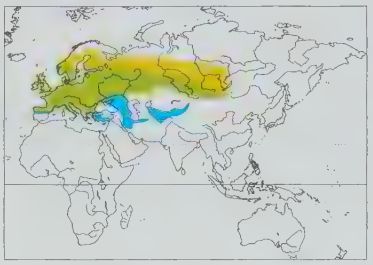
10. Yellowhammer

Emberiza citrinella

French: Bruant jaune **German**: Goldammer **Spanish**: Escribano Cerillo
Other common names: Yellow Bunting; Eastern Yellowhammer (*erythrogenys*)

Taxonomy. *Emberiza citrinella* Linnaeus, 1758, Sweden.
Most closely related to, and perhaps forming a superspecies with, *E. leucocephalos*; sometimes considered conspecific, but the two differ clearly in plumage, as well as in behaviour and osteology, supporting treatment as separate species. Closest species to this pair are *E. stewarti* and *E. cirlus*. Present species and *E. leucocephalos* hybridize extensively in W & C Siberia (across c. 3000 km in taiga and forest-steppe zone from R Ural E to L Baikal), and intensity of interbreeding is increasing, since each species is expanding its breeding range across/towards that of the other; this type of interbreeding has been described as intermediate between occasional hybridization (not influencing gene pools of parent species) and introgressive hybridization (resulting sometimes in local fusion of species). An independent recent analysis of phylogeny supports recognition of two independent species, although cytochrome *b* sequences are very similar, resulting in a strong indication that they are sister-species; sharing of haplotypes even in very distant locations seems to be result of introgression of mitochondrial DNA. An independent alternative study also argues that both species are older than their closest relatives and that mtDNA has recently introgressed between them, most likely as a result of selective sweep. Has been suggested that race *erythrogenys* is only the result of hybridization with *E. leucocephalos*. Nominate race intergrades with *erythrogenys* in a broad zone extending from Baltic Republics, W European Russia and W Belarus S to E Hungary, E & S Balkans and Greece. Three subspecies recognized.

Subspecies and Distribution.
E. c. caliginosa Clancey, 1940 – Ireland, I of Man and Britain (S to Wales and N & W England).
E. c. citrinella Linnaeus, 1758 – Fennoscandia (S from c. 70° N) and SE England S to N Iberia, S France and Italy and E to extreme NW European Russia, Poland, Czech Republic, Hungary and Balkans.
E. c. erythrogenys C. L. Brehm, 1855 – E Europe (from European Russia, C Ukraine and Balkans) E to SC Siberia (Irkutsk) and NC Mongolia (R Selenge), and to c. 64° N, also isolated population in E Black Sea coast region and Caucasus; some migrate S to Turkey, Levant, Iraq, Iran and C Asia, a few to N Italy.
Introduced in New Zealand region.



Descriptive notes. 16–16·5 cm; 20–36·5 g. Rather large bunting. Male nominate race in fresh plumage (Sept–Nov) has yellow head with broad black and olive lateral crownstripe (most of crown feathers yellow, with relatively well-demarcated tiny dark greyish-green spot on tip), more or less diffuse dark border around ear-coverts (appearing broken at upper rear corner); warm brown upperparts streaked blackish, much less streaked on rufous-chestnut rump and uppertail-coverts; edges of primaries with yellow tones, and white in outer rectrices; throat pale yellowish, streaky dark malar stripe; below, yellowish with blackish streaks, especially on breast and rear flanks, with olive chestband and elements of rufous on side of breast and upper flanks; iris dark brown; bill blue-grey, slightly paler below; legs flesh-brown. Male in worn plumage (May–Aug) has head extensively yellow, dark pattern sometimes restricted to narrow blackish streaks above supercilium, often very faint above eye, sometimes restricted to small dark area at base of bill and at rear, and narrow border around ear-coverts, with breast more prominently rufous; supercilium lemon-yellow behind eye, anteriorly more greenish-yellow (approaching colour of lores), dark greenish eyestripe curving down around rear ear-coverts to lower rear corner, malar stripe usually absent; nape a mixture of yellow and greenish-grey, upperparts more richly coloured than in fresh plumage. Female in fresh plumage is in general more variable than male, with pattern similar, but less prominent and brilliant colours above, and slightly paler yellow below, much broader olive on crown, ear-covert markings, malar stripe and throat marks, olive nape and band around lower neck and shoulder, breaking up on side of breast; in the hand, differs from male in having greyish crown tips usually more extensive, with more and longer prominent dark shaft streak and reduced amount of yellow. Female in worn plumage shows less extensive yellow on head and more streaked crown, also grey-green head side with no yellow, otherwise similar in pattern to male, but in general with rather dull ground colours above and paler yellow below, where greyish-black streaking on breast and flanks more marked, and throat pale yellow; in the hand, crown feathers have the greyish tip usually more extensive, with more and longer prominent dark shaft streak and reduced amount of yellow, compared with male. First winter is rather less distinctive, with less yellow on head, which usually almost wholly brown, lacking obvious supercilium, and with diffuse streaks on crown, and buff-white underparts with only some faint yellow tinge; first-winter male plumage similar to adult female, except for brighter yellow and chestnut tracts and reduced size of marks on head; first-winter female duller than adult in similar plumage, but still lacking olive on crown and nape. Juvenile is variable, but has pattern of more intense streaking on underparts and duller colours than average adult female, with indistinct supercilium, and broader blackish streaks on mantle and scapulars. Race *caliginosa* male is slightly darker, more richly coloured and with more streaks than nominate; *erythrogenys* is paler and less well streaked than male nominate, with hindneck and shoulders greyish (rather than greenish), and with yellow pigments and chestnut on flanks and breast richer. Voice. Song, generally from top of tree, bush or wire, consists usually of a rather constant series of 5–12 similar notes, usually ending in drawn-out descending note of different pitch, e.g. "zi-zi-zi-zi-zi-zi-zi-ziiiiiiii", penultimate note usually a little higher before the descent of lower final note; geographical dialects occur. In analysis of territorial songs of different males four different structures distinguished, with frequency ranges of elements more constant across individuals than were the ranges of the notes, and among the latter the low-frequency element was nearly twice as conserved as the high-frequency element. Call notes characteristic, the commonest a "stif", as well as an array of subtle variations of similar clicking calls, e.g. "pt...pt", also "trp", and a fine "tsii" described as alarm call.
Habitat. Breeds mainly in open woodlands, scrub, heathland, cultivations and similar habitats, also riparian forest and orchards, avoiding dense forest. Most abundant between 600 m and 900 m; in S of range a rather montane species, inhabiting clearings in forest to 2000 m, especially in areas where cereals are cultivated on higher slopes. In Ukraine and Russia extends into steppe oakwood (*Quercus*); at margin of forest tundra and true tundra in N of range in E. In winter mostly in agricultural land, often stubble fields, unharvested cereal fields, pastures, margins of fields (where weed seeds may be found), orchards, edges of forest and on waste ground. Roosts in trees or bushes, sometimes in reeds.
Food and Feeding. Mostly seeds; during breeding season, at least, also invertebrates. Recorded foods include seeds and other parts of spruce (*Picea*), pine (*Pinus*), beech (*Fagus*), grape (*Vitis*), mistletoe (*Viscum*), and several other plant species, such as those of genera *Urtica*, *Rumex*, *Polygonum*, *Chenopodium*, *Stellaria*, *Cerastium*, *Rubus*, *Vicia*, *Trifolium*, *Empetrum*, *Myosotis*, *Coryza*, *Taraxacum*, *Centaurea*, *Sonchus*, *Achillea*, *Helianthus* and *Plantago*, and several grasses (Poaceae), especially cereals. Several studies in UK farmland areas during autumn–winter reveal high consumption of cereal grain (wheat and oats constantly preferred over barley), as well as a few common weed species, taken in proportion to their availability and size. During breeding season, shift towards invertebrates is related to feeding of nestlings. Takes wide array of invertebrates, which include springtails (Collembola), mayflies (Ephemeroptera), grasshoppers and crickets (Orthoptera), cockroaches (Blattodea), earwigs (Dermaptera), bugs (Hemiptera), lacewings (Neuroptera), adult and larval butterflies and moths (Lepidoptera), caddis flies (Trichoptera), flies (Diptera), Hymenoptera, beetles (Coleoptera), spiders (Araneae), woodlice (Isopoda), millipedes (Diplopoda), earthworms (Lumbricidae), and snails (Gastropoda). Forages almost exclusively on ground, but recorded also as clinging from tall herbs, especially during snowfalls. During breeding season, different techniques for catching insects recorded, including brief pursuits of flying insects, also jumping from ground, and even briefly hovering from branches on trees. Outside breeding season, feeds in flocks of variable size, usually of the order of tens of individuals, occasionally hundreds, rarely more (flocks of up to 3000 individuals recorded in Germany); often with mixed-species flocks containing other buntings and finches (Fringillidae). Roosts of variable size, normally of several tens or hundreds of individuals, sometimes up to 1000, usually also with other species such as *E. calandra* and some finches.
Breeding. Normally begins in Apr, later at higher latitudes, with late broods started in Sept; most first broods started May in W & C Europe; normally two broods, sometimes three. Nest built by female, sometimes joined by male on movements to/from site, material gathered from immediate surroundings of (normally within maximum radius of 50 m); composed of dry grass, plant stems, leaves and some moss, lined with rootlets, fine grass and sometimes animal hair, external diameter

11·5–13 cm, internal diameter 5·5–7 cm, depth of cup 4–4·5 cm, placed on or near ground, well hidden among grass or herbage, typically against base of herb, bush or small three, or inside well-protected thorn bush such as *Rubus*. Clutch 3–5 eggs, white, tinged bluish, greyish or purplish, usually some fine faint pale violet or purple spotting, rather variable in colour; incubation usually by female alone, period 12–14 days; chicks brooded entirely by female, male delivers food, nestling period 11–13 days. Breeding success in Britain was 58% of 244 hatched eggs in complete clutches, hatching success increasing from May to later in season; 44% of clutches produced fledged young at a locality in Britain, 52% did so at a German site; nests frequently preyed on by rodents and by corvids including crows (*Corvus*), Eurasian Jay (*Garrulus glandarius*) and Common Magpie (*Pica pica*). Predation accounted for 64% of nest failures; in one UK study examining variation in habitat selection and breeding success, territories found to be associated with hedgerows, vegetated ditches and wide uncultivated grassy margins around fields, avoiding pastures and silage leys, breeding starting slightly earlier on organic farms than on intensively managed ones, but with no differences in breeding success; another study found relationship between mixed farming and improvement of breeding success (abandonment of mixed-farming practice adversely affected success).

Movements. Sedentary and partially migratory. Only extreme N part of range completely vacated during winter. In W part of range autumn movements Sept–Nov, arriving regularly in winter in areas of coastal and inland Spain (where absent as a breeding species), as well as in coastal areas of Italy (where also not breeding), and similar pattern in parts of Balkans, most of Black Sea region and Mediterranean in Turkey, S to N Israel; in severe winters extends S to S Spain, N Africa, Cyprus and United Arab Emirates. E populations dispersive and migratory, wintering S mainly to Transcaucasia, N Iran, S Kazakhstan and N Mongolia, minority resident in W Siberia.

Status and Conservation. Not globally threatened. Locally common to very common; scarce in some areas. Introduced in New Zealand between 1862 and early 1870s, and now widespread and common throughout the islands; has also reached other islands in that region, e.g. Kermadecs, Lord Howe I. In Europe (including European Russia), breeding population estimated to number 18,000,000–31,000,000 breeding pairs, and considered stable during 1970–1990, equating to c. 54,000,000–93,000,000 individuals. Europe forms 50–74% of global range, and a very preliminary estimate of global population is 73,000,000–186,000,000 individuals; further estimates based on more reliable data, especially for Russia, are needed. Although declines recorded in Fennoscandia, Latvia and W Europe (Ireland, UK, Belgium, Netherlands), Austria and Italy during 1990–2000, most C & E European populations (including sizeable ones in Germany, Czech Republic, Poland and Ukraine) were stable; Russian trend not known. Changing land use and farming practices affect populations densities locally.

Bibliography. Alström *et al.* (2008), Arizaga *et al.* (2008), Aymí (1994), Balatsky (1992), Bowman (1996), Bradbury & Stoate (2000), Bradbury *et al.* (2000), Byers, Olsson & Curson (1995), Caro *et al.* (2009), Castell & Castell (2009), Cramp & Perrins (1994), Crick *et al.* (1994), Dale & Manceau (2003), Debout (2001), Douglas *et al.* (2010), Dunn & Wright (2009), Dzierzanowski (2004), Estrada *et al.* (2004), Frauendorf (2003), Gavrilov & Gavrilov (2005), Gladwin (1985), Glaubrecht (2003), Glutz von Blotzheim & Bauer (1997), Golawski & Dombrowski (2002), Gruber & Nagle (2010), Hagemeijer & Blair (1997), Hansen (1984), Hardi (1989), Hart *et al.* (2006), Hasse (1995), Horváth (1960), Il'ichev (1962), Irwin *et al.* (2009), Jarvi & Marjakangas (1985), Khakhlov (1991), Kirwan *et al.* (2008), Koce *et al.* (2008), Kyrkos *et al.* (1998), Lee, Collins *et al.* (2001), Lille (1996), MacLeod, Duncan *et al.* (2005), MacLeod, Parish, Duncan, Moreby & Hubbard (2005), MacLeod, Parish, Duncan, Wratten & Hubbard (2005), Martí & del Moral (2003), McCarthy (2006), Møller (1988), Morris & Bradbury (2002), Morris, Whittingham *et al.* (2001), Morris, Wilson *et al.* (2005), Murray *et al.* (2002), Oliver (2001), Pagliani *et al.* (1999), Panov, Nepomnyashchikh & Zykova (2006), Panov, Rubtsov & Monzikov (2003a, 2003b), Panov, Rubtsov & Mordkovich (2007), Perkins, Anderson & Wilson (2007), Perkins, Whittingham *et al.* (2002), Portenko & Stübs (1971a), Prochazka & Honza (2004), Prokopchuk & Petrusenko (1976), Prys-Jones (1977), Radjabli *et al.* (1970), Rasmussen & Anderton (2005a, 2005b), Rogacheva (1992), Rubtsov (2007), Rutkowska-Guz & Osiejuk (2004), Ryttman *et al.* (2009), Semrad (2002), Shirihai (1996), Shirihai *et al.* (1995), Simeonov (1983), Snow & Perrins (1998), Stoate & Szczur (2001), Stoate *et al.* (1998), Südbeck *et al.* (2007), Sundberg (1995), Svensson (1992), Svensson *et al.* (2009), van der Veen (2000), Wernham *et al.* (2002), Whittingham *et al.* (2005), Wonke & Wallschläger (2009), Yom-Tov (1992).

11. Pine Bunting

Emberiza leucocephalos

French: Bruant à calotte blanche **German**: Fichtenammer **Spanish**: Escribano Cabeciblanco

Taxonomy. *Emberiza leucocephalos* S. G. Gmelin, 1771, Astrakhan, Russia.

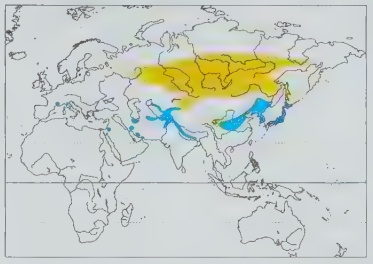
Most closely related to, and perhaps forming a superspecies with, *E. citrinella*; sometimes considered conspecific, but the two differ clearly in plumage, as well as in behaviour and osteology, supporting treatment as separate species. Closest species to this pair are *E. stewarti* and *E. cirlus*. Present species and *E. citrinella* hybridize extensively in W & C Siberia (across c. 3000 km in taiga and forest-steppe zone from R Ural E to L Baikal), and intensity of interbreeding is increasing, since each species is expanding its breeding range across/towards that of the other; this type of interbreeding has been described as intermediate between occasional hybridization (not influencing gene pools of parent species) and introgressive hybridization (resulting sometimes in local fusion of species). An independent recent analysis of phylogeny supports recognition of two independent species, although cytochrome *b* sequences are very similar, resulting in a strong indication that they are sister-species; sharing of haplotypes even in very distant locations seems to be result of introgression of mitochondrial DNA. An independent alternative study also argues that both species are older than their closest relatives and that mtDNA has recently introgressed between them, most likely as a result of selective sweep. Proposed races of present species *stachanowi* (described from Naryn, in Tien Shan of C Kyrgyzstan) and *karpovi* (from Chita, in Transbaikalia, and Blagoveshchensk, in SE Russian Amurland) are synonymized with nominate. Two subspecies recognized.

Subspecies and Distribution.

E. l. leucocephalos S. G. Gmelin, 1771 – E European Russia from C & S Ural region (Sverdlovsk district and Chelyabinsk) E across Siberia (N to c. 62° in W and 67° in E) to Russian Far East (upper R Kolyma and mountains N of Sea of Okhotsk), S to N Kazakhstan, C & E Tien Shan, NW & NE China, N Mongolia, and lower R Amur and Sakhalin I; bulk of population winters from Afghanistan and N Pakistan E to Nepal, N China, N Mongolia and Japan, and S to S Turkmenistan, N & SW Iran and N Israel (also tiny numbers in NE Italy and SE France).

E. l. fronto Stresemann, 1930 – NE Qinghai (from E border of Zaidam Depression) E to S Gansu, in NC China.

Descriptive notes. 16–17·5 cm; 18·5–37 g. Rather large bunting, similar in size to *E. citrinella*, but slightly larger, with tail 5–10% longer. Male nominate race in worn plumage (Mar–Jul) has distinctive head pattern, with black on forehead and continuing as two black lateral crownstripes bordering white crown to rear nape (sometimes a hint of grey below lateral crownstripe), broad deep brick-red supercilium, white ear-coverts and cheek with often incomplete black borders, deep brick-red lores, chin and throat, brick-red colour extending rearwards as band beneath black ear-covert border; eyering of same colour as supercilium; nape grey-brown with faint darker brown streaks, mantle and back pale reddish-brown with darker brown stripes (no indication of green tones), shoulder shows reddish-brown tones, rump reddish-chestnut and uppertail-coverts slightly darker; scapulars of same colour as mantle, but with



broad bright reddish-chestnut fringe and each feather with conspicuous dark brown streak on shaft; edges of primaries and secondaries white to pinkish-buff (no yellow), pale tips of greater upperwing-coverts forming indistinct whitish wingbar, median upperwing-coverts rufous-buff with whitish fringes (forming additional thin bar), outer rectrices with white shafts; distinct white half-collar between throat and breast (some individuals have fairly distinct greyish additional collar below this), breast and flanks brick-red (paler than same tones on head), flanks with much white admixed, rest of underparts whitish without any yellow tones; iris dark brown; bill blackish-grey on upper mandible, lower mandible horn to grey-horn, often brighter along cutting edge; legs pale and variable, from fleshy-orange to fleshy-brown. Male in fresh plumage (Aug–Nov) has pattern reminiscent of male *E. citrinella*, but with yellow replaced by white; dark streaks on crown created by grey-brown fringes on head feathers (lost when plumage worn), present also on ear-coverts, which have fringes greyish-brown and whitish; streaks on crown slightly more distinct than those of *E. citrinella*. Female in worn plumage is similar to *E. citrinella*, but lacking yellow tones: central crownstripe rather variable individually, but on average is limited to rear crown; whitish spot on nape. Female in fresh plumage (non-breeding) is very similar to worn plumage (in spring–summer), but generally paler, and with rufous tones less marked on supercilium, throat and underparts. First-winter male is similar to fresh-plumaged adult, but general tones darker and brick-reddish tones on throat and supercilium not so well marked; pattern of breast and flanks not so well marked as on adult. First-winter female is like fresh-plumaged adult, but duller. Juvenile is very similar to first-winter female, but in general with even duller tones and more tinged buffy-brown, especially on upperparts. Race *fronto* male differs from nominate in having broader black bands on head, especially on forehead, chestnut tones on average darker, also slightly longer wing. Voice. Calls and song very similar structurally to those of *E. citrinella*, songs being only a little shorter and slower, with fewer, more evenly spaced notes. Detailed analysis in zone of sympatry reveals that song of present species differs from those of *E. citrinella* in having smaller number of notes, lower rate of repetition, and longer pauses between the series of notes; main difference is in frequency of initial notes, either evenly spaced or accelerating, these including a normal song, "zi-zi-zi-zi-zi-zi-ziiiiiiii", in which (according to sonagrams) each "zi" element is composed of two parts, one higher and one louder, the latter more evident than in *E. citrinella*, making song in some ways softer. Also described is a slight difference in pitch of notes, those of present species being higher. Calls "stif" and various clicks, more or less identical to those of *E. citrinella*.

Habitat. Prefers edges of forests and clearings in S taiga, also areas devoid of trees following logging or fires in denser parts of forest. In Kazakhstan breeds in coniferous and mixed forests with shrubs, to 2000 m. Present also in small patches of trees and forest "islands" in the steppe and on outskirts of settlements. During migration and winter found in open landscape with scrub and trees, in forest belts, gardens and tall weedy thickets, normally with arable fields, orchards, gardens or waste ground, often near water and swampy pastures. Tiny population wintering in Italy prefers well-preserved, flat or gently undulating coastal dunes; in Israel, present in badlands and garrigue on mountain slopes and in open hilly areas; in SE France (Camargue) recorded in old sand dunes recolonized by vegetation, with good shrub and tree cover, which occur as isolated islands in cultivated areas.

Food and Feeding. Diet during breeding season mainly invertebrates, such as grasshoppers (Orthoptera), bugs (Hemiptera), beetles (Coleoptera), caterpillars (Lepidoptera), flies (Diptera), spiders (Araneae) and snails (Gastropoda). Nestling diet also invertebrates, including similar array of species to that taken by adults, as well as some seeds. Outside breeding season diet based mainly on seeds of several cereals, e.g. wheat, oats, barley, rye and rice, as well as those of some herbs and grasses. Forages mainly on ground. During migration and winter forages in flocks of variable size, often small groups, but up to 150 individuals in Kyrgyzstan and several hundreds in Mongolia, usually mixed with other seed-eating species such as other buntings and finches (Fringillidae).

Breeding. Season late Apr to end of Jul, usually most pairs starting during May; normally two broods. Nest built by female, a tightly woven cup of grass, rootlets and stalks, lined with soft grass and sometimes hair, placed normally in small depression on ground sheltered by grasses, bush or fallen vegetation. Clutch 4–5 eggs, rarely 6, pale whitish-blue or whitish-green, marked with small dark dots, streaks and a few fine lines; incubation entirely by female, period 13 days; chicks fed by both sexes, nestling period 9 days, young fully fledged 1–3 days later.

Movements. Chinese race *fronto* resident. Nominate race migratory. Autumn migration starts in Aug or Sept, later, in Sept/early Oct, at Chokpak Pass, in W Tien Shan (Kazakhstan), usually in flocks of several tens, and finishing during Nov; regular passage recorded at some places in Japan, such as migration watchpoint of Hegura-jima (off NC Honshu), during Oct. Arrival on wintering grounds in Afghanistan and India during Nov. In W Europe, tiny population wintering in Italy present between mid-Oct and mid-Mar. Return migration at Chokpak recorded from mid-Feb to early May, in flocks of 30–40 birds, finishing during mid-Apr; in N Kazakhstan a little later, from end Mar to early Apr, finishing end Apr. Spring migration seems to be rather quick, since individuals already on breeding grounds in Yakutia, in NE Russia, from second half of Apr, when none present on wintering grounds. Vagrants recorded widely W to NW Europe, S to N Africa and Saudi Arabia, and in Korea and Alaska; small numbers now regular in winter in SE France (Camargue).

Status and Conservation. Not globally threatened. Locally common. No realistic estimates of global population, since bulk of this breeding in Siberia, where surveys needed; European breeding population estimated at 50–100 breeding pairs, but this accounts for less than 5% of global range. Despite lack of detailed information, numbers thought to be stable. Process of interbreeding with *E. citrinella* in areas of contact is producing a zone of local fusion of species in two areas, i.e. SE of W Siberia and adjoining regions of NW Altai; this has led to a sharp decline in numbers of present species in former area (in vicinity of Novosibirsk). This process is still evolving, and long-term outcome requires further study. Wintering presence in Italy discovered in 1994–1995, in Tuscany (L Orbetello); in following winter further individuals discovered elsewhere in W Italy, including flock of 45–50 individuals near mouth of R Serchio in Pisa, and subsequent overwintering recorded also in NE Italy.

Bibliography. Alström *et al.* (2008), Ayé & Schweizer (2003), Balatsky (1992), Beale (2000), Blomdahl & Hägg (2007), Boswall (1970), Bowman (1996), Bradshaw & Gray (1993), Breaks (2009), Byers, Olsson & Curson (1995), Castell & Castell (2009), Corso (1996), Cramp & Perrins (1994), David & Gosselin (2002a), Dementiev *et al.* (1954, 1970), Dubois (2008), Flint *et al.* (1984), Fraticelli (1997), Fry & Keith (2004), Gavrilov & Gavrilov (2005), Glutz von Blotzheim & Bauer (1997), Hagemeijer & Blair (1997), Il'ichev (1962), Irwin *et al.* (2009), Jiguet (2003), Kasparek (1986), Kayser (1999), Khakhlov (1991), Kirwan *et al.* (2008), König (1996), Korzyukov (1982), Kutubidze (1965), Landsdown & Charlton (1990), Lewington (1990), Lewington *et al.* (1991), MacKinnon & Phillipps (2000), Mauersberger (1971), Maumary *et al.* (1990), McCarthy (2006), Minshull (1996), Oates (1996), Occhiato (2003a, 2003b), Panov (1973), Panov, Rubtsov & Monzikov (2003a, 2003b), Panov, Rubtsov & Mordkovich (2007), Portenko & Stübs (1971a), Radjabli *et al.* (1970), Rasmussen & Anderton (2005a, 2005b), Riddington (1995), Rogacheva (1992), Rubtsov (2007), Shirihai (1996), Shirihai *et al.* (1995), Shkatulova (1962), Slack (2009), Snow & Perrins (1998), Svensson (1992), Svensson *et al.* (2009), Tyurin (1961), Yamashina (1933).

PLATE 41

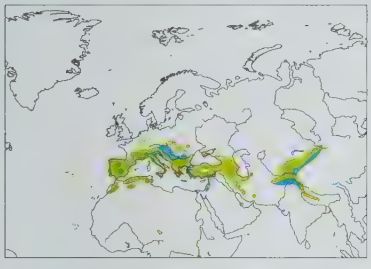

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cm 5
ssp cia
ssp godlewskii
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ssp stracheyi
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ssp semenowi
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12. Rock Bunting

Emberiza cia

French: Bruant fou **German**: Zippammer **Spanish**: Escribano Montesino
Other common names: Western Rock Bunting, European/Eurasian Rock Bunting, Meadow Bunting(!)

Taxonomy. *Emberiza cia* Linnaeus, 1766, southern Europe = lower Austria.
Forms a superspecies, and previously treated as conspecific, with *E. godlewskii*. Recent phylogenetic analysis indicated that, according to cytochrome *b* tree, interrelationships among present species, *E. godlewskii* and *E. cioides* are unresolved. Similarities in plumage to *E. capensis*, *E. striolata* and *E. tahapisi* seem to be result of parallel evolution, rather than close phylogenetic relationship. Geographical variation mainly clinal, races grading into each other; birds from N Europe tend to be darker than those from S Europe and C Asia, but differences between races generally slight. Other proposed races are *callensis* (from Bom Jesus, Braga, in N Portugal), *africana* (from Spain and Morocco E to Tunisia) and *mokrzechyi* (from extreme W Caucasus), all synonymized with nominate; and *prageri* (from Crimea and Caucasus), *serebrowskii* (from Altai and Tarbagatay) and *lasdini* (from Pamirs), all synonymized with *par*. Four subspecies recognized.
Subspecies and Distribution.
E. c. cia Linnaeus, 1766 – C & S Europe E to Turkey and Levant, and N Africa E to Tunisia.
E. c. par E. J. O. Hartert, 1904 – Crimea and Caucasus and E Turkey E to Iran, and C Asia E to W Mongolian Altai.
E. c. stracheyi F. Moore, 1856 – NW Himalayas from extreme SW China (SW Xizang), Baltistan and Kashmir E to N India (Kumaon) and W Nepal.
E. c. flemingorum J. Martens, 1972 – W & C Nepal.



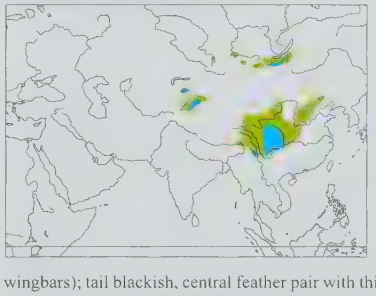
Descriptive notes. 15–16·5 cm; 17–29 g. Fairly large bunting, with proportionately short wing and long tail. Male nominate race in fresh plumage has pale ash-greyish head, throat and breast, contrasting dark lateral crownstripe, eyestripe and moustachial stripe, latter extended posteriorly to meet rear eyestripe at nape side; upperparts rich chestnut with broad black streaks, rump and uppertail-coverts unstreaked reddish-brown; upperwing mostly blackish, flight-feathers with narrow pale outer edges, tertials with pale rufous outer edges and narrower inner edges, median coverts tipped whitish (forming wingbar), greater coverts tipped buffish-white (second, less obvious wingbar); tail blackish, central pair with thin rufous edges, outer pairs with white on one or both webs, amount of white increasing outwards, outermost rectrix white on outer half of inner web and on most of outer web; underparts below breast rusty brown; tinges of yellowish-brown in this plumage disappear with wear, producing more contrasted pattern in spring; iris dark brown; bill greyish, darker above and light lead-grey below; legs bright orange-flesh or reddish. Female is similar to male, normally somewhat duller, with less extensive grey on breast and with more diffuse head pattern, but sometimes not reliably separable. Juvenile has buff to rufous-buff head streaked dark, dark eyestripe, brownish ear-coverts bordered dark below, upperparts buff to reddish-buff with prominent dark brown streaking, rump somewhat more rufous and also streaked, upperwing-coverts tipped buffish, tertials black with light rufous edgings, underparts buffish, breast streaked dark, flanks less boldly streaked; bare parts much as for adult. First-winter is similar to adult female. Races differ mainly in plumage darkness, but variation largely clinal, becoming paler and greyer from N to S and from W to E: *par* is very similar to nominate, but paler and larger; *stracheyi* is darker and more richly coloured, with tips of median and greater upperwing-coverts rufous-buff (instead of whitish), in size intermediate between previous and nominate; *flemingorum* is smaller and paler than last, with both wingbars buffish. Voice. Song, normally from rock or top of tree, a melodic verse with sudden scale changes, and sometimes as a short high-pitched phrase with last note rising and repeated; reminiscent of song of Dunnock (*Prunella modularis*) and, to lesser extent, a weaker version (though more musical) of *E. schoeniclus*, also in some ways even of song of Eurasian Wren (*Troglodytes troglodytes*) and in some instances part of the phrases normally sung by Common Chaffinch (*Fringilla coelebs*). Calls normally a weak and sharp "tzi" and variants, sometimes a little longer; also "trrr" when disturbed.
Habitat. Sunny places on rocky slopes in hills and high mountains, ravines, and in clearings in conifer forests and, less usually, deciduous forests, as well as in areas with bushes and young trees, cultivated terraces, and vineyards. In general prefers areas where bare soils and rocky areas alternate with sparse vegetation, S-facing when on slopes, and with varied relief and availability of exposed perches. According to one study in S Spain, habitat selection during breeding is determined by need for protection against predators, selecting to place nests under patches of low vegetation (to detect approach of predator), but close to taller vegetation (to provide cover when escaping); in study in Slovakia, for breeding chose patches having relatively lower bush cover, relatively higher rock cover, and higher complexity of horizontal surface. In winter found also in lowland sites, where more common in cultivated areas and wastelands. To c. 4000 m in Asia.
Food and Feeding. Outside breeding season feeds mainly on seeds of herbs and other plants, and during breeding period mostly on invertebrates. Among invertebrates recorded as food are mayflies (Ephemeroptera), grasshoppers (Orthoptera), bugs (Hemiptera), flies (Diptera), adult and larval Lepidoptera, ants (Formicidae), adult and larval beetles (Coleoptera), spiders (Araneae), earthworms (Lumbricidae), snails (Pulmonata). Plant seeds include those of knotgrass (*Polygonum*), chickweed (*Stellaria*), fleabane (*Conyza*), woodrush (*Luzula*), several kind of grasses (Poaceae) and mosses. Nestling diet mostly invertebrates, when older also seeds. Forages mainly on ground, in rocky areas or along scrubby vegetation, also in low herbs and grass in fields and similar places. Recorded also as hanging in herbs to reach seeds at tips of plants, as well as taking insects by flight in manner of flycatchers (Muscicapidae). In post-breeding period, gathers in small loose flocks at or near breeding site. In winter found singly and in parties of up to ten or so individuals, sometimes joining other seed-eating species; during cold-weather movements sometimes in flocks of up to 15–30 individuals, exceptionally 40–70.
Breeding. Season from late Mar or Apr to Jul–Aug, occasionally to mid-Sept, peak of egg-laying in most of range during May; sometimes two broods, regularly so if first one successful, exceptionally three broods. Nest built by female, taking usually 6–8 days, composed of dry herbs and mosses, together with fine grasses and hair, normally placed in sunny site on ground, protected by vegetation, or at base of rock, and exposed to S, but sometimes in shady place, access normally by rocky surface more or less devoid of vegetation; rarely, in crevice in wall or in tree. Clutch 3–6 eggs, pale greyish to purplish-white, heavily and intricately scrawled with long and meandering dark black streaks; incubation by female, period 13–15 days; chicks fed by both parents, nestling period 9–13 days; young leave nest before able to fly, becoming independent three weeks later. In study in Germany, only 47% of nests produced fledged young; losses due mainly to predation by mustelids such as stone marten (*Martes foina*), least weasel (*Mustela nivalis*) and ermine (*Mustela erminea*), also by red fox (*Vulpes vulpes*), several corvids including Eurasian Jay (*Garrulus glandarius*), Common Raven (*Corvus corax*) and Carrion Crow (*Corvus corone*), and smooth snake (*Coronella austriaca*).
Movements. N populations partly migratory, some moving short to medium distance S in cold winters. In S of range mostly resident, performing altitudinal movements, or probably only movements of limited distance. Present in coastal areas of Mediterranean where absent during breeding period, but unknown whether this involves local altitudinal migrants or is due to arrivals of individuals from N areas. Recorded as winter visitor in Cyprus and Iraq. Vagrants have reached Great Britain, Netherlands, Denmark and Sweden.
Status and Conservation. Not globally threatened. Locally common; rather sparsely distributed. European breeding population estimated at c. 1,300,000 pairs. Large decline recorded during 1970–1990; long-term monitoring at locality in Baden-Württemberg, in S Germany, between 1950s and 1970s and in 1988 revealed decline of at least 35–45%. During 1990–2000 considered stable overall in European range; present population probably below previous levels. Abandonment of traditional farming practices, the intensification of agriculture (and spread of monocultures) and extension of urban zones adversely affect the whole population, since these are causes of habitat loss; reforestation of many areas in Europe is also having negative effect. On the other hand, factors such as fires in Mediterranean area, which could help to produce patches of new habitat in the form of open areas, could benefit this species. Little information on status in E of range; thought to be relatively stable and locally common.
Bibliography. Alström *et al.* (2008), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cazemier (2006), Cramp & Perrins (1994), Cucco & Ferro (1988), Estrada *et al.* (2004), Fry & Keith (2004), Fuchs & Macke (2002), Giebing (2000), Glutz von Blotzheim & Bauer (1997), Gubin (1980), Gyorgypal (1980), Hagemeijer & Blair (1997), Hausch (1999), Hollom (1962), Karnas (1988), Kirwan *et al.* (2008), Lebreton & Thévenot (2009), Mann *et al.* (1990), Martí & del Moral (2003), Mauersberger & Portenko (1971), Messlinger (2004), Pfeffer & Gilot (2002), Piechocki & Bolod (1972), Polak & Trontelj (2005), Pühringer (2002), Purger (1990), Rasmussen & Anderton (2005a, 2005b), Richter (1998), Ruzic (2005), Sackl & Sackl (2008), Sánchez *et al.* (2009), Schuphan (2011a, 2011b), Sierro & Arlettaz (2003), Snow & Perrins (1998), Stankovic (2008), Südbeck *et al.* (2007), Trévoux & Trévoux (2008), Uhrin (1993), Václav & Prokop (2007), Vrezec (2001a), Vucanovic (1999).

13. Godlewski's Bunting

Emberiza godlewskii

French: Bruant de Godlewski **German**: Felsenammer **Spanish**: Escribano de Godlewski
Other common names: Eastern Rock Bunting

Taxonomy. *Emberiza godlewskii* Taczanowski, 1874, southern Dauria and Kultuk, Mongolia [= southern Lake Baikal, Russia].
Forms a superspecies, and previously treated as conspecific, with *E. cia*. Recent phylogenetic analysis indicated that, according to cytochrome *b* tree, interrelationships among present species, *E. cia* and *E. cioides* are unresolved. Similarities in plumage to *E. capensis*, *E. striolata* and *E. tahapisi* seem to be result of parallel evolution, rather than close phylogenetic relationship. Proposed races *nanshanica*, described from C China (R Churmyk, basin of upper Hwang-he, in E Qinghai), and *gobica*, from WC Mongolia (S slope of Khangai Mts), synonymized with nominate, and, also in C China, *styani* (from Songpan, in W Sichuan) and *bangsi* (from Pashui, in Shaanxi) are treated as synonyms of *omissa*. Five subspecies recognized.
Subspecies and Distribution.
E. g. decolorata Sushkin, 1925 – NW China (foothills of S & E Tien Shan, in W Xinjiang); in winter also in valley of upper Syr Darya.
E. g. godlewskii Taczanowski, 1874 – Russian Altai E through Sayans to S end of L Baikal and W Transbaikalia, Mongolia, and N China (S to N & E Qinghai and Gansu).
E. g. khamensis Sushkin, 1925 – SC China from S Qinghai S to S & SE Tibetan Plateau (to Lhasa and Gyantse regions) and W Sichuan (to c. 29° N).
E. g. omissa Rothschild, 1921 – E China from S Heilongjiang S to N & E Sichuan.
E. g. yunnanensis Sharpe, 1902 – S China in extreme SE Tibetan Plateau and N Yunnan E to C Sichuan; also NE Myanmar in winter.



Descriptive notes. 17 cm; 14–23 g. A fairly large bunting, superficially similar to *E. cia*. Male nominate race has grey head, throat and breast, broad chestnut lateral crownstripe and posterior eyestripe, black loral stripe and moustachial stripe, and chestnut border of rear and lower ear-coverts; upperparts pale rufous with broad black streaks, rump and uppertail-coverts unstreaked reddish-brown, bright chestnut scapulars contrasting with mantle; upperwing blackish, flight-feathers with narrow pale edges, tertials with pale rufous outer edges and narrower inner edges, median and greater coverts tipped white (forming two wingbars); tail blackish, central feather pair with thin rufous edges, outer pairs with white on one or both webs, amount of white increasing outwards; underparts below breast pale ochraceous; when fresh (after moult), plumage duller-looking and slightly paler; iris dark brown; upper mandible blackish, lower mandible bluish-grey with blackish tip; legs pinkish-brown. Differs from *E. cia* mainly in less striking head pattern, paler upperparts with brighter chestnut scapulars, more marked wingbars, paler underparts. Female is very like male, perhaps slightly duller and with slightly darker crownstripes. Juvenile has buff to rufous-buff head streaked dark, dark eyestripe, brownish

On following pages: 14. Meadow Bunting (*Emberiza cioides*); 15. White-capped Bunting (*Emberiza stewarti*); 16. Jankowski's Bunting (*Emberiza jankowskii*); 17. Grey-necked Bunting (*Emberiza buchanani*); 18. Cinereous Bunting (*Emberiza cineracea*); 19. Ortolan Bunting (*Emberiza hortulana*); 20. Cretzschmar's Bunting (*Emberiza caesia*); 21. Cirl Bunting (*Emberiza cirlus*).

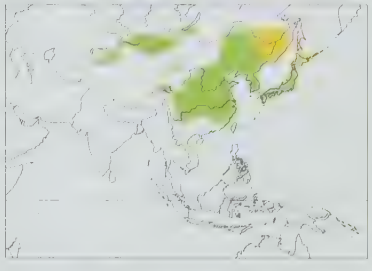
ear-coverts bordered dark below, upperparts buffish with prominent dark brown streaking, somewhat more rufous rump also streaked, upperwing-coverts tipped buffish, underparts buffish, breast with dark streaking, flanks less boldly streaked; bare parts much as for adult. Race *decolorata* is palest, with mantle, edges of greater upperwing-coverts and underparts paler sandy rufous, female may be even more pale and nondescript; *khamensis* is darker than nominate and more heavily streaked on mantle; *omissa* is rather more richly coloured than previous; *yunnanensis* is darkest, with the most saturated plumage tones. Voice. Song, usually from top of rock or tree, quite variable, apparently begins with much higher-pitched "tziit" notes than song of *E. cia*, and consists of a series of twittering notes, less varied and musical than those of latter, repeated several times. Calls include "tzii", similar to but slightly higher pitched than that of *E. cia*, also a harder "pett pett".
Habitat. Bushy and rocky slopes in mountains and hills, also in ravines, often near forest; avoids higher mountains. Common also in montane steppe zones in C Siberia, as well as on rocky meadow-steppes, where present also during winter; less numerous in larch (*Larix*) forests on slopes and in valley pine (*Pinus*) forests in rocky regions. Outside breeding season found in lowland areas, where it visits farmland and cultivated fields.
Food and Feeding. Diet outside breeding season consists mostly of seeds, especially of grasses (Poaceae); during breeding period a variety of invertebrates. Forages mostly on ground. In non-breeding season usually in small flocks, sometimes up to 35 individuals, and sometimes mixed with *E. spodocephala* and rosefinches (*Carpodacus*).
Breeding. In N of range most start to breed from mid-May, a proportion not before end Jun. Nest cup-shaped, with loose structure made from withered grasses and plant stems, lined with fine rootlets and hair, placed on ground under overhanging rock, or sheltered by stones. Clutch 3–5 eggs, very similar to those of *E. cia*; incubation c. 13–14 days; nestling period 10–14 days.
Movements. Resident, with local dispersive movements. Apparently makes altitudinal movements, which could be reason for presence in non-breeding season in areas such as N Myanmar.
Status and Conservation. Not globally threatened. Locally common to fairly common. Global population size not quantified, but numbers thought to be stable in absence of evidence of declines or reported threats. Reaches densities of 40 birds/km² in areas of montane steppe, being the most numerous species in R Bolshiye Ury basin, in Altai region of Russia; in lower densities of 2 birds/km² in larch forests on slopes and in valley pine forests in rocky regions.
Bibliography. Alström *et al.* (2008), Armani (1985), Byers, Olsson & Curson (1995), Dementiev *et al.* (1954, 1970), Dornberger (1981), Dorzhiev & Jumov (1991a, 1991b), Flint *et al.* (1984), Gavrilov & Gavrilov (2005), Harrison (1934), Hesse (1913), Johansen (1905, 1944), Mauersberger (1972), Mauersberger & Portenko (1971), Rasmussen & Anderton (2005a, 2005b), Sushkin (1925), Tsybulin (1988).

14. **Meadow Bunting**

Emberiza cioides

French: Bruant à longue queue **German**: Wiesenammer **Spanish**: Escribano de Brandt
Other common names: Siberian Meadow Bunting, Long-tailed/Red-eared Bunting; Japanese Meadow Bunting (*ciopsis*)

Taxonomy. *Emberiza cioides* J. F. Brandt, 1843, Siberia.
Japanese race *ciopsis* differs quite strongly from others both in head colour and in vocalizations, and could be worthy of species status; further study needed. Geographical variation somewhat clinal, involving size and colour saturation: other proposed races include *shiretokoensis* (described from E Hokkaido, in N Japan), synonymized with *ciopsis*; in SE Russia, *ussuriensis* (from Ussuri) and *vagans* (from mouth of Sidemi, in Amur Bay and mid-Ussuri), both subsumed in *weigoldi*; and, in China, *tangutorum* (from near Xining, in W Qinghai), treated as synonym of nominate. Five subspecies recognized.
Subspecies and Distribution.
E. c. tarbagataica Sushkin, 1925 – NW China from SW Altai S to C & E Tien Shan (in N Xinjiang).
E. c. cioides J. F. Brandt, 1843 – SC Siberia from E Altai E to Mongolia and adjacent Transbaikalia (Buryatia) in EC Russia.
E. c. weigoldi Jacobi, 1923 – E of Transbaikalia in SE Russia (Amurland and Ussuriland), S to NE China (S to Hebei) and N Korea.
E. c. castaneiceps F. Moore, 1856 – E China (S of Hebei) and S Korea.
E. c. ciopsis Bonaparte, 1850 – S Sakhalin I and Kuril Is S through Japanese islands to Yakushima (S of Kyushu).



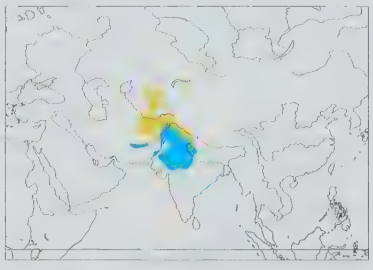
Descriptive notes. 17 cm; 17–26 g. Relatively large and long-tailed bunting. Male nominate race breeding (plumage worn) has crown chestnut, relatively broad white supercilium, chestnut ear-coverts, contrasting white moustachial stripe and black submoustachial stripe; nape pinkish-buff, side of neck grey, upperparts rufous-brown, streaked dark brown, rump and uppertail-coverts unstreaked chestnut; wing feathers brownish-black, edged reddish or dull brown, median and greater upperwing-coverts narrowly tipped white; tail dark, with extensive white mostly on outermost pair; throat off-white, bordered below by broad chestnut breastband; side of breast and flanks rufous, paling to pinkish-buff on belly and off-white on undertail-coverts; iris brown; upper mandible and bill tip blackish, lower mandible grey; legs greyish-pink. Differs from similar *E. jankowskii* in having ear-coverts chestnut (rather than grey), less obvious wingbars, unmarked rufous underparts without dark belly patch, and less bold black streaking on mantle. Male non-breeding (plumage fresh) has colours dulled by buffy-grey feather tips, often completely obscuring chestnut breastband, and buffy edges of crown feathers giving impression of narrow central crownstripe; streaking on mantle less well defined owing to pale feather edges. Female resembles male in plumage colour, but somewhat duller, usually with weaker facial pattern, but many are superficially very similar. Juvenile resembles female, but paler buffy brown overall, with head very finely streaked, and breast speckled, rather than streaked; extremely similar to juveniles of *E. godlewskii* and *E. cia*. Race *tarbagataica* is palest, being sandy brown above, streaked darker on mantle, only a little rufous on rump, and with narrow breastband; *weigoldi* is brighter and more chestnut overall and a little smaller than nominate; *castaneiceps* is smallest and darkest race, only sparsely streaked above and with brownish lower underparts; *ciopsis* is distinctive, has slimmer bill, blackish ear-coverts, less contrast between breastband and lower underparts, and some have dusky blotches on breast. Voice. Song, from top of small bush or tall tree, a short, simple phrase very similar to that of *E. godlewskii*, has been transcribed as "chi-hu chee-tsweet-tsweet-tuee"; song of race *ciopsis* is rather different, having a twittering rhythm, can be transcribed as "ziu-chuhu tsitsirri tsetziz". Typical call a short, thin, repeated "zit zit zit".
Habitat. Found in all manner of lightly wooded rolling hills and mountain foothills; rocky areas of steppe and forest-steppe, also *Caragana* shelterbelts, and sometimes open larch (*Larix*) and pine (*Pinus*) forest on hill slopes; also found in shrub thickets. In Japan, breeds at forest edge and in cultivated fields with thickets. Up to 1700 m. Visits areas around human habitations.
Food and Feeding. Diet chiefly grass and weed seeds, augmented by invertebrates during summer. Feeds mostly on ground, hopping with hunched posture. In winter forages in small to medium-sized flocks of c. 30–40 individuals, exceptionally several hundred individuals; mixes freely with finches (Fringillidae) and other buntings, especially at favoured drinking locations, which it visits first thing in morning and again in late afternoon.
Breeding. Season Apr–Aug; two and often three broods. Monogamous. Nest built by female alone, a cup of rootlets and grasses, lined with finer materials such as horsehair, placed on or just above ground, usually concealed by small bush or clump of grass. Clutch 3–6 eggs, mean 4, whitish or pale grey, marked with patches, fine lines and scribbles, incubation period 11 days, fledging after a further 11 days.
Movements. Mostly sedentary or, at most, a short-distance migrant. Remains close to breeding areas in winter, some descending to valley bottoms and gathering into small flocks; more severe weather conditions result in population shifts, but unlikely that any move far from native range. In W Mongolia, present at foot of Mongolian Altai from late Sept to early Apr, with clear maximum in Oct. In Japan a breeding summer visitor to N island of Hokkaido and to nearby Sakhalin I, where arrives in Apr and leaves in Oct; race *castaneiceps* is rare visitor to Japan. Vagrants reported on some S Japanese islands and on Taiwan.
Status and Conservation. Not globally threatened. Common locally over most of its breeding range; little evidence of any marked decreases in recent decades. Densities of up to 80 birds/km² reported from parts of China; likewise, up to 80 birds/km² in *Caragana* shelterbelts with scattered trees, in C Siberian forest-steppe. Records in but in view of this species' generally sedentary nature, all European records almost certainly involve escaped cagebirds.
Bibliography. Akashi & Yamagishi (1987), Alström *et al.* (2008), Austin & Kuroda (1953), Brazil (1991), Byers, Olsson & Curson (1995), Chalikova & Kolbintsev (2005), Collar *et al.* (1994), Dementiev *et al.* (1954, 1970), Deng Wenhong *et al.* (2003), Dorzhiev & Jumov (1991a), Du Hengqin (1994), Fu Tongsheng *et al.* (1998), Fujimaki (1980), Gamova (2002b), Gantlett (2000), Iijima (1973), Ilinskii (1981), Jahn (1942), Johansen (1944), Komeda (1987), Lam Chiuying & Costin (1991), Lewington *et al.* (1991), MacKinnon & Phillipps (2000), Maeda & Yoshida (2009), Mey (1988), Nakamura (1973), Nakamura & Iijima (1977), Nishide (1987), Portenko & Stübs (1974), Rasmussen & Anderton (2005a, 2005b), Rogacheva (1992), Sodhi *et al.* (1999), Tada & Anzai (1994), Vaurie (1956), Yamagishi (1970, 1971, 1978, 1981, 1991), Yamagishi *et al.* (1973).

15. **White-capped Bunting**

Emberiza stewarti

French: Bruant de Stewart **German**: Silberkopfammer **Spanish**: Escribano de Stewart
Other common names: Chestnut-breasted/Stewart's Bunting

Taxonomy. *Euspiza stewarti* Blyth, 1854, Landour and Dehra Dun, Uttarakhand, India.
Monotypic.
Distribution. Breeds in mountains from S Kazakhstan (Karatau Range), S Uzbekistan, Tajikistan and W, N & S Kyrgyzstan S to extreme SE Turkmenistan (Kugitang Range), Afghanistan, W & N Pakistan, Kashmir and N India (NW Himachal Pradesh); winter range includes S Afghanistan and the N Punjab of Pakistan, but most move farther S into N Indian states (S to Gujarat, W Uttar Pradesh, Madhya Pradesh and NE Maharashtra).



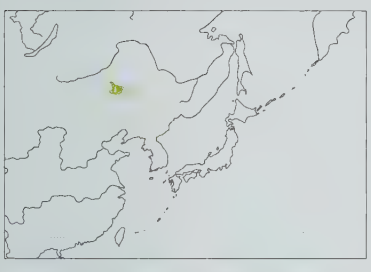
Descriptive notes. 15 cm; 13–21 g. Distinctive bunting with comparatively small bill. Male breeding (worn plumage) has crown and nape, side of head and upper breast light buffy grey, becoming whitish with wear and contrasting with blackish bib extending from throat to submoustachial area and back beneath ear-coverts, and prominent blackish eyestripe; upperparts chestnut, upperwing-coverts brown with paler edgings, tail dark with extensive white in outermost two feather pairs; sides (and narrowly centre) of breast and flanks chestnut, lower underparts off-white, washed pinkish-buff; iris dark brown; bill dark grey; legs greyish-pink. Male non-breeding (fresh plumage) is duller, buff-grey feather tips making black of throat and eyestripe sullied dark brown, and grey of head and breast washed sandy; upperparts duller and browner, with some streaking on mantle. Female has rufous rump, in contrast to overall dull brown and narrowly streaked remainder of plumage; head pattern relatively plain, with slightly darker border of ear-coverts, highlighted by pale spot in lower rear corner; has more white in outermost two pairs of tail feathers than most buntings; some, perhaps older, females show indications of male-like plumage, such as dusky throat or chestnut patches at sides of breast, or chestnut scapulars, and in extreme cases these can be very difficult to age or sex. Juvenile resembles female, but paler buffy brown overall, with head very finely streaked and breast speckled, rather than streaked. Voice. Song, from top of small bush or crag, usually a simple phrase, rather variable, can be a buzzy, metallic rattle finishing with single high-pitched note, or can recall that of *E. citrinella* or *E. leucocephalos*, or even *E. hortulana*, but is slower in delivery and lacks protracted rising terminal note ("cheese"). Calls include high-pitched "tit" and squeaky, staccato "tchirit".
Habitat. Favours rocky gulleys in dry, lightly wooded hills and mountains; associated especially with juniper (*Juniperus*) scrub and stands of chilgoza pine (*Pinus gerardiana*) between 1200 m and 2500 m, but reported as high as 3600 m. Where range overlaps with that of *E. cia*, latter replaces present species at higher elevations. In winter descends to dry foothills, scrub-jungle, poor agricultural land and edges of plains with scattered bushes.
Food and Feeding. Feeds chiefly on grass seeds, augmented by berries in autumn and winter. Young fed with variety of invertebrates, mostly insects and spiders (Araneae). Forages in bushes, as well as on ground, hopping with flat-backed, hunched posture. In winter mixes freely with other buntings and finches (Fringillidae), especially at favoured drinking locations, which it visits first thing in morning and again in late afternoon. In heat of day takes shelter in bushes, sitting quietly with ruffled "crest" of raised crown feathers.
Breeding. Nest-building begins immediately on arrival on breeding grounds, in Apr, and eggs reported from very end of Apr, but mostly from mid-May to early Jun in S of range (Kashmir) and to early Jun in N; many pairs apparently double-brooded. Probably monogamous. Nest built by female alone, a cup of rootlets and grasses, lined with finer materials, placed on ground, usually concealed by small bush or overhanging rock on steep dry slope. Clutch 3–5 eggs (mean 4), white with blue or grey tinge, mottled purplish-grey and with dark red-brown spots and blotches; incuba-

tion probably by female only, period 11–14 days; young leave nest after 8 or 9 days, but unable to fly until c. 14 days old.
Movements. Migratory. Begins to arrive on breeding grounds in Apr. Post-breeding departure through first half of Aug, with stragglers in Sept and early Oct. Reported abundance on passage through Kashmir E to Simla need confirmation, as this species is unrecorded in Tibetan region to N, suggesting that passage birds enter N Pakistan and disperse E along Himalayan foothills. Vagrant in Nepal and SE Iran; recently recorded in United Arab Emirates.
Status and Conservation. Not globally threatened. Common in appropriate habitat over most of C Asian breeding range. Little evidence of any marked decreases in recent decades. This species' preference for rocky ravines renders it relatively safe from indiscriminate forest clearance.
Bibliography. Ali & Ripley (1974), Armani (1985), Bannon & Richardson (1993), Bates & Lowther (1952), Busuttil & Ayé (2009), Byers, Olsson & Curson (1995), Castell & Castell (2009), Dementiev *et al.* (1954, 1970), Grimmett *et al.* (1998), Gubin (1982), Paludan (1959), Portenko & Stübs (1971b), Rasmussen & Anderton (2005a, 2005b), Roberts (1992), Stuart Baker (1926), Wallschläger (1983).

16. Jankowski's Bunting
Emberiza jankowskii

French: Bruant de Jankowski **German**: Jankowskiammer **Spanish**: Escribano de Jankowski
Other common names: Rufous-backed Bunting

Taxonomy. *Emberiza jankowskii* Taczanowski, 1888, near Sidemi, south Ussuriland, south-east Russian Far East.
Monotypic.
Distribution. Breeds NE China (E Inner Mongolia and adjacent W Jilin).

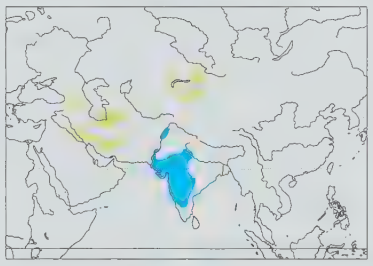


Descriptive notes. 16 cm; c. 20 g. Relatively small-headed and long-tailed bunting. Male breeding (worn plumage) has rufous crown, contrasting whitish supercilium, black stripe from base of bill to eye; lower ear-coverts very pale grey, bordered by black submoustachial stripe, upper ear-coverts darker grey; upperparts mostly reddish-chestnut, mantle duller and paler brown with broad blackish streaks; two white wingbars formed by tips of greater and median upperwing-coverts; tail with white towards tips of outermost two feather pairs, otherwise rectrices dusky with pale fringes, outer webs becoming light reddish towards base; throat and underparts whitish, washed pale grey on centre of breast and light rufous on side of breast and flanks, with dusky-chestnut patch on central belly; iris dark brown; bill grey, darker tip and paler lower mandible; legs greyish-pink. Male non-breeding (fresh plumage) is duller in colour owing to pale feather tips; dark belly patch obscured or smaller. Female resembles non-breeding male, but often has weak speckles across breast and lacks belly patch. Juvenile is duller and colder brown above, with dusky crown centre and weakly streaked flanks. Voice. Song, from top of small bush, usually a simple phrase, has been transcribed as "chu-chu cha-cha cheee" and has been likened to start of an accentor (*Prunella*) song, but finishing with rising "eeee" (like end of *E. citrinella* or *E. leucocephalos* song); a longer, more varied song sometimes recorded, particularly in Jilin. Calls include single or double "tsit", probably as contact; louder, almost explosive "sstillit" serves as alarm call, as probably does a thin penetrating "hsiu".
Habitat. Open grassy habitats, mainly steppes or low hills dominated by the grasses *Filifolium sibiricum*, *Stipa baicalensis* and *Spodiopogon sibiricus*, interspersed with Siberian apricot (*Armeniaca sibirica*) up to 3 m tall. Former Russian populations favoured low rounded hills with stunted scrubby oaks (*Quercus*) within boggy meadows of coastal plain.
Food and Feeding. Little known. Diet quite varied, adults feeding on fallen grain, weed seeds, grasshoppers (Orthoptera) and larval cicadas (Cicadidae). Young fed primarily with invertebrates, recorded items being grasshoppers, caterpillars, and spiders (Araneae) with their cocoons. Forages chiefly on ground; spends more time on ground than most other buntings. On the whole seems to be remarkably confiding, allowing close approach by humans.
Breeding. Little studied. Season in W Jilin late Apr to late Jul; extinct E populations bred later, commencing mid-May and sometimes not until mid-Jun; possibly double-brooded. In scattered colonies within bushy grassland. Nest built by both sexes, from dry grasses, lined with horsehair, placed on ground among sparse grasses, sometimes at base of small tree. Clutch 4–7 eggs (mean 5·26), off-white with faint brownish marks, some dark brown spots and lines; incubation by female alone, period 11–14 days; chicks fed by both sexes, nestling period 10–13 days. Nests parasitized by Common Cuckoo (*Cuculus canorus*). Breeding success low; main causes of failure include nest predation by snakes, ants (Formicidae), possibly also by European suslik (*Citellus citellus*) and Amur Falcon (*Falco amurensis*), also grazing by livestock and nest-robbing by humans.
Movements. Appears to be resident at most sites where breeding has been recorded, perhaps dispersing over relatively short distances after breeding. Occasional short-distance movements in non-breeding season, and, at least formerly, sporadic presence of wintering individuals or small numbers recorded in a few places in Inner Mongolia, S Heilongjiang, Liaoning, Hebei, Beijing and N Korea. In the past possibly a more regular migrant; Russian breeders were said to migrate to nearby N Korea to overwinter there.
Status and Conservation. ENDANGERED. Very rare and local; has declined drastically, and decline continuing. Status altered from Vulnerable as recently as 2010; rate of decline suggests that Critically Endangered might be appropriate. Currently known to breed at only five sites in NE China (four in Inner Mongolia and one in W Jilin), with maximum known total population c. 100 mature individuals. Range formerly extended into extreme SE Russia (along coastal plain of S Ussuriland) and in adjacent extreme NE Korea, but no recent reports from either country; Chinese range formerly more extensive, covering wider parts of W Jilin and breeding also in E Jilin and S Heilongjiang. In first half of 20th century described as locally common in Heilongjiang, but no longer exists at its former sites in that province, nor at those in Russia and N Korea; extinct in E Jilin. In W Jilin, 350 breeding pairs in 1994 (none in 2005) at Huichin, 100 birds in 2001 but only two in 2008 (now extinct) at Baicheng; at Dagang Forest Farm, population dropped from 60 pairs in 1999 to ten in 2010. In Inner Mongolia, habitat destruction at Tumiji grassland had brought numbers down from c. 50 birds to only seven by 2010; two recently discovered sites in this province held, respectively, 53 individuals (29 males) and 13 individuals (nine males) in 2010. No doubt the specialized habitat requirements of this bunting have contributed significantly to its sudden demise. Dry grasslands have been largely destroyed by cutting for winter animal fodder, and extensive accidental or intentional burning, as well as conversion to agriculture and forestry, have also been blamed as main causes. This species, being a ground-nesting bird, must also be vulnerable to predation and trampling by domestic animals and humans. Another factor could be its semi-colonial nesting habits, with successful breeding dependent on close proximity of other pairs. Although protected both in Russia and in N Korea, it no longer occurs there. In China, some protection is afforded by the Xianghai Nature Reserve, but grassland destruction has occurred even inside reserve areas. Clearly, this is one of Asia's most threatened avian species; its only chance for survival depends on creation of a network of surviving grassland patches and much stricter protection from human activities.
Bibliography. Anon. (2010c), Bai Haisi *et al.* (2003), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Collar, Andreev *et al.* (2001), Collar, Crosby & Stattersfield (1994), Dementiev *et al.* (1954, 1970), Gao Wei *et al.* (2003), Hale (2010), Jiang Yunlei *et al.* (2008), Ler (1989), Litwinenko & Schibajew (1966), Musilek (1928), Neufeldt & Wunderlich (1981), Stattersfield & Capper (2000), Tong Fuchun *et al.* (2002), Wang Haitao *et al.* (2010), Yamashina (1957), Zhao Zhengjie *et al.* (1994).

17. Grey-necked Bunting
Emberiza buchanani

French: Bruant à cou gris **German**: Steinortolan **Spanish**: Escribano Cabecigrís
Other common names: Grey-hooded Bunting, Buchanan's Bunting

Taxonomy. *Emberiza buchanani* Blyth, 1845, peninsular India.
Forms a species group with *E. cineracea*, *E. hortulana* and *E. caesia*. Proposed race *huttoni* (described from Afghanistan) has features considered to lie within range of variation of nominate, with which it is synonymized. Geographical variation somewhat clinal and variable; species sometimes treated as monotypic. Three subspecies recognized.
Subspecies and Distribution.
E. b. cerrutii De Filippi, 1863 – breeds from SE Turkey, Armenia and Azerbaijan E to W & N Iran and S Turkmenistan; assumed to winter in India.
E. b. neobscura Paynter, 1970 – breeds NE Kazakhstan, Uzbekistan and Kyrgyzstan E to Altai ranges, SW Mongolia and NW China (NW Xinjiang); assumed to winter in India.
E. b. buchanani Blyth, 1845 – breeds from S Uzbekistan and Pamirs of Tajikistan S to N & C Afghanistan and SW Pakistan (Baluchistan); winters over most of W India (S to Hyderabad).



Descriptive notes. 16 cm; 17·2–26 g. Hooded bunting with rather long pale pinkish bill and prominent whitish eyering. Male nominate race breeding (worn plumage) has crown to nape, sides of head and neck, malar stripe and side of breast grey, giving hooded effect; upperparts rufous-tinged grey-brown, finely streaked darker brown, scapulars broadly bordered rufous-cinnamon, upperwing similarly rufous-grey with darker feather centres and paler fringes; tail feathers black, central pair greyish, outermost pair with extensive white over distal portion of inner webs; submoustachial stripe, chin and upper throat whitish, shading to deep cinnamon on breast and remaining underparts, becoming paler on lower underparts; iris dark brown, clearly defined narrow white eyering; bill very pale pink, yellowish or brownish-yellow, somewhat longer and slimmer than that of *E. hortulana*; legs pinkish-orange. Differs from *E. hortulana* mainly in grey (not olive) hood reaching breast sides but not extending over breast, in whitish (not yellowish) chin and submoustachial stripe, also in generally smaller size, relatively longer-tailed appearance in flight, and somewhat longer and slimmer bill. Male non-breeding (fresh autumn plumage) is similar to breeding, but all colours subdued by whitish feather fringes and tips, dulling rufous of underparts, but making white of throat and submoustachial stripe cleaner; upperparts appear paler because of wide sandy-grey feather fringes, tail browner and worn. Female is similar to dullest non-breeding male, but often with some fine streaking on crown and nape, duller pale rufous scapulars and fine streaking across breast. Juvenile plumage is short-lived, similar to female, but nape virtually unstreaked, giving slight contrast with diffusely streaked crown and streaked mantle, scapulars less rufous, and has more extensive rufous and brown streaking on underparts; first-winter similar to adult female, but no rufous visible below. Races differ chiefly in degree of colour saturation in breeding plumage, complicated by extent of wear of pale feather fringes of non-breeding plumage: *cerrutii* is somewhat paler than nominate, more sandy grey (less extensively rufous) above, and less deep cinnamon below; *neobscura* is relatively darker grey above, with bolder blackish streaking on mantle and scapulars, also has more richly coloured underparts. Voice. Song, usually from top of large boulder, a simple phrase of c. 4 rising notes followed by lower-pitched terminal flourish, "tsee-tsee-tsee-tsee-dew-dedew", resembles that of *E. hortulana*; some individual variation, and also recalls high-pitched version of first part of song of *E. citrinella* or *E. leucocephalos*. Calls a soft, short "tsip" or "tsik" and sweeter "seeop" or "choup", all of which may be given in flight; similar to those of *E. hortulana*.
Habitat. Dry, rocky mountainsides, ravines and upland plateaux, with grassy clumps and weedy vegetation; tends to avoid trees, but tolerates broken bushy cover. Breeds chiefly at 900–1400 m, but in some places reaches upper limit of 2400 m, and reported at 3200 m in Afghanistan. In winter found in stony, dry cultivation and *Euphorbia*-covered dry slopes.
Food and Feeding. Wide variety of seeds, and shoots of dry-country plants, including those of bistorts (*Polygonum*), spurge (*Euphorbia*), sea-buckthorn (*Hippophae*) and salt tree (*Halimodendron*), and various grasses. In breeding season young fed almost entirely with invertebrates, especially both larval and adult stages of weevils (Curculionidae) and other beetles (Coleoptera), grasshoppers (Orthoptera), bugs (Hemiptera), ants (Formicidae) and snails (Pulmonata). Forages quietly on ground in pairs and small parties among sparse vegetation; feeds from early morning until 10:00–11:00 hours, before flying to water source, resuming feeding in early evening. Small parties amalgamate in late Jul and Aug prior to migration, but groups rarely exceed 20 individuals, largest recorded flock being of more than 50 (in Pakistan). Flocking not reported on spring passage. On migration in Kazakhstan reported as forming mixed flocks with *E. hortulana*, and in N Pakistan mixed with *E. cia* and *E. stewarti*.
Breeding. Males arrive at breeding sites a few days ahead of females. Eggs reported from late Apr to Jul in Iran, early May in S Turkmenistan, late May to early Jul in Kazakhstan, and late May in Afghanistan; single-brooded, but two broods suspected at times. Probably monogamous; more study required. Nest built by female only, a scrape lined with coarse grass stems, wool and hair, on ground and well hidden under shelter of boulder, grass tuft or small shrub, rarely up to 30 cm above ground in small shrub. Clutch 3–6 eggs, variably bluish to pinkish, with sparse brownish spots, streaks and blotches concentrated at large end; incubation by female alone, male possibly helps (male with brood patch reported); both sexes feed young; no information available on duration of incubation and nestling periods; family breaks up c. 7–8 days after young leave nest.

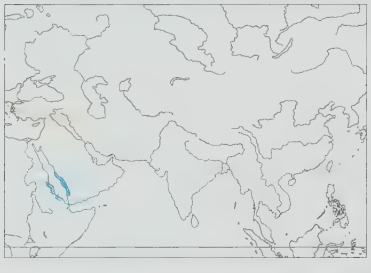
Movements. Migratory. Departure from breeding grounds from late Aug through Sept, a little earlier in Kazakhstan, where many leave during first half Aug. In Tajikistan migration peak in first half Sept; arrives in Pakistan in Sept, and can be abundant there. Although a few winter in Sind (S Pakistan) in years with good monsoon, great majority move E through Kutch into NW India, where they winter from N Gujarat E to C Uttar Pradesh and E Maharashtra, S to N Andhra Pradesh and C Karnataka; as races not separable in non-breeding plumage, assumed that all winter together in W India, although likely discrete areas exist where each race predominates. Return passage evident through Mar in Kutch, with birds back on breeding sites by end Mar in S Baluchistan, late Apr in E Turkey, Iran and C Afghanistan. Passage throughout Apr and May through Kazakhstan. Vagrants recorded in Sri Lanka, the UAE, Kuwait, W Siberia, Finland, Sweden, Norway, Germany (Heligoland), Netherlands and Cyprus; also (race *cerrutii*) in Dagestan and Stavropol Krai; one in Vietnam in 2006, the first record for SE Asia.
Status and Conservation. Not globally threatened. Abundant in many areas; somewhat localized over extensive range. Migration studies at Chokpak Pass, in W Tien Shan of Kazakhstan, indicate considerable drop in numbers passing through since 1940s. Reasons for this unclear, but overgrazing of sparse vegetation of its semi-arid habitats by domestic animals may be a contributing factor.
Bibliography. Ali & Ripley (1974), Busuttil & Ayé (2009), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Haffer (1989), Johansen (1944), Kaluthota *et al.* (2010), Kirwan *et al.* (2008), Koblik *et al.* (2006), Kozlova (1933), Martens (1979), Mauersberger (1960b, 1982), Paludan (1959), Rasmussen & Anderton (2005a, 2005b), Roberts (1992), Schlegel (1920), Wallschläger (1983), Wright (2009).

18. Cinereous Bunting

Emberiza cineracea

French: Bruant cendré **German**: Türkenammer **Spanish**: Escribano Cinéreo
Other common names: Grey-headed/Ashy-headed Bunting

Taxonomy. *Emberiza cineracea* C. L. Brehm, 1855, Izmir, Turkey.
Forms a species group with *E. buchanani*, *E. hortulana* and *E. caesia*. Observations of apparent intermediate individuals on passage indicates that races intergrade in some unknown part of range. Two subspecies recognized.
Subspecies and Distribution.
E. c. cineracea C. L. Brehm, 1855 – breeds SW Turkey and adjacent E Greek islands of Skyros, Lesbos and Chios; winters in Sudan, Eritrea and S Saudi Arabia.
E. c. semenowi Zarudny, 1904 – breeds SE Turkey and SW Iran; probably winters SW Arabia.



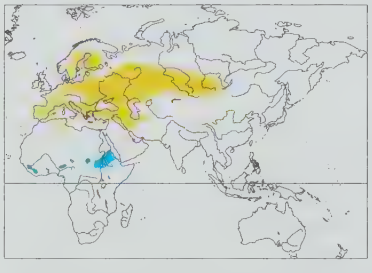
Descriptive notes. 16·5–18 cm; 21–29·7 g. Relatively large, long-bodied, but rather featureless bunting with fairly long bill. Male nominate race has forehead, crown, ear-coverts, side of head and nape yellowish-grey, forming ill-defined hood; chin and throat clear light yellow, pale yellow eyering; lores indistinctly paler and malar stripe ill defined, giving otherwise plain-faced appearance; upperparts medium grey, weakly streaked darker on mantle, with rump and uppertail-coverts virtually unstreaked purer grey; upperwing browner grey, each feather with blackish centre and light buff border, creating indistinct pale wingbars at tips of median and greater coverts (in fresh, non-breeding plumage wings cleaner and more boldly patterned); tail blackish-brown, white over distal portion of inner webs of two outermost pairs of feathers; breast brownish-grey, colour extending onto upper flanks, sometimes washed pale greenish-yellow; remainder of underparts, including undertail-coverts, off-white; iris dark brown, narrow but clear light yellow eyering; bill pale grey; legs flesh-pink. Female is duller than male, with dull brownish-grey hood and pale buff-yellow (rather than clear yellow) on lores and throat, but malar stripe more conspicuous than on male. Juvenile is similar to non-breeding female, but crown and upperparts more strongly speckled and streaked; bill pale grey, as on adult, not pale pink. Race *semenowi* has entire head and underparts washed with brighter yellow. Voice. Song, from prominent boulder, treetop or bush, an insignificant little phrase consisting of 4–6 notes, first few notes increasing in volume, last two longer, weaker and descending in pitch, "drip-drip-drip-drieeh-drieeh"; reminiscent of rapid abbreviated song of *E. citrinella* or *E. hortulana*, but sharper in tone than either. Calls include weak, but rather harsh, "tsik", short "quip" like that of *E. hortulana*, and descending "tieu", the last recalling one of the calls of *E. citrinella*.
Habitat. Breeds in dry, hilly country with scattered rocks and shrubby cover. In winter in open country and coastal lowlands, as well as rocky foothills of desert and semi-desert with sparse grasses and other scant vegetation, including fringes of dry cultivation.
Food and Feeding. Poorly studied. Feeds chiefly on invertebrates during breeding season, otherwise primarily on seeds. In late May stomach contents of three specimens composed of caterpillars (Lepidoptera), flies (Diptera), small beetles (Coleoptera) and small snails (Pulmonata); Apr specimens contained mixture of seeds and invertebrates, contents of three out of eight stomachs being entirely seeds. Forages on ground, often loosely associating with parties of *E. hortulana* and *E. caesia* when on passage. Otherwise solitary or in small family parties of 4–5, rarely as many as ten together, and once (exceptionally) 40 in Israel.
Breeding. Little information. Eggs reported late Apr in SW Iran and W Turkey and late May in E Turkey, where recently fledged young noted as late as mid-Aug. Probably monogamous. Nest construction probably by female only, though male often in attendance; nest a foundation of grass seedheads, stalks and thistle leaves, lined with hair and rootlets, placed on ground against rock or concealed by tuft of vegetation. Clutch 4–6 eggs, light bluish with small speckles and scrawls. No other information.
Movements. Migratory. All breeding areas vacated from late Aug onwards. The two races differ somewhat in their migration routes and winter ranges, although a certain amount of intermingling takes place at passage stopovers. At well-studied locations in Israel, through passage from mid-Mar to mid-May and again in first half Sept; both races much more evident in spring than in autumn. Nominate race arrives on breeding grounds in early Apr, having taken a route from its winter quarters in coastal Eritrea and adjacent NE Sudan (perhaps this race also in NE Ethiopia); moves N along shores of Red Sea, through Levant and into S Turkey, then W to SW Turkey; seems to avoid migrating across E Mediterranean, as indicated by scarcity of records from Cyprus. E race *semenowi* reported on breeding grounds as early as late Feb, probably having travelled along Persian Gulf from winter quarters in SW Saudi Arabia and Yemen. Unclear whether mixed-race flocks form in winter or only on passage, but in N & C Israel *semenowi* extremely rare; in S Israel its occurrence varies from year to year, e.g. at Eilat as many as 30–40% are *semenowi* in some springs, whereas in other years this race absent. Considering the species' limited range, a remarkable number of vagrants reported: individuals recorded Tunisia, Denmark, Heligoland (Germany), Oman and Samarkand (Uzbekistan); report from E Afghanistan requires adequate documentation, as it concerns two individuals in mid-winter (other documented vagrants seem to have involved overshooting on spring migration).
Status and Conservation. Not globally threatened. Currently considered Near-threatened. A little-known, unobtrusive species with low population density and fragmented range. Generally uncommon or rare, even in core of range. Density of 8 pairs/20 ha estimated in study area in Turkey. In Greece c. 115–305 pairs breed on three Aegean islands (Skyros, Lesbos and Chios) close to Turkish mainland. Turkish breeding population, estimated as between 2500 and 7500 pairs, thought to have declined by as much as 19% during 1990–2000. Presence as a breeding species in N Syria and Iraq requires confirmation. In Zagros Mts, in SW Iran, population could be as low as 100 pairs. Winter distribution poorly known, but includes Eritrea and Yemen, and potentially also NE Ethiopia, NE Sudan and SW Saudi Arabia (where records may relate solely to individuals on migration). In Turkey, continuing loss of habitat through development for tourism has had considerable impact over W of its range, and suitable habitats in SE Turkey have been lost through dam construction, not only because of subsequent flooding of the land, but also because of resettlement of displaced villagers and their livestock to previously under-populated areas. Resulting grazing levels should be monitored, as high grazing pressure could result in trampling of nests, whereas insufficient grazing promotes lusher vegetation, thus reducing availability of open feeding sites. The species is legally protected under Greek and Turkish laws, and one of its breeding sites on Lesbos is partially protected as a Natural Monument and Wildlife Refuge.
Bibliography. Anon. (2010c), Bruun (1984), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Castell & Castell (2009), Chappuis *et al.* (1973), Cramp & Perrins (1994), Fry & Keith (2004), Glutz von Blotzheim & Bauer (1997), Hagemeijer & Blair (1997), Hölzinger (1995), Kirwan *et al.* (2008), de Knijff (1991), Mauersberger (1956), Möller & Richardson (1994), Onmus *et al.* (2009), Rosetaar (1995), Shirihai (1996), Stattersfield & Capper (2000), Tucker & Heath (1994), Wallschläger (1983), Walther (2006), Walther *et al.* (2004).

19. Ortolan Bunting

Emberiza hortulana

French: Bruant ortolan **German**: Ortolan **Spanish**: Escribano Hortelano

Taxonomy. *Emberiza hortulana* Linnaeus, 1758, Sweden.
Forms a species group with *E. buchanani*, *E. cineracea* and *E. caesia*. Proposed race *elisabethae* (Uliastai, in NW Mongolia) claimed to differ in colour intensity, but these differences seem to be due to individual variability. Monotypic.
Distribution. Breeds in Europe from N Fennoscandia (almost reaching Arctic Circle) S, very patchily, to N Portugal, C Spain (including Balearic Is), S France, N Italy, Greece, Crete, Turkey and N Israel, extending E across European Russia, Ukraine and N Caspian region to N Kazakhstan and Altai and Khangai Ranges in NW & WC Mongolia and, in S, through Caucasus, N Iraq and N Iran to borders of Turkmenistan; also N Africa (coastal Algeria). Non-breeding range not well known, probably mountains along S fringes of Sahara, where recorded Sierra Leone, Guinea, Ghana and Nigeria in W, and E Chad and SE Sudan E to Ethiopia and Eritrea in E, and probably includes Yemen and Oman.



Descriptive notes. 16–17 cm; 17–28·1 g. Relatively stocky bunting with comparatively short tail. Male in spring (plumage worn) has olive or greyish-olive head and breast, contrasting with light yellow throat and submoustachial stripe, and unstreaked rufous lower underparts; some (especially in N Turkey and Armenia) are distinctly grey on head and may have whitish throat; upperparts, including wing, dull brown, quite strongly streaked with black; tail blackish, white areas towards tip of outermost three feather pairs; iris dark brown, narrow but clear pale yellow eyering; bill pale pink; legs flesh-pink. Differs from *E. caesia* in having yellow (rather than orange) throat and submoustachial stripe, dull brown (not rusty) rump, also usually olive-toned (not blue-grey) head and breast. Female in spring is similar to male, but less bright, with some streaking on crown and nape and dark malar stripe; may lack olive breastband, latter being obscured by diffuse streaking. Male in fresh non-breeding plumage (autumn) has dusky malar stripe and dark streaking on crown and nape; resembles female, but underparts more colourful (though sexing of many autumn birds often tricky). Juvenile is very dull, with rufous-buff ground colour of lower underparts, boldly streaked across breast, more finely so on flanks, bill greyish at first but soon becoming pinkish; first-autumn bird similar to adult female but tends to be more heavily streaked, although variation makes ageing difficult. Voice. Song, from prominent treetop or bush, rarely in short song flight, a short phrase of 5–6 notes, with ringing quality in first 2–3 notes, dropping in pitch with final two, can be transcribed as "swee-swee-swee, dee-dee"; varies individually and geographically, but basically recalls an abbreviated version of *E. citrinella* song. Calls include clear, ringing disyllabic "tsleeu" (the principal flight call), short incisive "quip" or "pwit" (generally given by flushed migrants) and short "chu" (often accompanies "tsleeu" call).
Habitat. Breeds in lightly wooded dry, open country, both in plains and on hill and mountain slopes, reaching elevations of up to 2500 m; breeding range lies within Jul isotherms of 15–30°C. Habitats vary over extensive range: in many parts of Europe favours open cultivation, with scattered trees and bushes, and unmade farm tracks between small weedy fields; more locally found in forest clearings, but in general avoids extensive forests and coastal areas. On migration, in Mongolia, can be found resting in open desert-steppe. In winter found in semi-arid cultivation, especially in open upland habitats between 1000 m and 3000 m.
Food and Feeding. During breeding season feeds chiefly on wide variety of invertebrates, including ants (Formicidae), beetles (Coleoptera) and grasshoppers (Orthoptera); otherwise primarily on seeds. Typically, forages both on ground and among foliage of bushes, and even in canopy of trees, notably oaks (*Quercus*), which are particularly rich in variety and abundance of caterpillars (Lepidoptera), an important food source for rearing young. Also, often makes flycatching sallies from bushes or trees. Often solitary, but even in breeding season small parties may gather at important feeding spots. In late summer forms small groups, by early autumn these merging to create larger flocks of up to several hundred individuals, remaining together through winter. On migration sometimes in larger gatherings, in Israel e.g. roosts of up to 800 birds in Sept and occasionally thousands together at stopover sites (such as oases) in spring; associates with *E. caesia* on passage.
Breeding. Eggs reported from mid-Apr in S of range, until early Jun in N. Monogamous, rarely polygamous; pair-bond lasts for one season only. Nest construction by female only, male often in

attendance, nest a cup of rootlets and grasses, lined with finer materials, placed in relatively deep depression on ground, often in field of growing crops. Clutch 4–5 eggs, pale blue to pink or greyish, with dark spots scrawls and speckles sometimes forming ring around large end; incubation by female, period 11–12 days; chicks tended by both parents, nestling period 12–13 days.

Movements. Migratory; after breeding, moves to N part of sub-Saharan Africa. Breeding areas vacated from mid-Jul onwards, most leaving from mid-Aug to mid-Sept. W populations move through coastal Morocco from late Sept to mid-Oct, and farther S passage through Mauritania, Senegambia and Mali reported up to late Nov, rarely into Dec; these seem to winter in mountain ranges of Sierra Leone and Guinea, with a handful of reports from Nigeria. On the whole little is known of range across C Africa. E populations winter in highlands of Ethiopia, Eritrea and probably adjacent S Sudan and N Yemen, but relatively little known: arrive in C Ethiopia early Oct, having left breeding sites in W Siberia from late Jul onwards; studies at Chokpak Pass (SE Kazakhstan) determined that first-year individuals move through before adults, with peak passage in early Sept; passage continues SW on relatively broad front over Iran, Iraq and Arabia. Spring migration of W populations more conspicuous than that in autumn, moving through W Mediterranean region late Mar to mid-May, peak first half of Apr; arrival in extreme N breeding areas (N Sweden) from mid-May, some not until early Jun. Regular scarce migrant in British Is (chiefly in Sept). Vagrants have reached Faeroe Is, Iceland, Canary Is, Irkutsk (vicinity of L Baikal), Japan, Hong Kong, N Pakistan, N India, Seychelles and Kenya.

Status and Conservation. Not globally threatened. Widespread and abundant. Following estimates for W Palearctic populations (numbers of pairs) based mostly on surveys in late 1980s: Norway 100–300, Sweden 25,000–100,000, Finland 150,000–200,000, Estonia 5000–10,000, Latvia 500–2000, France 10,000–23,000, Belgium 2–3 pairs (1994), Germany 4000–5000 (but 10,000–14,000 pairs estimated in 2005), Poland 10,000–100,000, Czech Republic 200–300, Hungary 10–30, Switzerland 200–250, Austria up to 50, Italy 4000–8000, Croatia 1500–2500, Slovenia 300–500, Bulgaria 10,000–100,000, Romania 15,000–25,000, European Russia 10,000–100,000, Belarus 1000–3000, Ukraine 800–2500, Moldova 6000–8000, Spain 200,000–250,000, Portugal 1000–10,000, Albania 1000–10,000, Greece 20,000–30,000, Turkey 1,000,000–10,000,000; in addition, reported as common in Lithuania, common locally in Azerbaijan, fewer than five pairs in Slovakia, and 6–8 pairs in Israel. No longer breeds in Denmark and Netherlands, and now merely a sporadic breeder in SE Norway and Belgium. Very local in Germany, Switzerland and Austria; localized but increasing in Gulf of Bothnia (Sweden); more widespread over E Europe E from Poland. Considered to have decreased in most W & C European countries since 1930s, especially since mid-1960s; decrease believed due to intensification of agriculture, including changes in land use, less crop diversity, the loss of hedgerows (making larger fields), and extensive use of pesticides. No indication of a decrease in C Asian populations, but few data.

Bibliography. Åstrom & Stolt (1993), Berg (2008), Bernardy *et al.* (2008), Bezzel (1993), Brokhovich (1990), Brotons *et al.* (2008), Busche (2005), Byers, Olsson & Curson (1995), Castell & Castell (2009), Claessens (1992), Conrads (1976), Conrads & Conrads (1971), Conrads & Quelle (1986), Cramp & Perrins (1994), Dale (2009, 2010, 2011), Dale & Christiansen (2010), Dale & Hagen (1997), Dale & Olsen (2002), Dale *et al.* (2005), Dementiev *et al.* (1954, 1970), Eber & Szijj (1960), Fonderflick & Thévenot (2002), Fonderflick *et al.* (2005), Fry & Keith (2004), Glutz von Blotzheim & Bauer (1997), Grimm (2008), de Groot *et al.* (2010), Grützmann *et al.* (2002), Guerrieri *et al.* (2006), Haffer (1989), Hagemeijer & Blair (1997), Hänel (2004), Kirwan *et al.* (2008), Kuzniak *et al.* (1997), Lanz (2009), Lister (2007), Mascher & Stolt (1961), McGregor (2004), Menz, Brotons & Arlettaz (2009), Menz, Mosimann-Kampe & Arlettaz (2009), van Noorden (1999), Osiejuk, Ratynska, Cygan & Dale (2003a, 2003b, 2005), Osiejuk, Ratynska, Dale *et al.* (2004), Ottvall *et al.* (2008), Revaz *et al.* (2005), Roselaar (1995), Skierczynski & Osiejuk (2010), Small (1992), Stolt (1977, 1987, 1993), Stolt & Fransson (1995), Tucker & Heath (1994), Vepsalainen *et al.* (2005), Welch (2010), Yamada (2006), Yosef & Tryjanowski (2002a).

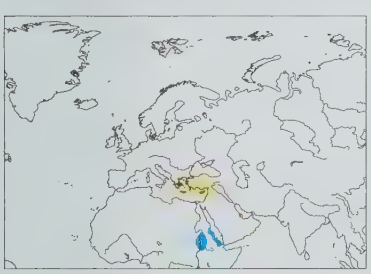
20. Cretzschmar's Bunting

Emberiza caesia

French: Bruant cendrillard **German**: Grauortolan **Spanish**: Escribano Ceniciento

Taxonomy. *Emberiza caesia* Cretzschmar, 1827, Kurgos Island, c. 17° N, River Nile, Sudan.
Forms a species group with *E. buchanani*, *E. cineracea* and *E. hortulana*. Monotypic.

Distribution. Breeds SW Albania, most of Greece, Crete, much of coastal W & S Turkey, Cyprus, W Syria, Lebanon, W Jordan, N Israel and Palestine; possibly also NW Iraq. Winters in Sudan both on coast and along Nile Valley; some reported S Egypt, NW & SW Saudi Arabia and Eritrea.



Descriptive notes. 16 cm; 18·5–23·5 g. Male breeding has grey-blue hood, breast and malar stripe, contrasting orange-rufous lores, chin, throat and submoustachial stripe, remaining underparts orange-rufous; upperparts warm rufous to buffy brown with blackish feather centres (streaked appearance), brightest rufous on unmarked rump and weakly marked uppertail-coverts; wing feathers blackish with pale fringes (indistinct wingbars); tail blackish, white areas towards tip of outermost three feather pairs; iris dark brown, narrow but clear pale eyering; bill light pink, culmen and tip usually greyer and often darker; legs flesh-pink. Differs from *E. hortulana* mainly in more richly coloured plumage, slightly longer tail, shorter wing and smaller bill. Male non-breeding is very like breeding, but somewhat duller, rump and belly a little paler, crown often streaked (variable). Female breeding is less bright than male, with sandy-brown wash as well as fine streaking on crown and breastband; grey of nape diffuses into rufous-brown on mantle (division being sharper on male). Female non-breeding is very like breeding, but duller, paler and more streaked. Juvenile plumage is short-lived, dull buff overall, streaked dark brown on both upperparts and underparts. Voice. Song, from prominent rock, tree or bush, a short phrase of 3 or 4 notes, "dziree-dziree-dzireee", similar to that of *E. hortulana* but somewhat lower in pitch, a little harsher and with a buzzing (rather than ringing) quality. Main call a sharp "tchipp", harder and sharper and less metallic in tone than that of *E. hortulana*; other calls include hard and sharp "tchu" and hard "plet", latter like that of *E. hortulana*.

Habitat. For breeding favours coastal habitats, including small islands, with boulder-strewn hillsides, usually with sparse vegetation, below 1300 m; in drier, more stony country than that preferred by *E. hortulana*. Successfully competes with *E. hortulana* where ranges meet, latter being forced to breed at higher elevations. In winter found in dry open country such as grassy plains and savanna, semi-arid cultivation and wadis.

Food and Feeding. Diet little studied, but known to consist of wide variety of small seeds, especially of grasses (Poaceae); some invertebrates also taken, notably ants (Formicidae) at times of emergence of alate swarms. Forages almost entirely on ground; unlike *E. hortulana*, does not forage in foliage or perform aerial flycatching. Small parties merge to form quite substantial gatherings (up to several hundred individuals) in autumn and winter, when mixed flocks with *E. hortulana* occur.

Breeding. Eggs reported from mid-Apr to mid-Jun in Greece and Cyprus; in N Israel, eggs reported as early as late Mar and as late as mid-Jul, with two broods regularly reared. Nest built by female, a cup of dried grasses and rootlets, thickly lined with finer materials, placed on ground in relatively deep depression against rock or among roots of shrubby plant. Clutch 4–5 eggs, sometimes 6, off-white with variable yellow to pinkish tinge, with dark spots, lines and small blotches and faint greyish underlying smears; incubation mainly by female, period 12–14 days; male helps to tend young, nestling period 12–13 days.

Movements. Migratory; post-breeding movement chiefly to Nile Valley and Red Sea coast of Sudan. Breeding areas vacated in Jul and Aug, some juveniles leaving as early as mid-Jun in Israel, with late birds in S Egypt until early Nov; migrates on broad front both over and around E Mediterranean. Arrives in Sudan winter quarters in Sept. Spring migration chiefly Mar and Apr in E Mediterranean region in general. For a species with such a restricted breeding range, surprisingly prone to vagrancy: reported from British Is, France, Netherlands, Germany, Sweden, Finland, Poland, Austria, Bulgaria, Malta, Algeria, Libya, Chad, Kuwait, UAE, Iran, Oman, Georgia, Canary Is, possibly also Kenya; also S Russia (Caucasian shore of Black Sea). Some W European records, at least, may refer to escaped cagebirds.

Status and Conservation. Not globally threatened. Locally common, and comparatively numerous throughout much of range; uncommon in Jordan. Global population has been tentatively estimated at between 447,000 and 920,000 individuals. Following country estimates have been made: Albania fewer than 500 pairs, Greece 5000–15,000 pairs, Turkey 10,000–100,000 pairs, Cyprus 10,000–20,000 pairs, Israel a few thousand pairs. No figures available for Syria and Lebanon. No obvious threats.

Bibliography. van den Berg & Damhuis (1981), Byers, Olsson & Curson (1995), Castell (1997), Castell & Castell (2009), Cichocki (1988), Cramp & Perrins (1994), Daskaleva (2007), Dementiev *et al.* (1954, 1970), Dennis (1969), Donnelly (2008), Fry & Keith (2004), Glutz von Blotzheim & Bauer (1997), Haffer (1989), Hagemeijer & Blair (1997), Holloway (1998), Kirwan *et al.* (2008), Klinge *et al.* (1997), Koblik *et al.* (2006), Mauersberger (1960c), Oddie (1981), Robel (1997), Roselaar (1995), Shirihai (1996), Small (1992), Tucker & Heath (1994), Yosef & Tryjanowski (2002b).

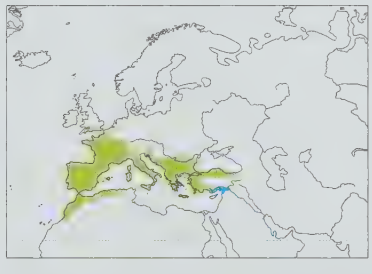
21. Cirl Bunting

Emberiza cirlus

French: Bruant zizi **German**: Zaunammer **Spanish**: Escribano Soteño

Taxonomy. *Emberiza cirlus* Linnaeus, 1766, southern Europe.
Recent phylogenetic analysis suggests that this species may form an independent subclade within a clade shared with *E. citrinella*, *E. leucocephalos* and *E. stewarti*, but with weak support under different analytic approaches. Proposed races *nigrostriata* (described from Ghisonaccia, in Corsica) and *portucaliae* (from Oporto region, in Portugal) considered to exhibit only very slight differences from birds in rest of range, and not sufficient to merit naming of geographical races. Treated as monotypic.

Distribution. Temperate areas of W & S Europe, NW Africa and Turkey: SW England and NW & C France E to Romania and coastal W & N Turkey, S to Morocco, coastal Algeria and NW Tunisia, and to Mediterranean islands of Balearics, Corsica, Sardinia, Sicily and Crete.
Introduced to New Zealand (South Island).



Descriptive notes. 15–16·5 cm; 20–29 g. Medium-sized slim bunting, slightly smaller than *E. citrinella* and with proportionately shorter tail. Male breeding (worn plumage) has distinctive head pattern of greyish-green crown to nape with fine black streaking, black eyestripe enclosed by long yellow supercilium and long yellow stripe from bill back to rear ear-coverts, and black chin and throat; upperparts chestnut with black feather centres and light olive edges, rump is greyish-olive or pale brownish-grey and unstreaked or very lightly streaked; upperwing feathers with paler edges, tertials black with broad rufous fringes; tail brownish-black with whitish edges, outer two feather pairs with white on inner webs; upper breast yellow, bordered below by broad olive-green band, side of breast chestnut, lower breast and belly pale yellow, becoming whitish on undertail-coverts, flanks streaked brown; iris dark brown; bill blackish-grey above, lower mandible pale bluish-grey with some blackish-grey on underside; legs brownish-pink. Male non-breeding (fresh plumage) has pattern somewhat obscured by pale feather tips, especially on head, where black feathering tipped buffish. Female is superficially similar to male, but with head and breast patterns far less distinctive: supercilium paler, eyestripe greyish-brown, ear-coverts pale yellow, chin and throat yellowish and bordered by narrow malar stripe; upperparts as on male, but paler, uppertail-coverts with dark shaft streaks; underparts pale olive-grey, side of breast light rufous, lower underparts pale yellowish, all except belly with dark streaks. Typical female is rather similar to female *E. citrinella*, but ground colour appears more buffish than yellow and streaking below is sharper. Juvenile is similar to female, but generally paler and greyer above, and already has well-developed dark eyestripe and dark moustachial stripe (distinguishing it from rather similar juvenile of *E. citrinella*), hint of rufous on scapulars, and paler brown rump and edges of tertials (chestnut on *E. citrinella*); first-winter male is very like adult female, but with more rich colour on flanks and breast, and greener lesser upperwing-coverts. Voice. Song, usually from bush, tree or wire, consists of a long trilling rattle, "sre-sre-sre-sre-sre-sre-sre-sre-sre-sre", rather metallic and at constant pitch, repeated typically in series of 10–20, at a distance reminiscent to some extent of song of Arctic Warbler (*Phylloscopus borealis*) or Western Bonelli's Warbler (*Phylloscopus bonelli*). Call a fine clicking "ziit", and sometimes a "siiuu" like that of *E. schoeniclus*.

Habitat. Usually linked to areas of bushes and small woodlands surrounded by open landscape, and edges of forest and various types of farmland such as vineyards, fruit trees and others, where scrub and herbs present at borders of fields, and on roadside verges; often in hilly areas, but also on flat ground. In N of range generally in places more exposed to S, as well as with more sheltered areas and tree cover, than sites favoured by *E. citrinella*. In S reaches 1500 m in montane habitats, and occupies more diverse array of habitats. In winter shows preference for fallow fields or stubble. Detailed analysis of habitat preferences in Italy revealed that distribution was positively influenced by extent of arable land, grassland and mixed woodland, and negatively by urbanized land and orchards, indicating importance of low-intensity farming.

Food and Feeding. Adults take invertebrates during breeding season, but for most of year feed on seeds of herbs and grasses, preferably couch (*Elymus*), rye-grass (*Lolium*), meadow-grass (*Poa*), and several types of cereal grains. Nestling diet mostly invertebrates, including mayflies (Ephemeroptera), grasshoppers (Orthoptera), earwigs (Dermaptera), bugs (Hemiptera), lacewings (Neuroptera), several types of Lepidoptera, flies (Diptera), ants, wasps and sawflies (Hymenoptera), spiders (Araneae), earthworms (Lumbricidae) and snails (Pulmonata). Plant material identified includes, among others, seeds or fruits of olive (*Olea*), nettle (*Urtica*), knotgrass (*Polygonum*), bindweed (*Fallopia*), chickweed (*Stellaria*), bittersweet (*Solanum*), groundsel (*Senecio*), several kind of grasses and mosses. Forages mostly on ground, generally near cover of bush or hedge; sometimes climbs on stems of cereals or herbs to reach tips of plants (where seeds available). In non-breeding season usually in small flocks, generally of fewer than ten individuals, very occasionally up to c. 50; often mixed with other buntings and finches (Fringillidae).

Breeding. Season long, first nests started from mid-Apr and last ones during Aug, exceptionally beginning Sept; usually two broods, sometimes three. Nest probably built entirely by female, taking 4–6 days, a bulky cup of stalks, grasses, dry roots and moss, lined with fine grass and hair, placed low down, usually below 2 m (but not normally on ground), in dense thorny shrub, conifer or behind similar kind of concealing vegetation on wall, or sometimes in deciduous tree. Clutch 2–5 eggs, most commonly 3–4, greyish-white with many sepia spots and streaks; incubation by female, period 12–13 days; chicks fed by both sexes, nestling period 11–13 days. Of 86 eggs in study in E Spain (Valencia), 65% hatched and 31% produced fledged young; of 73 nests in German study 37% failed, losses due mainly to predation by domestic cats, Eurasian Jay (*Garrulus glandarius*) and Red-backed Shrike (*Lanius collurio*), also inclement weather and disturbance from farming activities.

Movements. Those breeding in N part of range partially migratory; resident in S. Ringing studies have provided a number of long-distance recoveries, mainly of birds moving S or W for winter; longest movement recorded 725 km, from Belgium to SW France. Colour-ringing studies in small British population (in Devon) reveal that, in general, birds winter within a few kilometres of breeding sites. Some altitudinal movement, with post-breeding descent from montane areas to lowlands. Also, some arrive in winter in coastal areas in milder parts of Mediterranean Basin; origin of these not known, but possibly related to altitudinal movements or involve partial migrants. Migrants noted at Strait of Gibraltar (in S Spain) and in Col de Bretolet (Switzerland), and vagrants recorded S to Canary Is, Malta and Egypt; elsewhere recorded as vagrant E to Denmark, Poland, Russia, Czech Republic and Crimea, and in Tula Oblast (W Russia).

Status and Conservation. Not globally threatened. Locally common; scarce and very local in NW of range. Estimated population in Europe (more than 95% of global range) c. 2,000,000–5,200,000 pairs. Introduced in New Zealand in late 1800s; now successfully established, mainly in South I. Breeding densities during five-year study in orange groves in E Spain varied from 0·6 to 10·1 pairs/ha, being positively correlated with rainfall (but not to temperatures) during previous Dec–Mar period (rainfall leading to increase in food supply). Despite moderate increase in numbers in several countries during 1970–1990, present data suggest that population is stable, as apparently was the case in Spain and Italy during first years of 21st century. Since 1960s a decline was evident in, especially, N of range; in Britain, where the species bred widely in S England and Wales, its range contracted greatly, until it was finally confined to a handful of pairs in a small area in SW (S Devon); conservation work, principally in the form of habitat management, has succeeded in raising the population to more than 849–862 "territories" in 2009, although little evidence of range expansion has been recorded. Throughout its range, some factors, such as loss of traditional farming, the intensification of agriculture and an increase in forest cover, could have adverse effects in the future.

Bibliography. Albegger (2007), Alström *et al.* (2008), Barba & López (1990), Bezzel (1993), Bosselmann (2005), Bradbury *et al.* (2008), Brambilla *et al.* (2008), Brewster (1999), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cramp & Perrins (1994), Crick *et al.* (1994), Debout (2001), Estrada *et al.* (2004), Evans & Smith (1994), Evans *et al.* (1997), Federschmidt (1988), Fry & Keith (2004), Glutz von Blotzheim & Bauer (1997), Groh (1994), Hagemeijer & Blair (1997), Herremo (2009), Jeffs & Evans (2004), Jiguet & Julliard (2005), Kirwan *et al.* (2008), Koblik *et al.* (2006), Koce *et al.* (2008), Kreutzer (1979, 1983, 1987, 1990a, 1990b, 1991), Kreutzer & Guttinger (1991), Link & Ritter (1973), Magyar & Waliczy (1995), Martí & del Moral (2003), Mauersberger (1960a), McCarthy (2006), Peach *et al.* (2001), Pinter (1991), Ponz *et al.* (1996), Roselaar & Aliabadian (2009), Salathé (1979), Snow & Perrins (1998), Stanbury *et al.* (2010), Stanimirovic (1998), Stevens *et al.* (2002), Stöhr (2002), Svensson (1992), Svensson *et al.* (2009), Wotton, Langston *et al.* (2000), Wotton, Rylands *et al.* (2004).

PLATE 42 ➤

PLATE 42

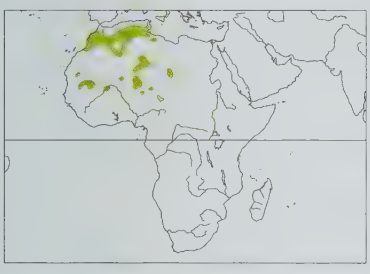

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ssp reidi
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ssp vincenti
ssp fucata
ssp arcuata

22. House Bunting

Emberiza sahari

French: Bruant du Sahara **German**: Hausammer **Spanish**: Escribano Sahariano

Taxonomy. *Emberiza sahari* J. Levaillant, 1850, near Ghelma, between Ghardaïa and Ouargla, southern Algeria.
Often treated as conspecific with *E. striolata*, but constant differences in plumage and behaviour. Exhibits some variation in plumage tone: more richly coloured birds from SW Morocco sometimes treated as race *theresae* (described from Anja, in SW Morocco) and darker ones from S Mali as *sanghae* (from Sangha, near Bandiagara, in Mopti, in S Mali), but differences considered minimal. Treated as monotypic.
Distribution. NW Africa from Morocco and Mauritania patchily E to NW Chad.



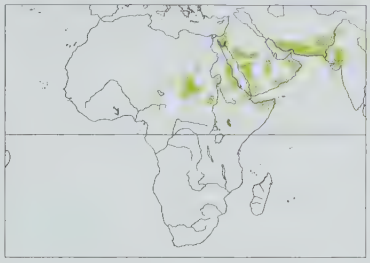
Descriptive notes. 13–14 cm; 12–18 g. A rather small, slender bunting, smaller than *E. cia* and with rather plain face, rufous upperwing-coverts and secondaries lacking blackish feather centres; outer tail edged rufous (not white). Male has head, neck, throat and upper breast grey, finely streaked blackish, slightly paler supercilium, cheek stripe and submoustachial stripe all contrasting little with darker side of crown, eyestripe, moustache and malar; whitish spot on rear ear-coverts; upperparts rich cinnamon-rufous, diffuse grey-brown mottling on mantle; flight-feathers dark brown with cinnamon margins; lower breast and belly rich cinnamon; iris dark reddish-brown; bill blackish above, yellow or pinkish below; legs pale pinkish-brown. Differs from *E. striolata* in much plainer plumage and less strikingly patterned head. Female is duller, with dull brownish head, streaked darker on crown; supercilium buffy. Juvenile is slightly duller than female, has bill uniformly coloured. Voice. Male song, throughout year but most intense prior to breeding, a series of simple notes, similar to that of *E. striolata* but tends to be more varied, with 2–3 repeated elements, and often slightly lower-pitched. Call "dzwii".
Habitat. Rocky areas, usually near water. Closely associated with human dwellings in much of its range, but occurs also around natural rock outcrops and wadis. At up to 2300 m in Atlas Mts in Morocco.
Food and Feeding. Diet mainly seeds, also occasional flowers, berries, insects and spiders (Araneae). Frequently scavenges food around human dwellings and markets; also associated with livestock, gleaning among their feed. Forages mainly on ground.
Breeding. Late Jan to late Oct, mainly late Feb to late Jul, in Morocco; frequently multiple broods, up to four per season. Monogamous; usually retains same mate throughout a breeding season, but considerable turnover of mates between years. Territorial; male advertises territory by singing from exposed perches. Nest built by female, male may assist with collecting of material, a small cup of twigs, roots and grass stems, lined with finer material, including plant fibres, hair and wool, placed 1–3 m up in hole in old wall or cliff face; rarely on ground; often uses same nest for subsequent broods. Clutch 2–4 eggs (rarely 1–5), whitish, tinged pale green or blue, with dark brown or purple markings; no information on incubation period; chicks fed by both parents, nestling period 17–19 days; young remain on territory and fed by parents for up to 2–3 weeks after fledging. Average breeding success in Morocco 1·3–1·7 fledglings per nest (58–66% of eggs hatch, and 50–57% of hatchlings fledge); main cause of failure human disturbance. Probably starts breeding at 1 year of age.
Movements. Mostly resident; some move to lower elevations in winter in Morocco. Occasional vagrants wander well outside normal range, reaching Canary Is, S Spain and Gambia.
Status and Conservation. Not globally threatened. Locally common. Range has expanded N in previous century, up to 200 km in Morocco, with similar expansions in Algeria and Tunisia. Regarded as sacred in Morocco, and allowed to enter dwellings without hindrance.
Bibliography. Bannerman (1953), Bannerman & Priestly (1952), Barlow *et al.* (1997), Byers, Olsson & Curson (1995), Castell (2000), Castell & Castell (2009), Cave & MacDonald (1955), Collinson (2006), Courteille & Thévenot (1988), Cramp & Perrins (1994), Étchécopar & Hüe (1967), Fry & Keith (2004), Goodman & Meininger (1989), Hemetsberger (2005), Hollom *et al.* (1988), Isenmann & Moali (2000), Kirwan & Shirihai (2007), Roux *et al.* (1990), Schneider (1998, 2005), Thévenot *et al.* (2003), Traylor (1960), Uhlig (1993), Vaurie (1956), Wallis (1912).

23. Striolated Bunting

Emberiza striolata

French: Bruant striolé **German**: Wüstenammer **Spanish**: Escribano Estriado
Other common names: Striped Bunting

Taxonomy. *Fringilla striolata* M. H. C. Lichtenstein, 1823, Ambukol, Nubia, Berber, Sudan.
Often treated as conspecific with *E. sahari*, but constant differences in plumage and behaviour. Race *jebelmarrae* interpreted as an intergrade between nominate and *saturatior* by some workers, but others consider it synonymous with latter; situation complicated by considerable individual variation in plumage. Three subspecies recognized.
Subspecies and Distribution.
E. s. striolata (M. H. C. Lichtenstein, 1823) – Israel and Sinai Peninsula, Arabian Peninsula, S Iran, Pakistan and NW India, and NE Sudan, Eritrea and N Somalia.
E. s. jebelmarrae (Lynes, 1920) – NE Chad and W Sudan.
E. s. saturatior (Sharpe, 1901) – C Sudan, SW Ethiopia and NW Kenya.
Descriptive notes. 12–13 cm; 12–16 g. A small, slender bunting, smaller than *E. cia* and with more "scruffily" striped face; outer tail edged rufous (not white). Male nominate race has head, neck, throat and upper breast grey, streaked blackish, whitish supercilium, cheekstripe, submoustachial stripe and central throat (contrast of head stripes varies with feather wear; greatest in worn plumage in spring); upperparts cinnamon-rufous, heavily streaked dark grey-brown; flight-feathers dark brown with cinnamon margins; lower breast and belly washed cinnamon (typically, paler than *E. sahari*); iris brown; bill blackish above, lower mandible yellow, sometimes with dark tip; legs pale pinkish-brown. Differs from *E. sahari* in having more heavily streaked plumage and more strikingly patterned head, also on average slightly smaller, with shorter bill and tail. Female is duller than male, has sandy-brown



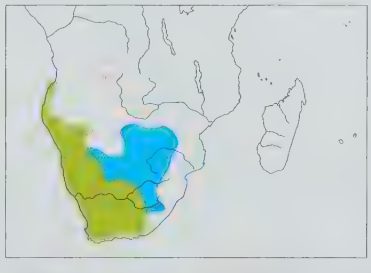
head streaked darker on crown, buffy supercilium; told from female *E. sahari* by more heavily streaked plumage. Juvenile is duller than female, has uniform bill. Race *saturatior* slightly larger than nominate, has darker and more heavily streaked head; *jebelmarrae* is even darker, with richer underparts, male's white head stripes are less prominent. Voice. Male song, from low bush or rock, mainly in period before and during breeding, a short, stereotyped "trip trip te-tree-cha, tre-tree-cha", lasting 1·5–2 seconds. Flight call "chielp" like that of a sparrow (*Passer*), unlike twittering flight call of *E. cia*.
Habitat. Rocky areas with arid scrub, usually near water. Typically less closely associated with human settlements than *E. sahari*, but occurs in towns and villages in Somalia and locally in Oman; occasionally breeds in ruined buildings in Asia. Habitat less restricted in winter, when may occur around cultivation.
Food and Feeding. Diet mainly seeds of grasses and herbs (e.g. *Heliotropium*), also occasional flowers, berries (*Ziziphus*) and insects. Forages mainly on ground; also takes seeds directly from grass-heads. Sometimes flutters into air to grab a stem with seedhead, pulls it to ground, and then stands on it while taking seeds. Frequently visits water to drink. Forms small flocks after breeding and in winter, often with *E. tahapisi* in S Arabia and *E. cia* in Pakistan; flock size in Israel up to 47 individuals (average eight); average 6–7 in Pakistan.
Breeding. Season Mar–Jun, sometimes to Nov, timing and extent of breeding linked to local rainfall; frequently two broods per season in Israel and up to three broods in Pakistan. Monogamous. Breeds singly; but occasionally in loose colonies with nests 10–30 m apart. Usually territorial; male advertises by singing from elevated perch, occasionally from ground. Nest built by female, although male reportedly assists in E of range, a neat cup of grass and fine plant stems, placed on ground or in crevice on rock face, site usually sheltered from sun by overhanging rock. Clutch 2–4 eggs, whitish with reddish-brown markings; incubation by female, period 12–14 days; both parents feed chicks, nestling period 12–14 days.
Movements. Resident and nomadic; subject to local movements after breeding, when small flocks wander outside breeding range. Those breeding at higher elevations often descend to lower elevations in winter (e.g. Oman, Pakistan, India). May irrupt into some areas to breed after good rains. Vagrants reach S Europe.
Status and Conservation. Not globally threatened. Fairly common; often unobtrusive and easily overlooked. Annual numbers fluctuate in Israel; this linked to rainfall, numbers falling during droughts, and increasing rapidly through combination of immigration and reproduction following good rains.
Bibliography. Ali & Ripley (1974), Archer & Godman (1961), Armani (1985), Ash & Miskell (1998), Aspinall (1996), Byers, Olsson & Curson (1995), Cave & MacDonald (1955), Collinson (2006), Cramp & Perrins (1994), Étchécopar & Hüe (1967), Fry & Eriksen (1984), Fry & Keith (2004), Goodman & Meininger (1989), Hollom *et al.* (1988), Jennings (2010), Kirwan & Shirihai (2007), Lewis & Pomeroy (1989), Pande *et al.* (2006), Roberts (1992), Shirihai (1996), Vaurie (1956).

24. Lark-like Bunting

Emberiza impetuani

French: Bruant des rochers **German**: Lerchenammer **Spanish**: Escribano Alaudino

Taxonomy. *Emberiza impetuani* A. Smith, 1836, "country between Nu. Gariep and Tropic" = east Botswana.
Proposed race *eremica* (described from near Otjiwarongo, NC Namibia) subsumed into nominate. Two subspecies recognized.
Subspecies and Distribution.
E. i. impetuani A. Smith, 1836 – Angola (coastal plain S of Luanda, also locally in Moxico), Namibia, NW South Africa and W Botswana, occasionally irrupting E to Zimbabwe and N South Africa (Limpopo Province).
E. i. sloggetti (Macdonald, 1957) – W South Africa, occasionally irrupting E to Mpumalanga, Swaziland, Lesotho and S KwaZulu-Natal.



Descriptive notes. 12–14 cm; 13–19 g. A rather plain, nondescript bunting. Nominate race has head sandy brown with darker brown streaking on crown, distinctive broad buffy supercilium extending well onto nape; lower cheek also paler sandy buff; mantle and back grey-brown, streaked dark brown; upperwing-coverts dark brown with broad cinnamon margins, flight-feathers dark brown with narrow cinnamon margins; throat creamy buff, merging into sandy-buff breast and belly, breast with sparse and very narrow brown streaks; iris brown; bill dark grey above, paler blue-grey or yellowish below; legs pinkish-brown. Sexes alike. Juvenile is slightly duller than adult, with more diffuse streaking and browner breast. Race *sloggetti* is paler that nominate, with broader pale margins on upper contour feathers. Voice. Male song a fairly long series of twittering and buzzy notes lasting 2–4 seconds. Contact call a soft "chip"; alarm call a deeper "chut".
Habitat. Semi-arid grasslands and shrublands, in both rocky and sandy areas. Typically associated with the Karoo system, both W succulent Karoo and E grassy Nama-Karoo, but irrupts into more mesic habitats during droughts. Occasionally visits gardens in Karoo villages.
Food and Feeding. Diet mainly grass seeds; also some forb seeds, soft green leaves and wide diversity of invertebrates, including hairless caterpillars, termites (Isoptera), small beetles and their larvae (Coleoptera), flies (Diptera), millipedes (Diplopoda) and spiders (Araneae). Forages on ground, favouring open areas; also jumps up to pull down grass-heads. Frequently visits water to drink. Average flock size in S Karoo 31 individuals.
Breeding. Season linked to rainfall; moves into areas after rains, but breeds only if sufficient rain. Monogamous. Solitary, but nests often closely spaced (less than 20 m apart) in favourable conditions.

On following pages: 25. Cinnamon-breasted Bunting (*Emberiza tahapisi*); 26. Socotra Bunting (*Emberiza socotrana*); 27. Cape Bunting (*Emberiza capensis*); 28. Tristram's Bunting (*Emberiza tristrami*); 29. Chestnut-eared Bunting (*Emberiza fucata*); 30. Little Bunting (*Emberiza pusilla*); 31. Yellow-browed Bunting (*Emberiza chrysophrys*); 32. Rustic Bunting (*Emberiza rustica*).

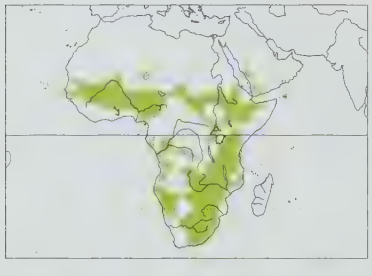
Territorial; male displays by singing from prominent perch, as well as in aerial display with slow, deep wingbeats. Nest built by female, often accompanied by male, a loose cup of twigs, lined with grass seeds and rootlets, placed on ground among rocks or under small bush or grass tuft, usually on SE side shaded from sun. Clutch 2–4 eggs, rarely 5 (mean clutch size greater following good rains), whitish to pale green or pale blue, variably spotted reddish-brown and grey; incubation by female only, lasting 11–13 days; both parents feed chicks, nestling period 12–14 days. Hatching success 76%; successful nests fledge average of 2·8 chicks, but predation rates extraordinarily high (96%, over two separate studies); average breeding success only 0·08–0·1 fledglings per nest.
Movements. Nomadic, following rainfall events; small numbers resident in some areas. Migrates into more mesic areas of Western Cape in summer to breed, arriving after winter rains cease. Some irrupt well E and N of normal range during droughts. Vagrants of nominate race reach Gabon, DRCongo and W Zambia.
Status and Conservation. Not globally threatened. One of most abundant nomadic birds in the Karoo. This species' nomadic behaviour makes it hard to protect within traditional nature reserves, but it remains abundant in much of its range. Historically was caught for the cagebird trade in Namibia, where it adapted quite well to captivity.
Bibliography. Benson (1982), Bowen (1983), Boyer & Bridgeford (1988), Brewster (1997), Brickell & Arnold (1990), Brickell & Konigkramer (1997), Byers, Olsson & Curson (1995), Chapin (1954), Clancey (1989), Collett (1982), Day (1987), Dean (1997, 2000), Dean & Milton (2001), Dean & Siegfried (1997), Friedmann & Northern (1975), Fry & Keith (2004), Harrap (1970), Harrison *et al.* (1997), Hockey *et al.* (2005), Irwin (1981), Jones (1994), Kieser & Kieser (1978), Lloyd (1998, 1999), Panagis & Stutterheim (1985), Ryan *et al.* (1984), Schwarzenberger & Dean (2003), Skead, C.J. (1995), Skead, D.M. (1960, 1975), Tarboton (2001), Tyler & Tyler (2001), Vincent (1949), Winterbottom (1972).

25. Cinnamon-breasted Bunting

Emberiza tahapisi

French: Bruant cannelle **German**: Bergammer **Spanish**: Escribano Canelo
Other common names: Cinnamon-breasted Rock Bunting, African Rock Bunting

Taxonomy. *Emberiza tahapisi* A. Smith, 1836, "country towards the sources of the Vaal River", Mpumalanga, South Africa.
Race *septemstriata* sometimes thought to be a hybrid between nominate and *goslingi*. Six subspecies recognized.
Subspecies and Distribution.
E. t. goslingi (Alexander, 1906) – Mauritania and Senegal E to Cameroon, NE DRCongo and SW Sudan.
E. t. septemstriata Rüppell, 1837 – E Sudan and N & C Ethiopia E to Eritrea and NW Somalia.
E. t. arabica (Lorenz von Liburnau & Hellmayr, 1902) – S Arabia.
E. t. insularis (Ogilvie-Grant & H. O. Forbes, 1899) – Socotra I.
E. t. tahapisi A. Smith, 1836 – S Ethiopia S through E Africa to SE South Africa; also locally in Angola, and S Gabon E to S DRCongo.
E. t. nivenorum (Winterbottom, 1965) – S Angola S to C Namibia.



Descriptive notes. 13–15 cm; 11·6–21 g. A widespread Afrotropical bunting with cinnamon-washed underparts. Male nominate race has striking head pattern of black and white stripes (pattern darker and cleaner than that of either *E. sahari* or *E. striolata*); upperparts buffy brown, streaked blackish-brown, rump plainer and only lightly mottled dark brown; flight-feathers and greater uppering-coverts blackish with cinnamon-buff outer margins; throat to upper chest black, rest of underparts rich cinnamon; iris dark brown; bill dark brown or blackish-grey above, pale pink or yellowish below; legs yellowish or pinkish-brown. Female is duller and paler than male, has grey-brown head and throat streaked blackish-brown, facial stripes washed buff. Juvenile is similar to female, but even duller, with paler underparts. Race *nivenorum* is paler than nominate; *goslingi* has plain grey throat (both sexes), wing-coverts rich rufous-brown and flight-feathers with rufous bases; *septemstriata* is intermediate between *goslingi* and nominate, with some rufous in wing, male's throat mottled grey and black; *insularis* has darker lateral head stripes, smaller black throat patch, less rufous in wing, whitish underwing-coverts; *arabica* is slightly paler below than nominate. Voice. Male song a short, fast series of notes, ascending in pitch, "chip-chip-ip-ereee" or "cha-cha-cha chip", sometimes ending with buzzy trill, "chip-chip-ipereeezzzzz". Call a nasal "dwe-wer-errr" or "fair-air"; soft "twee" in flight.
Habitat. Mainly rocky hillsides, stony areas and erosion gulleys in wide range of habitats, from arid and semi-arid scrub to mesic woodland, provided adequate open ground present. Found also in sandy areas with no rocks, so long as there is adequate bare ground. Favours degraded areas, including old fields; often seen also along paths and road verges. Usually near water in arid areas.
Food and Feeding. Diet mainly grass seeds; also some soft green leaves, nectar and a wide diversity of insects, including termites (Isoptera), hairless caterpillars, beetle (Coleoptera) and wasp (Vespidae) larvae, grasshoppers (Orthoptera), adult and larval flies (Diptera), and occasional small adult beetles. Captives also ate spiders (Araneae), millipedes (Diplopoda) and small slugs (Gastropoda). Forages mainly on ground; sometimes jumps up to pull seeds from grass-heads, or clings to millet heads to strip seeds. Moves into recently burnt areas within hours of a fire. Regularly visits water to drink, especially in arid areas; has been recorded as sun-bathing, and regularly visited a salt lick.
Breeding. Season Jul–Jan (mainly Sept–Dec) in W Africa, Jan–Jun in E Africa, Apr–Jul in Malawi, Nov–Jun (mainly Jan–Feb) in Zimbabwe, Oct–Apr (mainly Dec–Jan) in South Africa, Dec–Feb on Socotra and Oct–May in S Arabia. Monogamous. Solitary, but neighbouring nests may be only 20–30 m apart in areas of high density. Territorial; male sings from prominent perch. Nest built by female, taking 4–13 days, a cup of vegetation, including grasses, twigs, dead leaves, rootlets and bark, lined with finer material, placed on ground against rock or at base of small bush or grass tuft or in rock face or earth bank; built in natural depression or excavates a shallow scrape with its body, and may use mud to cement material to ground. Clutch 2–4 eggs (rarely 5), varies regionally, e.g. 2–3 (average 2·6) in Nigeria, 2–4 (average 2·9) in Malawi and 3–4 (average 3·3) in Zimbabwe, eggs pale greenish with dark brown spots; will lay replacement clutch if first one lost; incubation usually by female only, but male of nominate race may assist, period 12–14 days; chicks fed by both parents, nestling period 13–16 days; juveniles beg from adults on natal territory for 2–3 weeks after fledging, may remain nearby for at least 2 months. Average breeding success 42% in Nigeria (mean 1·1 fledglings/nest); in Zimbabwe hatching success 66%, but only 31% of chicks fledged, losses due mainly to predation, possibly linked to nest visits by observers.
Movements. Resident, local nomad and partial migrant. In W Africa, moves N in rainy season and S in dry season. Similar movements in SC Africa, with populations breeding in both areas: mainly a summer visitor (Dec–Mar) in Botswana and Zimbabwe, but numbers peak in Zambia and Malawi after rains (Apr–Sept). Evidence of movements to lower elevations in winter in Swaziland. One bird ringed in Northern Cape (South Africa) in Jul recovered 10 months later in Zimbabwe. Report of vagrant (of race *septemstriata*) in NE Egypt (Sinai) disputed.
Status and Conservation. Not globally threatened. Uncommon to locally common. Density 0·1–0·3 pairs/ha in Eastern Cape and Nigeria, up to 3 pairs/ha in C Zimbabwe; even greater densities locally in N Nigeria. Very common on Socotra I. Range extended c. 290 km S in Ivory Coast since 1985, a result of climate change and/or habitat alteration. Persists on recently isolated habitat islands, suggesting that it is tolerant of habitat fragmentation. Caught for cagebird trade in some countries; adapts quite well to captivity. Adults occasionally caught in spider webs.
Bibliography. Anon. (2002), Archer & Godman (1961), Ash & Miskell (1998), Aspinwall (1981), Bannerman (1953), Barlow *et al.* (1997), Benson (1941, 1982), Borrow & Demey (2001), Brickell & Arnold (1990), Brickell & Konigkramer (1997), Brooks (1987), Byers, Olsson & Curson (1995), Castell & Castell (2009), Chapin (1954), Cheke & Walsh (1996), Cumming & Steyn (1966), Dean (1987, 1997, 2000), Dean & Bond (1994), Dobson (1988), Elgood, Fry & Dowsett (1973), Elgood, Heigham *et al.* (1994), Friedmann & Northern (1975), Fry (1971), Fry & Keith (2004), Gartshore (1975), Goodman & Meininger (1989), Grimes (1987), Harrison *et al.* (1997), Haydock (1949), Hockey *et al.* (2005), Hollom *et al.* (1988), Irwin (1981), Jennings (2010), Kennedy (1969), Lawson & Edmonds (1983), Lewis & Pomeroy (1989), McGregor *et al.* (2007), Oatley (1996), Osiejuk (2011), Panagis & Stutterheim (1985), Pettet (1977), Read (1982), Salewski *et al.* (2001), Scholte (1994), Serle (1940), Skead, C.J. (1995), Skead, D.M. (1960, 1975), Tarboton (2001), Vernon (1977), Vincent (1949).

26. Socotra Bunting

Emberiza socotrana

French: Bruant de Socotra **German**: Sokotraammer **Spanish**: Escribano de Socotora
Other common names: Socotra Mountain Bunting

Taxonomy. *Fringillaria socotrana* Ogilvie-Grant and H. O. Forbes, 1899, Adho Dimellus, 4000 feet [c. 1220 m], Socotra.
Monotypic.
Distribution. Socotra I.



Descriptive notes. 13–14 cm; 13–16 g. Male has striking head pattern of black and white stripes; grey-brown mantle streaked blackish-brown, back pale grey with blackish chevrons, rump pale grey with diffuse dark streaks; upperwing-coverts chestnut-brown, greater coverts with dark brown inner webs; flight-feathers dark brown with rufous outer margins; throat whitish, contrasting with rich cinnamon breast, which grades into whitish on belly; iris dark brown; upper mandible dark brown, lower mandible horn-yellow; legs yellowish-horn. Distinguished from *E. tahapisi* by rich chestnut wing-coverts, whitish throat, rather pale (not cinnamon-washed) belly, and pale grey rump band, with black head stripes typically narrower, and a narrow black malar stripe. Female is slightly duller than male, with dark head stripes brownish-black, but often indistinguishable in field. Juvenile is much duller than adult, with grey-brown head stripes with darker streaks, cheekstripe washed brown, throat off-white, merging into warm buff-brown breast with faint darker streaking, belly creamy with buff wash on flanks; lower mandible pale horn, legs pinkish-brown. Voice. Male song a clear "tseeto tee too" or "tseit tsoo tsee tsoo". Juvenile gives high-pitched "tseeep".
Habitat. Favours rocky hill slopes with relatively dense grass and shrub vegetation; sometimes found close to stock posts, but this may be result of similar habitat preferences by herdsmen in the region. Breeds from 600 m to above 1200 m, mainly in Hajhir (Hagghier) Range and Ma'lih Plateau. Moves to lower elevations in non-breeding season, when may occur on coastal plain.
Food and Feeding. Diet mainly grass seeds. Forages on ground; also takes seeds direct from grass-heads. In small flocks in non-breeding season.
Breeding. Little known; nest undescribed. Breeds during winter rains: males singing in late Nov through to Feb, female with brood patch in Feb, and recently fledged young observed in Feb and early Apr. Singing males are clustered, and pairs are often close together during breeding season, suggesting that breeding is semi-colonial.
Movements. Resident, with some movement to lower elevations outside the breeding season.
Status and Conservation. VULNERABLE. Restricted-range species: present in Socotra EBA. Rare and local. Considered at risk because of its tiny global range (c. 310 km²), low density and patchy distribution within its range. Total population estimated to be 1400 birds (c. 300 pairs) and thought to be stable, but may face threats from increasing grazing pressure and introduced alien predators, including feral cats, black rats (*Rattus rattus*) and small Indian civets (*Viverricula indica*).
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Clouet *et al.* (1998), Collar *et al.* (1994), Fry & Keith (2004), Jennings (2010), Kirwan *et al.* (1996), Morton (1996), Ogilvie-Grant & Forbes (1903), Porter & Suleiman (2011), Ripley & Bond (1966), Ryan *et al.* (2009), Stattersfield & Capper (2000).

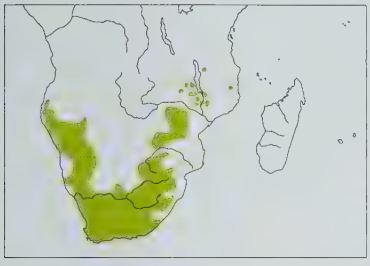
27. Cape Bunting

Emberiza capensis

French: Bruant du Cap **German**: Kapammer **Spanish**: Escribano de El Cabo
Other common names: Southern Rock Bunting; Vincent's Bunting (*vincenti*)

Taxonomy. *Emberiza capensis* Linnaeus, 1766, Cape of Good Hope, South Africa.
Distinctive NE race *vincenti* sometimes treated as a separate species. Considerable geographical variation in plumage tone, but validity of large number of subspecies questionable; proposed race *media* (described from Deelfontein, in Northern Cape) is synonymized with *cinnamomea*. Eleven subspecies recognized.
Subspecies and Distribution.
E. c. nebularum (Rudebeck, 1958) – SW Angola.
E. c. bradfieldi (Roberts, 1928) – N & C Namibia.
E. c. capensis Linnaeus, 1766 – S Namibia S to SW South Africa (Western Cape).
E. c. vinacea Clancey, 1963 – NE Northern Cape (South Africa).
E. c. cinnamomea (M. H. C. Lichtenstein, 1842) – S Northern Cape and Eastern Cape E to W Free State (South Africa).

E. c. vincenti (P. R. Lowe, 1932) – locally in highlands of SE Zambia, S Malawi, adjacent Mozambique and extreme SW Tanzania.
E. c. plowesi (Vincent, 1950) – NE Botswana and Zimbabwe (E to Nyange, in E highlands).
E. c. smithersii (Plowes, 1951) – Chimanimani Mts, in E Zimbabwe and adjacent Mozambique.
E. c. limpopoensis (Roberts, 1924) – SE Botswana and adjacent South Africa (North West and Limpopo Provinces).
E. c. basutoensis (Vincent, 1950) – breeds Lesotho highlands and adjacent E South Africa (W KwaZulu-Natal); post-breeding movement to lower elevations.
E. c. reidi (Shelley, 1902) – lowlands of Lesotho and E Free State E to W Swaziland and interior of KwaZulu-Natal.



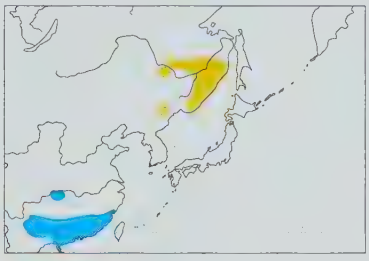
Descriptive notes. 15–16 cm; 17–27 g. Male nominate race has head striped black and white, with narrow white median crownstripe; mantle and back grey-brown with prominent dark streaking, merging into plainer rump; upperwing-coverts rich chestnut (forming distinct shoulder patch), greater coverts with blackish-brown inner webs; flight-feathers blackish-brown with rufous outer margins; throat off-white, underparts pale grey, undertail-coverts whitish; iris dark brown; bill dark grey, paler lower mandible; legs dark grey to pinkish-grey. Female is slightly smaller than male, very similar in plumage, but may appear duller with brown tinge in head stripes (often indistinguishable in the field). Juvenile is similar to female, sometimes with diffuse streaking on breast. Race *nebularum* is palest, whitish below and rather plain sand-grey above; *bradfieldi* is slightly richer in tone than previous; *cinnamomea* is richer above than nominate, washed yellow-buff below; *vinacea* is paler than nominate, with redder upperparts and buff-washed underparts; *reidi* has warmer colouring than nominate, with pale areas of head tinged rich buff, underparts washed cinnamon; *basutoensis* is darker and greyer than most other races, with heavy streaking above and a grey-washed throat; *limpopoensis* is even richer above than *reidi*, with extensive rufous in wing; *plowesi* is pale, with pale grey underparts and buff-washed upperparts, recalling *bradfieldi* but more heavily streaked above; *smithersii* is dark olive-grey above, heavily streaked, and darker olive-grey below than *basutoensis*; *vincenti* is the most distinctive, has upperparts dark grey, chestnut shoulder largely confined to lesser and median upperwing-coverts, greater coverts blackish, edged chestnut, throat whitish, underparts dark slate-grey with almost blackish belly. Voice. Male song an accelerating series of cheerful notes, "chip chup chip chup chit-it wit-wee", often repeated monotonously from elevated perch. Typical call, by both sexes, a nasal "wer-wi-wer" or "wee-ti-pee-yer", ascending in pitch.
Habitat. Shrubland and grassland, usually in rocky areas. Favours dry habitats and well-drained areas in more mesic habitats where there are openings on ground between vegetation. Visits gardens close to natural vegetation.
Food and Feeding. Diet includes grass and forb seeds, soft green leaves, fallen fruits, arils of *Acacia cyclops*, and wide diversity of invertebrates, including termites (Isoptera), hairless caterpillars, grasshoppers (Orthoptera), moths (Lepidoptera), ants (Formicidae), spiders (Araneae) and larvae of beetles (Coleoptera), flies (Diptera) and wasps (Vespidae). Forages mainly on ground, hopping in open areas among vegetation. Also takes some seeds from low plants, and scavenges among detritus heaps at harvester ant (*Messor capensis*) nests. Occurs singly and in pairs. Can become tame and confiding, entering buildings and scavenging scraps at picnic sites. Visits water to drink in more arid areas, and bathes frequently in warm weather.
Breeding. Season May–Jan (mainly Sep–Oct) in winter-rainfall area of Western Cape; elsewhere Oct–Jun (peak Nov–Jan in most areas, Apr–May in Malawi). Monogamous. Nests solitarily. Male displays by singing from prominent perch, as well as in aerial display with slow, deep wingbeats. Nest built by female, often accompanied by male, a neat cup of grass, plant stems and roots, lined with finer material, sometimes including animal hair, placed on ground near rock, at base of grass tuft or in sheltered spot on hillside, or low down in bush. Clutch 2–5 eggs (usually 2–3), white or washed greenish-blue, with blackish and brown markings; incubation period 13–14 days; chicks fed by both sexes, nestling period 10–13 days in wild, up to 18 days in captivity.
Movements. Largely resident; subject to local influxes in some areas. In highlands of Lesotho, race *basutoensis* descends in winter to lower elevations in adjacent South Africa (KwaZulu-Natal and Eastern Cape), but is resident in alpine belt of KwaZulu-Natal.
Status and Conservation. Not globally threatened. Fairly common to common throughout much of its range; generally scarce in extreme NE, where absent from much seemingly suitable habitat. Density in fynbos 8–15 birds/km². Persists in recently isolated habitat islands, suggesting that it is tolerant of habitat fragmentation, and inhabits fynbos areas invaded by *Acacia cyclops*.
Bibliography. Armani (1985), Benson (1941, 1982), Benson & Benson (1977), Brickell & Arnold (1990), Brickell & Konigkramer (1997), Brown & Barnes (1984), Byers, Olsson & Curson (1995), Dean (1997, 2000), Dean & Bond (1994), Dean & Milton (2001), Fraser & Crowe (1990), Friedmann & Northern (1975), Fry & Keith (2004), Harrison *et al.* (1997), Hockey *et al.* (2005), Irwin (1981), Johnson (1998), Kieser & Kieser (1978), Medland (1996), Oatley (2005), Rudebeck (1958), Skead, C.J. (1995), Skead, D.M. (1960, 1966a, 1966b), Tarboton (2001), Vincent, A.W. (1949), Vincent, J. (1936), Winterbottom (1970), Woodall (1971).

28. Tristram's Bunting

Emberiza tristrami

French: Bruant de Tristram **German**: Tristramammer **Spanish**: Escribano de Tristram

Taxonomy. *Emberiza tristrami* Swinhoe, 1870, Amoy [= Hsiamen], Fujian, China.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species may form part of a clade with *E. chrysophrys*, with *E. variabilis* as sister-species. Monotypic.
Distribution. Breeds NE China (from Lesser Khingan Mts and R Zeja, in Heilongjiang) E to SE Russian Far East (Amurland and Ussuri regions, including Sikhote Alin Mts). Winters in SE China (SE Yunnan E to Fujian, also Hunan and E Sichuan); very rare winter visitor also N Thailand and N Laos, probably also N Vietnam (Tonkin).
Descriptive notes. 15 cm; 14–21 g. Distinctive, small and compact bunting with striped head. Male is unmistakable, has black head and throat with white central crownstripe, broad white supercilium (tends to be buffish in front of eye) extending a little behind ear-coverts, white spot on upper rear corner of ear-coverts, sharp white submoustachial stripe extending back to side of neck; hindneck and mantle dull buffy brown with diffuse black streaking, becoming rufous-brown to chestnut on lower back, unstreaked rump and uppertail-coverts; tail brown, central feather pair rufous-brown, outer two pairs with some white at edges; median and greater upperwing-coverts with buff to whitish tips (two distinct wingbars), rufous edges of primaries forming patch on folded wing; underparts



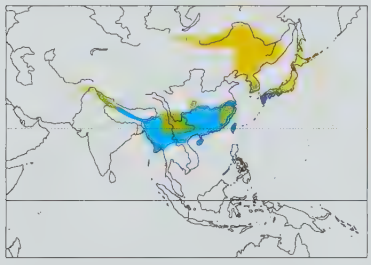
white, extensive rufous-brown wash with some dark streaking on breast and flanks; iris dark chestnut-brown; bill rather pointed, grey above and at tip, pinkish lower mandible; legs light fleshy-pink with whitish claws. Female is duller than male, less contrasting, with dark parts of head greyish-brown (instead of black), but same pattern of stripes, buff supercilium and ear-coverts, with buffish-white chin and throat, dark malar stripe. In fresh non-breeding plumage in autumn, buffish fringes makes white parts buffier and black parts browner, and partly concealing dark colour of throat. Juvenile resembles female, but somewhat duller; first-winter male similar to male non-breeding, but lores and ear-coverts noticeably browner with contrasting dark border, iris dark grey-brown; first-winter female generally very similar to non-breeding female, but crownstripe, supercilium and submoustachial stripe more buffish. Voice. Song, from inconspicuous perch in tree, a high-pitched unit followed by a drawn-out one, one or two units given 1–4 times in rapid succession, often with final "chit", one such phrase could be "hsiee swee-swee swee-tsirririri"; rather similar to song of *E. chrysophrys*. Call an explosive "tzick", irregularly repeated.
Habitat. Forested areas with good presence of undergrowth bushes, especially on hills, in Ussuriland also occupying flat areas. Seems to prefer mixed forests, but found also in understorey of conifers, in tall pine (*Pinus*) forests as well in spruce (*Picea*) in taiga. In winter in forest in wooded hills.
Food and Feeding. Diet consists of both vegetable and animal matter. During migration recorded as taking beetles (Coleoptera), flies (Diptera) and other insects, as well as seeds. Forages on ground. In small flocks outside breeding season.
Breeding. Laying at end of May or beginning of Jun; two broods in a season. Nest made from dry grass blades, often lined with horsehair, built near ground, often among grasses or on lower branches of bush; in one study, important factor for nest-site selection was presence of herbs and bushes, with 80% of nests built in false spiraea (*Sorbaria sorbifolia*); second nests found 50–120 m from first ones. Clutch 4–5 eggs, pinkish with greenish tinge, marked with sparse blackish patches and streaks; incubation entirely by female, period 12–14 days; no information on nestling period; starts to build nest for second brood 1–1·5 weeks after fledging of first brood. Average success 3·7 fledglings.
Movements. Autumn migration starts in Sept, most having departed from breeding areas during Oct, with last stragglers recorded Dec. Main passage during Sept in Korea, and Oct in Beidaihe (NE China). Normally stays in winter quarters Nov–Mar. Main spring passage in NE China and Korea between end of Apr and beginning of Jun; arrival on breeding grounds in Ussuriland from end Apr to beginning May, when snow still lying. Regular on passage in E Mongolia. Annual in autumn and spring passage on islands in Sea of Japan and Korea Strait; regular in E Mongolia. Vagrant to main islands of Japan.
Status and Conservation. Not globally threatened. Common to fairly common locally in appropriate habitat over most of its breeding range; little evidence of any marked decreases in recent decades. Local study in Ussuriland (Kedrovaya Pad Reserve) revealed 18 pairs/km² as highest breeding density, in riparian mixed forest.
Bibliography. Alström *et al.* (2008), Armani (1985), Brazil (1991, 2009), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Dementiev *et al.* (1954, 1970), Flint *et al.* (1984), Gamova (2002a), Ilinskii (1976, 1981), Kanouchi *et al.* (1998), Knystautas & Liutkus (1984), Knystautas & Sibnev (1987), Koblik *et al.* (2006), Kuleshovar (1970), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Nam Hyun-Young *et al.* (2011), Rasmussen & Anderton (2005a, 2005b), Robson (2000).

29. Chestnut-eared Bunting

Emberiza fucata

French: Bruant à oreillons **German**: Bandammer **Spanish**: Escribano Orejudo
Other common names: Grey-headed/Grey-hooded Bunting

Taxonomy. *Emberiza fucata* Pallas, 1776, at Onon and Ingoda Rivers, near Chilka, Chita, southeastern Siberia, Russia. Recent phylogenetic analyses indicating that this species is sister of *E. calandra* considered unreliable, and not well supported in different analytical approaches in same study. Proposed race *fluviatilis* (described from Zhenjiang, in Jiangsu, in E China) treated as synonymous with *kuatunensis*. Three subspecies recognized.
Subspecies and Distribution.
E. f. fucata Pallas, 1776 – breeds E Mongolia (including Khentii) and SE Transbaikalia E to SE Russia (Amurland, S Khabarovsk, S Ussuriland), NE China (Heilongjiang), Sakhalin I, Korea and Japan (S Kurils, and Hokkaido S to C Honshu); winters in S Japan (C Honshu S to Ryukyu Is), S Korea, S China, including Hainan, and Taiwan.
E. f. kuatunensis La Touche, 1925 – breeds E China (Zhejiang and Fujian); winters to SE China, Bangladesh, N & C Myanmar and N Indochina.
E. f. arcuata Sharpe, 1888 – breeds in Himalayas from N Pakistan E to W Nepal and S China (N Yunnan); winters lower in W Himalayas.



Descriptive notes. 16 cm; 14–21 g. Medium-sized bunting, adult with distinctive facial pattern and double breastband. Male nominate race breeding (worn plumage) has dark-streaked grey crown and nape, bright chestnut ear-coverts, prominent white eyering, narrow black moustachial stripe, white submoustachial stripe, chin and throat, and black malar stripe, malar expanding on breast side and breaking up into black streaks and spots that extend as broad necklace across breast; mantle and upper back grey-brown with black streaking, scapulars, lower back, rump and uppertail-coverts rufous-brown, feathers with dark centres; tail blackish-brown, rectrices with narrow pointed tips, long narrow white wedge on outer pair, small white spot on tip of next pair; upperwing blackish-brown, primaries with brown fringes; black necklace bordered below by white breastband, rest of underparts whitish, chestnut band on side of lower breast (sometimes forming complete band), warm orange-brown wash on sides gradually fading on belly, flanks narrowly streaked dark; iris dark reddish-brown; bill blackish above, lower mandible blue-grey to pale pinkish-horn; legs pinkish. Male non-breeding (fresh plumage) is similar to breeding, but head and breast patterns slightly obscured by pale feather fringes. Female has pattern like that of male, including breastbands, but with duller tones and less well marked, and

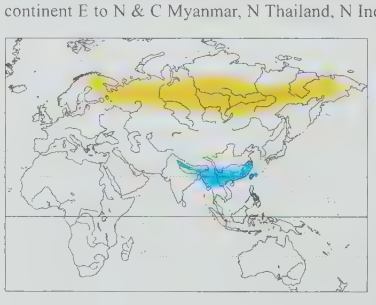
when fresh, with buffier tones. Juvenile has dull brown ear-coverts heavily edged dark and with small pale spot on rear corner, upperparts plain brown and heavily streaked, rump, scapulars and shoulders duller chestnut than adult pattern, underparts buff, fine streaks on breast and sides, pale chestnut flanks; first-winter resembles non-breeding adult of respective sex, but with even duller tones, worn flight-feathers and pinker lower mandible. Races differ mainly in levels of colour saturation and amount of chestnut on breast: *kuatunensis* is slightly smaller than nominate, darker and more reddish on upperparts, breastband similar, about intermediate in coloration and size between nominate and next; *arcuata* is slighly smaller than nominate, darker above and below, with richer tones and more rufous on back and flanks, whiter throat, broader black gorget, less prominent wingbars, female has breastband more marked than on nominate. Voice. Song, from top of shrub or weed, is twittering and more rapid than that of sympatric buntings, starts with a few staccato "zwee" or "zip" notes, accelerates into variable twitter and ends in three-part phrase, "chip chip chil-ri-wit chi chi tsiririri" or "zip zizewüziwiziriri chüpee chürüpp", reminiscent of song of *E. cioides*, but shorter and weaker; can be given also at slower tempo, with different units more clearly discernible, "zip chup chup cheechewee (tziri)". Call an explosive "pzick", similar to that of *E. rustica*.
Habitat. Scrubby hillsides, open areas near marshy fields and wetland fringes, rich floodplain meadows with bushes, and open grassy areas with thickets; in winter also in cultivated areas, including rice stubbles, and scrubby grassy fields. Often seen in low bushes and tall grasses adjoining fields and marshes. Occurs also in young secondary growth.
Food and Feeding. Diet consists of grass seeds and some insects. Forages on ground. Usually singly or in small parties of up to five individuals. In non-breeding season sometimes in larger flocks; also joins mixed flocks with *E. rustica* and *E. variabilis* and Brambling (*Fringilla montifringilla*).
Breeding. Start of breeding May or early Jun, with late broods during Aug in N of range; two broods in a season. Nest built from dry grass blades, weed stems, rootlets and twigs, lined with animal hair, fine roots and grass, placed in depression on ground in dry patch of soil in marsh, well concealed inside vegetation, or among low branches in bush. Clutch 3–6 eggs, usually 4, glossy white to yellowish-white or pale greenish-grey with sparse brown marks or sometimes darker spots and fine lines; incubation period c. 12 days. No further information.
Movements. Migratory. N populations (nominate race) winter in S Korea, S Japan, Taiwan and S China, including Hainan, between Nov and Apr; spring migration in NE China during Apr–May. Migrants recorded at Beidaihe (NE China) in variable numbers, mainly in Sept–Oct and in Apr–May; maximum single-day count 2100 individuals (21st Sept), but such numbers exceptional. Populations from E China (*kuatunensis*) apparently winter in S parts of range, reaching NE Indian Subcontinent and E to N half of Myanmar, N Thailand, N Laos and N Vietnam. Himalayan populations (*arcuata*) make post-breeding descent to lower elevations in foothills and adjacent plains; one record from NW Afghanistan considered doubtful, requiring re-evaluation.
Status and Conservation. Not globally threatened. Widespread, but rather uncommon. Global population not quantified; believed to be stable, as no local declines or substantial threats reported. Overgrazing possibly a threat locally in Mongolia and China.
Bibliography. Alström *et al.* (2008), Armani (1985), Bibikov (1960), Busching (2002), Byers, Olsson & Curson (1995), Eda (1996), Flint (1979), Fu Tongsheng *et al.* (1998), Fujimaki (1989), Gao Wei (1983), Golub (1983), Hwang Bo-Yeon & Park Shi-Ryong (1996), Ilinskii (1981), Kanouchi *et al.* (1998), Kim Kil-Won & Park Shi-Ryong (1993), La Touche (1906), Li Dehao *et al.* (1978), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Nakamura & Iijima (1977), Nishi (2004), Nishide (1987), Rasmussen & Anderton (2005a, 2005b), Robson (2000), Ryabitsev (1997), Shaw (2004, 2008), Slack (2009), Sodhi *et al.* (1999), Sokolov & Sokolov (1986, 1987), Sora (1976), Sung Ha-Cheol & Park Shi-Ryong (1994), Uemura (1989), Yamagishi *et al.* (1973).

30. Little Bunting

Emberiza pusilla

French: Bruant nain **German**: Zwergammer **Spanish**: Escribano Pigmeo

Taxonomy. *Emberiza pusilla* Pallas, 1776, Daurian Range, southern Chita, south-eastern Siberia, Russia.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. rustica*, *E. aureola*, *E. rutila*, *E. sulphurata* and *E. spodocephala*, forming a subclade with them; it has been suggested that they form a polytomous group of species, probably the result of a rapid, "simultaneous" radiation. Monotypic.
Distribution. Breeds from NE Norway, N Sweden, NE Finland and N Russia E across Siberia and Russian Far East (N to mouth of Ob and Gydan Peninsula, to c. 75° on R Yenisey, and mouths of Indigirka, Kolyma and Anadyr) to Pacific, S to c. 60° N in W and to middle R Yenisey, N of L Baikal, S Yakutia and near R Arka on Okhotsk Sea coast. Winters in region from N Indian Subcontinent E to N & C Myanmar, N Thailand, N Indochina and S China (S of R Yangtze).



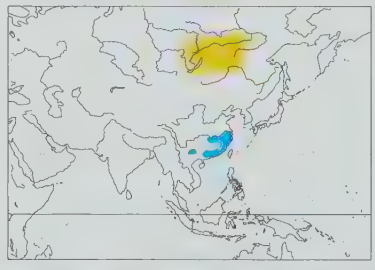
Descriptive notes. 12–13·5 cm; 12–19·3 g. Small bunting, c. 10% smaller than otherwise somewhat similar *E. schoeniclus*; small bill with straight culmen. In breeding plumage (worn) has much of head, including chin and upper throat, deep chestnut, prominent pale eyering, very dark broad lateral crownstripe, narrow dark line behind eye and around rear and lower edges of ear-coverts, latter with small light buff spot in rear corner; some variation, some individuals with less extensive chestnut, having rear supercilium and rear crown more creamy and chin buffish; upperparts greyish-buff, heavily streaked dark brown, rump less clearly streaked; lesser upperwing-coverts grey-brown, median and greater coverts dark brown with narrow pale tips (forming wingbars), flight-feathers dark brown with narrow pale reddish-brownish edges; tail brown, outermost feather with white outer web and white wedge on inner web, next feather with smaller pale wedge; lower throat and underparts whitish-buff, prominent streaks on breast and flanks; iris dark red-brown; bill dark grey, cutting edges and base of lower mandible pale pinkish-grey; legs pinkish. Non-breeding (fresh) plumage is similar, but head pattern somewhat obscured by paler feather fringes, has light red-brown lores and anterior supercilium, pale reddish-brown median crownstripe between dark crown sides, red-brown to orange-tinged yellow-brown ear-coverts with narrow dark border at rear and small pale spot in rear corner; upperparts with broader pale feather fringes than in breeding plumage, and underparts buffier, with whitish belly, and slightly more diffuse streaking. Sexes very similar. Juvenile is like adult, but plumage with less rich tones, supercilium sandy buff, ear-coverts rufescent brown, submoustachial stripe and throat pale sandy buff, nape olive-brown but less streaked than crown, mantle sandy buff with some rufous-brown and heavily streaked black, breast yellowish-buff and rather heavily streaked, iris dark grey-brown; first-winter much as adult winter. Voice. Song, from top of tree or bush, rather variable, consisting usually of two or three parts each of which composed of a number of similar units, with last part more variable, e.g. "zree zree zree tsütsütsütsü tzriiitu" or "tzrü tzrü tzrü zee zee zee zriiiiru"; some parts reminiscent of song of *E. schoeniclus*. Call a hard "pwick" or "zick", very like that of *E. rustica*, similar to call of Hawfinch (*Coccothraustes coccothraustes*) but weaker.
Habitat. Breeds in moist open taiga, or partly flooded forests, with dwarf birch (*Betula nana*) and willow (*Salix*) and alder (*Alnus*), as well as in more open tundra, from bushy areas to areas with only low, sparse shrubs; tends to concentrate along river valleys where willow stands present. Occupies less wooded and less flooded areas than those preferred by *E. rustica*, and wetter and less open areas than those used by *Calcarius lapponicus*. In winter uses variety of open and semi-open habitats, from edges of forest to scrubby hillsides, crop fields, stubble and paddyfields, also edges of roads and paths and areas of bushes near marshes; also visits gardens and orchards.
Food and Feeding. Diet during breeding includes seeds and invertebrates. Recorded items include mayflies (Ephemeroptera), stoneflies (Plecoptera), bugs (Hemiptera), adult and larval Lepidoptera, caddis flies (Trichoptera), adult and larval flies (Diptera), Hymenoptera, beetles (Coleoptera), spiders (Araneae), earthworms (Lumbricidae), also seeds of cowberry (*Vaccinium*), crowberry (*Empetrum*), grasses (Poaceae) and sedges (Cyperaceae). Nestlings fed mostly with invertebrates; fledglings fed mainly with defoliating caterpillars, craneflies (Tipulidae), midges (Diptera), beetles and spiders. Diet during winter mostly seeds, such as those of sedges, grasses and cereals, but invertebrates still form a significant percentage of items. Forages on ground and at low levels in bushes and trees. In N Scandinavia actively seeks caterpillars (of family Geometridae) a few metres above ground in birches, bilberry (*Vaccinium*) and other kinds of low vegetation. Solitary and in pairs and small groups. Outside breeding season usually in small flocks of up to a dozen or so individuals, occasionally more; mixes with other seed-eaters, also roosts with *E. schoeniclus*.
Breeding. Season begins relatively late, between early Jun and Jul, some pairs still nesting during Aug; single-brooded. Nest built entirely by female, composed of grass, twigs, stalks, moss and hair, lined with fine grass, lichens and hair, placed on ground and concealed in grass tussock, occasionally on tree stump or low down in tree. Clutch 4–6 eggs, colour variable from pale lavender-grey, pale ashy blue or pale green to pale pinkish-buff, pale chestnut or dark brown, with blotches of lilac-grey and marked with sparse dark reddish-brown spots, streaks and lines; incubation by both sexes, period 11–12 days; chicks fed by both sexes, leave nest 6–8 days after hatching, still unable to fly, fully fledged 3–5 days later; fed by both parents.
Movements. Migratory; winters mainly in region from NE Indian Subcontinent E to SE China and S to N Indochina. Normally migrates singly or in small loose flocks, very occasionally in flocks of 100 or more individuals. Autumn migration begins final third of Jul, increasing during Aug, most having left breeding areas by mid-Sept; those from W range initially head directly E, then turn SE in W Siberia; passage in Mongolia and N China during Sept and early Oct, and in NE China lasts a little longer, birds still passing during early Nov. During autumn regular in small numbers in NW Europe, Israel and Japan. Spring migration starts in Mar, last birds leaving wintering grounds early May; in NE China main period of spring migration between last third of Apr and first half of May. Vagrant in most W European countries, also Canary Is, N Africa, Turkey and Middle East, Afghanistan, Pakistan, Borneo, Philippines, W USA (Alaska and California) and NW Mexico (S Baja California); regular in some places, e.g. average of c. 30–35 each year in Britain, mainly Sept–Oct, and overwintering not uncommon.
Status and Conservation. Not globally threatened. Common to locally very common. One of the most numerous bird species in parts of the extreme N taiga. Estimated European population in range 5,000,000–8,000,000 breeding pairs, and considered secure. In favoured areas can reach very high densities, of more than 100 pairs/km². Annual fluctuations in occupation of some areas in C Siberia, with no pairs at all in some years and two years earlier 2 birds/km² or 48 birds/km² in preferred sites; in other study areas in Siberia dramatic fluctuations, between five and 30 breeding pairs in different years. Although no reliable estimates for Asian part of range, population assumed to be stable as no evidence of declines or potential threats. Reported decline in Finland during 1990–2000, however, and further estimates needed in order to determine whether similar pattern may emerge in European Russia and in E parts of global range.
Bibliography. Alström *et al.* (2008), Andersson *et al.* (1968), Bonaccorsi (1999), Bradshaw (1991), Brazil (1991, 2009), Brehme & Hamann (1992), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cramp & Perrins (1994), Gavrilov & Gavrilov (2005), Glutz von Blotzheim & Bauer (1997), Golovatin (1986, 1994, 2001, 2008), Hagemeijer & Blair (1997), Kirwan *et al.* (2008), Koblik *et al.* (2006), Königstedt & Müller (1988), Königstedt & Robel (1987), Kretchmar (1993), Lewington *et al.* (1991), Mather (1979), Mikkola & Koivunen (1966), Mills (1982), Nishi (2009), Oien & Oyan (1987), Olsen (1989, 1991), Radamaker & Powell (2010), Rasmussen & Anderton (2005a, 2005b), Robson (2000), Rogacheva (1992), Romanov & Morozov (1993), Ryabitsev & Shubenkin (1986), Ryabitsev *et al.* (1999), Ryzhanovsky (1986, 1988), Smith (1974), Snow & Perrins (1998), Sudhaus (1969), Svensson (1975, 1992), Svensson *et al.* (2009), Ullman (2003), Usai *et al.* (2008), Wallace (1976, 1981).

31. Yellow-browed Bunting

Emberiza chrysophrys

French: Bruant à sourcils jaunes **German**: Gelbbrauenammer **Spanish**: Escribano Cejigualdo

Taxonomy. *Emberiza chrysophrys* Pallas, 1776, Daurian Range, southern Chita, south-eastern Siberia, Russia.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species may form part of a clade with *E. tristrami*, with *E. variabilis* as sister-species. Monotypic.
Distribution. Breeds in E Siberia from Irkutsk, R Nizhnyaya Tunguska and Bratsk E to R Vilyuy and Yakutsk, S to Chamar Daban range (S of L Baikal) and Stanovoy Mts. Winters in S & E China.



Descriptive notes. 13–15 cm; 15–24 g. Medium-sized bunting, similar in size to *E. rustica*, but with somewhat bigger head and stouter bill. Male breeding has striking head pattern, with bright yellow eyebrow starting just in front of eye and becoming white posteriorly, black crown with narrow white median crownstripe, and blackish lores, eyestripe and ear-coverts with distinct small white spot on rear ear-coverts; mantle grey-brown with blackish streaks, central mantle and scapulars rufous, rump chestnut; tail brown-black, rufous edges on central rectrices and white on outer ones; lesser upperwing-coverts grey, median coverts blackish with white tips (forming distinct wingbar), greater coverts with pale buff tips (less prominent wingbar), strong chestnut edges on tertials and inner secondaries; submoustachial stripe and throat white, prominent sharp blackish malar stripe; underparts white, blackish streaking on breast and flanks,

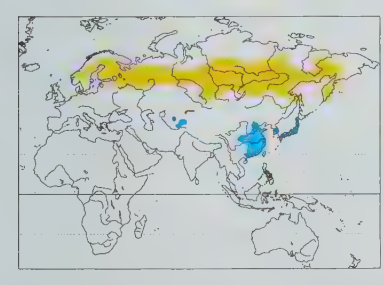
these also tinged pale rufous-brown; iris dark chestnut-brown; upper mandible dark grey, with pinkish along cutting edge, lower mandible pinkish-flesh, with dusky line running from tip along underside; legs pinkish-flesh. Female is broadly similar to male, but black areas on head partly concealed by brown fringes (fringes can wear away during breeding season, producing blackish pattern as on male), median crownstripe less pure white, tinged buffish, supercilium rather variable, from white to pale or deep yellow (independent of age), dark eyestripe extends down around rear ear-coverts, moustachial stripe ill-defined or lacking, malar stripe not so black and sharp as on male; chestnut stripe on centre of mantle slightly paler. Male and female non-breeding are both very similar to breeding female. Adult male and female non-breeding are rather similar, most cannot be sexed by plumage after complete moult in autumn. Juvenile is rather similar to female breeding, has lateral crownstripe dark brown, median crownstripe and supercilium pale buff or buff-white, side of neck and nape whitish with dark spots, lores buff, upper cheek and ear-coverts buff-brown, mantle tawny-buff and rump more rufous, all with distinct black streaks (more than on adult female breeding), lesser upperwing-coverts greyish-brown, streaking on breast narrow and more distinct than on adult; first-winter male similar to adult non-breeding, with rectrices more pointed, tail and wing feathers relatively more worn, some with streaked rump and uppertail-coverts, iris dark greyish-brown. Voice. Song, from perch in tree in dense forest, short, often starts with characteristic clear drawn-out note, usually followed by 2 high-pitched notes, and ends more rapidly, "chueee swii-swii chew chew chew" or "chueee tsriii tzriii wee-wee-wee tzitzi-tueei". Call a sharp "zick!", similar to that of *E. pusilla*, or "ziit", similar to that of *E. spodocephala*.
Habitat. In area of middle R Yenisey, inhabits open taiga on slopes of river valleys and on overgrowing vegetation, mainly where clusters of low conifers are regrowing and with rich ground cover; also mixed forest. In C Siberia favours well-drained mixed forests in region of Mirnoye, and in upper R Kamenka numerous in open mixed taiga with separate blocks of spruce (*Picea*) and fir (*Abies*) regrowth. Usually in clearings or edges of forest, but also interior of dense forest. In winter in scrubby and weedy areas, frequently near edges of forested areas.
Food and Feeding. Diet during breeding little known, presumably composed of an array of different flying insects and spiders (Araneae); these make up nestling diet. Outside breeding season diet dominated by seeds of grasses and herbs. Forages mostly on ground. During migration and in winter usually in mixed flocks with other buntings.
Breeding. Season begins late, usually during mid-Jun (some from beginning of Jun), dates of first clutches extending to mid-Jul, and recently fledged young recorded from beginning to third week of Jul. Nest messy-looking, with dry straw sometimes sticking out of sides of main section of cup, inner section made from fine straws, lined with finer straws and animal hair, mostly from horses (*Equus*) or moose (*Alces alces*), sometimes also moss, placed 1–2 m above ground and close to main trunk of bush or tree, normally conifer e.g. pine (*Pinus*) or spruce, exceptionally as much as 44 m up in tall tree. Clutch 3–5 eggs, greyish-white or cream-grey, with some lilac-grey shades, and irregular brown lines and dark streaks; incubation by both sexes, period 11–12 days; no information on nestling period.
Movements. Migratory; winters S & E China, accidentally S to Hong Kong. Breeding areas mostly deserted by mid-Aug, some late individuals present until mid-Sept; migration developing through Sept, when main passage noted NE China and Korea, reaching winter quarters in Nov–Dec. Main spring passage through NE China during Apr–May. Vagrants recorded W to Ukraine and W Europe (Britain, Netherlands, Belgium, France, Sweden).
Status and Conservation. Not globally threatened. Uncommon to rare in most of range; locally common in area of middle Yenisey. Reports of this species during breeding period in areas E of known range, such as in Magadan Oblast, may represent extreme limit of range or vagrancy. In middle Yenisey region found at higher densities in well-drained mixed forests in area of Mirnoye, up to 18 birds/km² (mean density in area 2 birds/km²); in another area, in upper R Kamenka, densities of 10–30 birds/km². No evidence of decline in population.
Bibliography. Alström *et al.* (2008), Brazil (1991, 2009), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Cramp & Perrins (1994), Davydovich & Gorban (1990), Dementiev *et al.* (1954, 1970), Donnelly (1993), Elkins (1985), Flint *et al.* (1984), Glutz von Blotzheim & Bauer (1997), Holman (1990), Jiguet (2007), Kanouchi *et al.* (1998), Kapanen (1995), Kitson & Robertson (1983), Larionov & Germogenov (1980), Lewington *et al.* (1991), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Nam Hyun-Young *et al.* (2011), Rogacheva (1992), Slack (2009), de Smet (1996), Snow & Perrins (1998), Svensson (1992), Svensson *et al.* (2009), Takano *et al.* (2001), Tebb & Ranner (2002), Ullman (2009), Vonk & van Ijzendoorn (1988), Wright (1994), Wunsch (1976).

32. Rustic Bunting

Emberiza rustica

French: Bruant rustique **German**: Waldammer **Spanish**: Escribano Rústico

Taxonomy. *Emberiza rustica* Pallas, 1776, Dauria = Transbaikalia.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. aureola*, *E. pusilla*, *E. rutila*, *E. sulphurata* and *E. spodocephala*, all together forming a subclade. Geographical variation of present species weakly defined; sometimes treated as monotypic. Two subspecies currently recognized.
Subspecies and Distribution.
E. r. rustica Pallas, 1776 – breeds in C & N Fennoscandia E to EC Siberia (L Baikal); winters in C & E Asia.
E. r. latifascia Portenko, 1930 – breeds in E Siberia from L Baikal E to Anadyrland and Kamchatka, S to R Amur mouth and N Sakhalin I, possibly also in Greater Khingan Mts (NE China); winters in C & E Asia.



Descriptive notes. 13–14·5 cm; 15·5–24·3 g. Medium-sized bunting with indication of crest (erectile), and longish bill with straight culmen. Male nominate race breeding has black crown with distinct white spot on rear centre and hint of white median crownstripe, sharp white supercilium less well defined anteriorly and often starting just in front of eye, black lores and ear-coverts with distinct white spot on upper rear corner of ear-coverts, broad white submoustachial stripe continuing below lower edge of ear-coverts, poorly defined black malar stripe; nape and side of neck reddish, mantle and upperparts in general reddish-brown with black streaks; tail dark brown, two outermost feather pairs with white on inner webs; lesser upperwing-coverts reddish-brown, median and greater coverts dark brown with white tips (forming two distinct wingbars), tertials largely blackish on inner web and proximally on outer web, the central blackish area much narrower at mid-length of outer web, rest of outer web and rather broad tip reddish-brown with pale buff edging; primaries dark brown with pale edges, secondaries similar to primaries in pattern but with more rufous-brown edges; throat and underparts white, well-marked reddish breastband, variable reddish streaking on flanks; iris dark chestnut-brown; bill dark grey, pinkish-grey base of lower mandible; legs pinkish-flesh. Male non-breeding (fresh plumage) is similar in pattern, but black areas of head mostly concealed by brown feather fringes, and white areas of head, including supercilium, submoustachial stripe and throat, more buffish-tinged, lores and ear-coverts buffy brown. Female breeding is similar to breeding male, but colours duller, malar stripe more marked, and chestnut of breast and flanks tinged with dark brown; rump also more mottled and tips of median upperwing-coverts (wingbar) not so white as on male. First-winter male and female resemble non-breeding adult in pattern, only clear differences being duller iris colour and pointed shape of rectrices. Juvenile is similar to first-winter female, but breast more clearly streaked and iris dark grey-brown. Race *latifascia* differs from nominate only in having darker and more richly coloured plumage, with heavier streaks, purer black on crown, and bill on average larger. Voice. Song, usually from top of tree, consists of some melodious notes reminiscent of those of e.g. Garden Warbler (*Sylvia borin*), or parts of song of Dunnock (*Prunella modularis*), "duuu-dele-duudo-deluu-delu" or "dudeleu-dewee-deweea-weeu". Normal call a sharp "tzik", not unlike flight call of Song Thrush (*Turdus philomelos*), but often repeated several times at short intervals.
Habitat. Breeds in swampy lowland spruce (*Picea*) or pine (*Pinus*) forest with some birches (*Betula*), willows (*Salix*) or other deciduous trees, also scrub along riverbanks and around *Sphagnum* bogs; in flooded pine forests frequently found where pines stunted and dead trees covered with moss. Undergrowth usually present, usually consisting of horsetail (*Equisetum*) and bushes such as *Rubus*. In C Siberian taiga in boggy forest or sparse pine forest with undergrowth of *Alnaster*, *Ledum* and dwarf birches, and ground vegetation of sedges (*Carex*) and bog-moss (*Sphagnum*). Some reported differences between years according to mean temperature of spring: when spring cold apparently prefers open habitats, readily selecting burnt or other dry areas, and in years with warmer springs favours humid floodplains. In non-breeding season found also in dry lowland forest and woodland, riverine scrub, and various open areas, including rank vegetation at edges of agricultural land.
Food and Feeding. Diet during breeding season mostly seeds and invertebrates associated with swampy areas, e.g. damselflies and dragonflies (Odonata), stoneflies (Plecoptera), caddis flies (Trichoptera), flies (Diptera, including craneflies and mosquitoes), also any other available invertebrates e.g. beetles (Coleoptera), caterpillars and adult Lepidoptera, larval and adult Hymenoptera, spiders (Araneae), aphids (Aphidoidea) and grasshoppers (Orthoptera). Among plant items recorded as eaten are seeds of weeds and grasses (Poaceae), including several cereals e.g. barley (*Hordeum*) and oats (*Avena*), cloudberry (*Rubus chamaemorus*) and sedge; also seeds of conifers. Forages mostly on ground and in low vegetation. During winter especially in rice stubble, in reedbeds, and in open spaces of different kinds, including urban parks. Outside breeding season found in small groups, especially during migration; in winter often in bigger flocks, sometimes as many as 400 individuals.
Breeding. Season starts May or early Jun, e.g. in Finland average date of first egg 6th Jun, in Kamchatka nest-building through Jun; usually one brood, but two recorded in some places, such as St Petersburg region of extreme W Russia. Nest apparently built entirely by female, male observed to collect material (not yet confirmed whether he also helps with building work), composed of grasses, sedges, horsetail, mosses, lichens, leaves and conifer needles, lined with fine grasses and plant material, hair and sometimes feathers, placed normally on ground near water, hidden among grass tussocks, among thick roots, under bush or tree or overhanging grass, sedges or similar plants, sometimes up to 4·5 m above ground in tree or stump. Clutch 4–6 eggs, pale bluish-green to grey-green, greenish-blue or pale blue, densely covered with variable olive-brown or greyish spots, blotches and scrawls; incubation by both sexes, male (does not develop brood patch) tending to sit for shorter stints, period 11–13 days; chicks fed by both parents, leave nest at 7–10 days, before able to fly; young fed by both adults for further c. 15 days. In Finnish Lapland, c. 82% of laid eggs survived, from which 67% nestlings fledged, giving average of 55% of nests successful, with 1·7 fledged young per nest when failed attempts included, or 3·5 young per successful nest; recorded high annual variation in hatching success, from 20% to 68%, probably related to changes in weather during brooding stage.
Movements. Migratory. Winters mainly in Japan from S Hokkaido S to Kyushu (rarely farther S), Korea, and E China from Hebei and Shangdong S to Fujian and W to E Sichuan and S Shaanxi; small wintering population around Tien Shan in S Kazakhstan and NW China (W Xinjiang). Autumn migration begins early, from late Jul and Aug, and by mid-Sept breeding grounds in N part of range mostly vacated; W populations initially head E, following taiga habitats, until arrival in E Siberia, when they turn S, passing through E Mongolia; individual ringed in Sweden was recovered in NE China at L Songhua (Jilin). Departs from wintering grounds in China from Feb, passing through N China during Mar, with late migrants through Apr; in Japan leaves wintering areas during Apr; males usually arrive back on breeding grounds before females. Recorded as accidental in Svalbard, Iceland and many W European countries (regular in Britain), also in most Middle East countries, Egypt, Afghanistan, NW India, Nepal, and Hong Kong; in E Pacific recorded Alaska, SW Canada (British Columbia) and W USA (Washington, Oregon, California).
Status and Conservation. Not globally threatened. Common and widespread; locally abundant. Estimated European population (including European Russia) c. 6,100,000–10,000,000 pairs; no corresponding data for Asian part of range, but seems to be common. Recorded densities in Finland of 3·6 pairs/km² in peatlands, but only 0·9 pairs/km² in spruce forest and 2 pairs/km² in pine forest; in Sweden average 1 pair/km²; in European Russia up to 166 birds/km² recorded in pine forests in Vologda region and up to 167 pairs/km² in damp forests in St Petersburg region. Variable densities recorded in different areas of C Siberia, with average 8 birds/km², but in one year reaching maximum of 42 birds/km² on upper Yenisey floodplain near Fomka; in extreme E of range, highest densities in Kamchatka 190 pairs/km² in riverine woods of alder (*Alnus*) and willow. In late 19th and early 20th centuries, range in Fennoscandia expanded W & SW, presumably aided by creation of additional suitable habitat. Population trends in Europe have exhibited moderate decline since 1980, especially in Finland and Sweden during 1990–2000, with similar reports from Norway, mostly as a result of impact of human activities on damp forests. Forest management and modern silvicultural practices in N Finland have led to forest fragmentation, which was direct cause of declines in density in areas monitored before human intervention in virgin forests. No information on trends in E part of range, in Russia, but population in this area assumed to be stable, as no evidence of any declines.
Bibliography. Agostani (2008), Alström *et al.* (2008), Babko (1983), Beale (2000), Bengtsson (2005), Bradshaw (1991), Brazil (1991, 2009), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cramp & Perrins (1994), Dale & Hansen (2009), Del Nevo & Ewins (1984), Dementiev *et al.* (1954, 1970), Ehrenroth & Jansson (1966), Flint *et al.* (1984), Fu Tongsheng *et al.* (1998), Fujimaki *et al.* (1996), Gavrilov & Gavrilov (2005), Glutz von Blotzheim & Bauer (1997), Goodman & Watson (1983), Grace (1991), Hagemeijer & Blair (1997), Haglund (1935), Iijima (1973), Kaneko (1976), Kirwan *et al.* (2008), Knystautas & Liutkus (1984), Knystautas & Sibnev (1987), Kuroda (1964), Nakamura (1969, 1973), Nakamura & Iijima (1977), Nakamura & Kitahara (1983), Olsen (1989, 1991), Portenko (1930), Portenko & Stübs (1971c), Pulliainen & Saari (1989), Rasmussen & Anderton (2005a, 2005b), Rogacheva (1992), Rymkevich (1976, 1979), Shcherbakov (1978), Sherrell (1994), Skinner (1930), Smith (1974), Snow & Perrins (1998), Staav (1976), Sung Ha-Cheol & Park Shi-Ryong (1994), Svensson (1992), Svensson *et al.* (2009), Tebb & Hamidan (2002), Tebb *et al.* (2008), Tsutsumi & Matsuzawa (1990), Uemura (1989), Virkkala (1987), West & Bailey (1986), Winkelman (1981), Yamagishi *et al.* (1973), Zavialov & Tabachishin (1997).

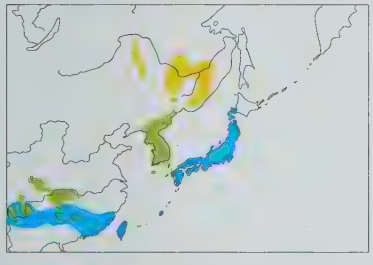

ssp elegantula
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33
♂
ssp elegans
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34
ssp ornata
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ssp aureola
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36
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PLATE 43
inches 2
cm 5
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ssp flaviventris
ssp affinis
37
ssp nigeriae
35
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ssp flavigaster
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33. Yellow-throated Bunting

Emberiza elegans

French: Bruant élégant **German**: Gelbkehlammer **Spanish**: Escribano Elegante
Other common names: Elegant/Yellow-headed Bunting

Taxonomy. *Emberiza elegans* Temminck, 1836, Japan.
Sometimes placed in a separate genus, *Cristemberiza*. Recent phylogenetic analyses indicate that this is a sister-species of *Latoucheornis siemsseni*. Geographical variation not fully understood and complicated further because descriptions of some proposed races were based on individuals in passage; further study required. Proposed race *ticehursti* (described from Sidemi R, in S Ussuriland) included within nominate. Two subspecies currently recognized.
Subspecies and Distribution.
E. e. elegans Temminck, 1836 – breeds from Russian Far East and NE China to Korea and Tsushima I (SW Japan); winters mainly in Korea, S Japan and SE China.
E. e. elegantula Swinhoe, 1870 – breeds in C China (S Gansu and S Shaanxi S to Yunnan, Guizhou and Hunan); winter records S to NE Myanmar.



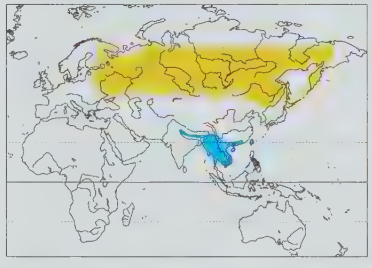
Descriptive notes. 15–16 cm; 14–22 g. Male nominate race breeding is unmistakable through combination of black crown with erectile crest, rich yellow supercilium (whitish at very front), black mask from lores and chin to rear ear-coverts, bright yellow throat, thin white band on foreneck, and sharply demarcated black crescent on breast; nape and side of neck grey (forming half-collar); feathers of mantle, scapulars and back rufous-brown with blackish shaft streaks and pale sandy brown fringes, rump and uppertail-coverts plain grey-brown; central rectrices brown, rest of tail feathers blackish-brown, outer pair with much white, adjacent pair with smaller white wedge; lesser upperwing-coverts grey, median and greater coverts with buff to whitish tips (forming two obvious wingbars), tertials blackish-brown with rusty-brown fringes and paler outer edge, primaries and secondaries brown with paler edges; underparts below breast mostly white, some chestnut streaks on flanks; iris dark chestnut-brown; bill blackish; legs pale grey-brown or pinkish. Male non-breeding (fresh plumage) has black pattern of head mostly concealed by brown feather fringes (gradually abraded during winter, revealing black during spring), nape brown, instead of grey, streaks on mantle less clear than during breeding; breast patch duller, with dark tones of centre of each feather concealed by brown fringes; bill paler blue-grey to dull pinkish-horn, typically dusky along culmen, tip and underside. Female breeding is similar to breeding male, but few contrasts in plumage, with crown and ear-coverts dark brown, supercilium buffish (more yellow on rear ear-coverts), throat yellow, but duller than on male, and never has black on chin; streaks on mantle less apparent; breast patch absent, breast has tinge of rufous-buff and indistinct rufous streaks. Female non-breeding is like non-breeding male, but dark areas of head browner. Juvenile has crown, ear-coverts and lores uniformly brown, supercilium pale buff, throat buffish-white, breast buffish-brown, breast and flanks finely streaked; first-winter male similar to adult non-breeding, but duller on head and breast, iris dark grey-brown; first-winter female similar to latter, but even duller. Race *elegantula* is darker overall and somewhat more richly coloured than nominate. Voice. Song, normally from perch in tree or bush, a long, monotonous twitter, e.g. "tswit tsu ri tu tswee witt tsuri weee dee tswit tsuri tu", often repeated at only brief intervals, at times seeming almost continuous; rather similar to song of *E. rustica*. Call a sharp "tzik", similar to that of *E. rustica*.
Habitat. Inhabits open dry deciduous forest and mixed deciduous–conifer forest, thickets and bushes, at edges and in clearings of woodland, often near streams; often on grassy slopes, also in hills and on sides of ridges, sometimes in young secondary pine (*Pinus*) and cedar forests with brush on low hillsides. In winter typically occupies mixed woodlands, shady conifer forests and edges of forests, orchards, and vegetation along riverbanks; also found in cultivated areas with scattered trees.
Food and Feeding. Food during breeding season consists mainly of invertebrates, but also some seeds. Forages on ground. Outside breeding season generally in rather small flocks, typically of up to c. 25 individuals, but up to at least 150; flocks average much larger during migration than in winter.
Breeding. Season begins in May; usually two broods. Nest a simple structure of loosely packed moss, plant stems, sedge and leaves, sometimes with hair, located in depression on ground under shrub or bush, sometimes openly. Clutch 4–6 eggs, whitish with background of lilac-grey tone, with irregular small dark spots and some irregular fine streaks; incubation by female, period 12–14 days. No other information.
Movements. Poorly known. Nominate race present in wintering areas from Nov to early Apr; winters mainly in Korea, S Japan and SE China (Guangdong, Fujian); apparently on rare occasions as far as Sakhalin I, Kuril Is, Hokkaido, Izu Is, Ryukyu Archipelago and Taiwan; uncommon passage migrant in E Mongolia. Race *elegantula* partly resident, but probably moving mostly to lower altitudes, with some N birds migrating to S part of breeding range; regularly reaches mountains of NE Myanmar. Species recorded as a vagrant in Alaska; records from Europe (Finland, Denmark, Netherlands, France and Germany) probably involve escaped cagebirds, rather than genuine natural arrivals.
Status and Conservation. Not globally threatened. Fairly common to locally common. Global population has not been reliably quantified, but assumed to be stable.
Bibliography. Alström *et al.* (2008), Bogorodski (1991), Brazil (1991, 2009), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Dementiev *et al.* (1954, 1970), Flint *et al.* (1984), Fu Tongsheng *et al.* (1998), Golub (1983), Hwang Bo-Yeon & Park Shi-Ryong (1996), Ilinskii (1981), Kanouchi *et al.* (1998), Knystautas & Liutkus (1984), Knystautas & Sibnev (1987), Lee Won-Ho & Kwon Ki-Chung (2006), Li Peixun (1989), Li Peixun *et al.* (1991), Li Qingwei *et al.* (2002), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Mauersberger (1966), Nam Hyun-Young *et al.* (2011), Ostapenko (1981), Portenko & Vietinghoff-Scheel (1978), Rashkevich (1965), Rasmussen & Anderton (2005a, 2005b), Restall (1970), Robson (2000), Stepanyan (1990), Sung Ha-Cheol & Park Shi-Ryong (1994), Sushkin (1925), Takano *et al.* (2001), Tomek (2002), Ueno *et al.* (1995), Vaurie (1959), Yamaguchi & Yahara (2002), Zeng Shaoju *et al.* (2004).

34. Yellow-breasted Bunting

Emberiza aureola

French: Bruant auréole **German**: Weidenammer **Spanish**: Escribano Aureolado
Other common names: White-shouldered/Golden Bunting

Taxonomy. *Emberiza aureola* Pallas, 1773, Irtysh River, south-central Siberia, Russia.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. pusilla*, *E. rustica*, *E. rutila*, *E. sulphurata* and *E. spodocephala*, forming a subclade with them; it has been suggested that they form a polytomous group of species, probably the result of a rapid, "simultaneous" radiation. Two subspecies recognized.
Subspecies and Distribution.
E. a. aureola Pallas, 1773 – breeds E Finland and W Russia E to Kamchatka, S to N Ukraine, N Kazakhstan and W & C Mongolia; winters in S & SE Asia.
E. a. ornata Shulpin, 1928 – breeds E Transbaikalia and NE Mongolia E to NE China (Heilongjiang), Sea of Okhotsk coast, Sakhalin I, and N Japan and Kuril Is; winters in S China.



Descriptive notes. 14–15·5 cm; 14–33 g. Medium sized bunting, slightly larger than *E. rutila*, with longish bill; distinctive in most plumages. Male nominate race breeding has lower forehead, chin and upper throat back to ear-coverts black, upper forehead, crown, nape and upperparts deep rufous-brown, a few traces of pale fringes on nape, mantle and rump; tail dark brown, outermost rectrices with white on outer web; lesser upperwing-coverts dark grey with white lower row of feathers, median coverts white (white areas merging to form prominent white patch), greater coverts rufous-brown with white tips (less well-marked wingbar), tertials with deep rufous-brown outer webs, primaries and secondaries brown, narrowly edged pale; lower throat yellow, this extending as band across lower side of neck, contrasting narrow red-brown breastband; rest of underparts yellow, flanks with heavy blackish streaks; iris dark chestnut-brown; upper mandible dark grey, cutting edges and lower mandible pink; legs pinkish to dull fleshy-brown. Male non-breeding is very similar to breeding, but with pale fringes on head, buffish lores, supercilium and centre of ear-coverts, fringes on upperparts broader, and chin, throat and malar region yellow; breastband obscured by buffish fringes. Female breeding is rather similar to first-winter male, but with worn and bleached plumage; upper wingbar (on median coverts) narrower and lower wingbar (greater coverts) whiter, and breastband usually absent; some females extremely similar to first-summer male; iris dark chestnut-brown. Female non-breeding has upperparts similar to first-winter male, but tones warmer brown. Juvenile is broadly similar to female breeding, but exhibiting very fresh plumage, breast prominently streaked, iris dark grey-brown; first-winter male like adult non-breeding plumage, but with less apparent rufous tones, lateral crownstripe and border around ear-coverts blacker and more prominent, nape rufescent greyish-brown with some streaks, mantle brown with blackish streaks (feathers lacking rufous-brown centres), back to uppertail-coverts greyish-brown with faintly dark streaks, breastband largely replaced by diffuse streaking, iris dark grey-brown; first-summer male similar to male breeding, but with some characters more like those of female; second-winter male intermediate between adult and first-winter, with head and breast patterns mostly like adult, but crown more greyish-brown; second-summer male very like adult, but more prominent streaks on mantle; first-winter female very similar to adult non-breeding, but paler below, iris dark grey-brown. Race *ornata* is very like nominate, but darker, and with yellow of underparts brighter and richer in tone, and tends to have more extensive black on forecrown. Voice. Song, usually from exposed perch on top of tree or bush, a series of usually 5–9 units arranged in 3–4 segments each with 2–3 units, e.g. "djuu-djuu weee-weee ziii-zi", or "dwee-di-dee wuuu cha-cha zreee", or "tru-tru tra tro-tro triih" and variations; reminiscent of song of *E. hortulana*, but with slower tempo and higher pitch. Call a sharp clicking "tsick".
Habitat. Breeds in bushy areas, deciduous scrub and copses, very often along watercourses, edges of lakes and wetlands, low-lying wet meadows with tall herbage and scattered trees such as willow (*Salix*) or birch (*Betula*); also in areas with secondary scrub or sparse shrubs and trees, burnt areas, and peat bogs and alpine meadows with scattered solitary spruces (*Picea*); in Siberia also in high-elevation tundra where vegetation provides singing perches and nesting sites. In E part of range, in Amurland, present in both dry and damp meadows with rich or sparse shrub undergrowth with some scattered trees, as well as sedge (*Carex*) and grass. In non-breeding season found in cultivations, farmland with hedgerows, rice fields, stubble fields, reedbeds, grasslands and arable land with scrub, also gardens.
Food and Feeding. During breeding season mostly invertebrates, at other times seeds and other plant material; vegetable items taken throughout year. Recorded invertebrates in diet are damselflies and dragonflies (Odonata), stoneflies (Plecoptera), grasshoppers and allies (Orthoptera), bugs (Hemiptera), adult and larval Lepidoptera, lacewings (Neuroptera), caddis flies (Trichoptera), adult and larval flies (Diptera), adult and larval Hymenoptera, beetles (Coleoptera), spiders (Araneae), snails (Pulmonata); vegetable material taken includes seeds and other parts of rose (*Rosa*), and grasses (Poaceae) including wheat (*Triticum*), rice (*Oryza*), *Sorghum*, bamboo (*Bambusa*) and *Milium*. Nestlings fed almost entirely with invertebrates. On arrival on breeding grounds in Russia, forages on low herbs and grass, taking insects and seeds, and frequently on bushes such as roses (*Rosa*), rarely on bare ground; also in larch trees (*Larix*). In Hokkaido (N Japan), in contrast, recorded as foraging mainly on ground in summer period. Outside breeding season forages in flocks, sometimes of hundreds of individuals; roosts communally, usually in bushes.
Breeding. Season normally starts from second half Jun to beginning Jul; one brood, rarely two. Nest built by female alone, taking 3–5 days, of dry grass and stalks, lined with soft pieces of grass, rootlets and sometimes hair, placed on ground in depression under tussock or roots, or slightly above ground in willow, shrub or other kind of well-covered vegetation, as a rule exposed from above; in sample of 37 nests studied in C Siberia, only three protected from above by small tree branch and six hidden by wisp of overhanging grass; territory usually 0·5–0·8 ha in C Siberia. Clutch 3–7 eggs, usually 4–5, greyish or greenish with olive or purplish-grey markings, and variable blotches and scrawls; incubation by both sexes, male doing less of the work (does not develop

On following pages: 35. Golden-breasted Bunting (*Emberiza flaviventris*); 36. Somali Bunting (*Emberiza poliopleura*); 37. Brown-rumped Bunting (*Emberiza affinis*); 38. Cabanis's Bunting (*Emberiza cabanisi*); 39. Chestnut Bunting (*Emberiza rutila*); 40. Tibetan Bunting (*Emberiza koslowi*); 41. Black-headed Bunting (*Emberiza melanocephala*); 42. Red-headed Bunting (*Emberiza bruniceps*).

brood patch), period 13–14 days; nestling period 11–14 days; young leave nest before able to fly, gain independence after a further 7–14 days. Breeding success variable: in Amur region 50% of eggs in sample of 40 nests produced fledged young, whereas in Yakutia 71% of eggs hatched, 24% lost through predation and 5% infertile; in Volga–Kama only 15% of nests successful, as 85% were deserted or failed owing to predation or because of disturbance by dogs and red foxes (*Vulpes vulpes*).

Movements. Migratory; winters from C & E Nepal, Bangladesh and NE India E to SE China (Guangdong) and Taiwan, S to N Malay Peninsula and SE Asia. Leaves breeding grounds early, and returns late. In W of range first departures end of Jul, with late records during late Aug to early Sept, and main direction seems to be E, as no evidence of passage in Kazakhstan except in NW, and many detected on migration in NE Altai and Mongolia during end Aug, when passage most intense, continuing to mid-Oct; in NE Russia (Yakutia and Kamchatka) most leave breeding areas in Aug, but those on Sakhalin I (race *ornata*) departs later (after moulting), vacating areas by middle and late Sept and, in S of island, some not until end of Oct, on average 6–9 weeks later than nominate; in NE China passage evident Aug–Oct, and in Japan present until late Sept, but many stop in Yangtze Valley (China) to moult, and in Hong-Kong passage Oct–Nov. Arrival in wintering areas in Nepal, India and Myanmar from as early as Oct, but in S of non-breeding range not until Nov. Spring migration during Apr–Jun, many/most still in wintering areas during May. Vagrants recorded W to W Europe (N to Iceland, W to Ireland, Britain, Spain), Turkey and much of Middle East, Egypt, Pakistan, Nicobar Is, Philippines, Borneo and Alaska.

Status and Conservation. VULNERABLE. Fairly common to locally abundant; declining. Estimated global population 120,000–1,000,000 mature individuals. Can attain high densities locally, e.g. 500 birds/km² in C Siberia during 1970s–1990s. In W of range, first colonized Finland during 1910–1920s, with second sustained wave of immigration from 1940s to 1960s, producing more stable population; began to decline in 1980s. Formerly one of the most numerous breeding passerines in much of Siberia, and still common in some regions, but (although no systematic surveys) severe declines noted in most breeding areas, and has disappeared from parts of its former range since 1990. Has not bred in Finland since mid-2000s, and Kazakhstan range has contracted N by 300 km since 1990; rapid decline recorded in Russia (in Moscow and Baikal regions), and severe declines recently noted also in Japan (Hokkaido) and Mongolia. No longer occurs in big numbers at migration watchpoints such as Beidaihe (NE China), and numbers at wintering sites throughout range have apparently declined rapidly over last 20 years. Main reasons for this bunting's decline thought to be hunting on wintering grounds, especially in China, and conversion of many areas of suitable habitat to agricultural use in same region. As numbers even on pristine breeding grounds have dropped very rapidly, primary cause probably excessive trapping at migration sites and, especially, wintering sites. Flocks roosting in reedbeds are flushed and then caught in mist-nets, cooked and sold as food (described as "sparrows" or "rice-birds"); this practice, previously restricted to small area of S China, has become more widespread, and hunters must now travel widely in order to find sufficient birds. More than 1,000,000 individuals killed annually and sold as "snacks", although the practice illegal in some areas. In addition, each year, in China, thousands of males are killed, stuffed and sold as mascots, their presence in the home being believed to bring happiness to the human occupants. Still in wintering areas, agricultural intensification, including shift to irrigated rice production and consequent loss of winter stubble, has reduced the amount and quality of habitat, and destruction of reedbeds has led to loss of many roost-sites. On breeding grounds, habitat quality has suffered in some areas of range; in particular, changes in flow pattern of rivers resulting from dam construction has caused drying-out of damp meadows, an important breeding habitat. Range-wide survey required in order to determine true extent of decline of this species.

Bibliography. Alström *et al.* (2008), Ananin & Ananina (1983), Anon. (2010c), Anufriev & Vartapetov (1998), Bergmann (1999), Bezuijen (2006), Brazil (1991, 2009), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Casén & Hildén (1965), Castell & Castell (2009), Chan (2004), Chernyshov (1991), Chia Hsiangkang & Li Shichum (1973), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Denisova & Gomolitskaya (1967), Flint *et al.* (1984), Fujimaki (1989), Fujimaki *et al.* (1996), Glutz von Blotzheim & Bauer (1997), Grischtschenko (2001), Hagemeijer & Blair (1997), Harrop (1993), Hongell (1977), Ilinskii (1981), Kanouchi *et al.* (1998), Kennedy (1984), Kidono (1977), Kilin (1983), Kirwan *et al.* (2008), Knystautas & Sibnev (1987), Larionov & Germogenov (1980), Lewington *et al.* (1991), Maki & Onishi (2000), Masatomi & Kobayashi (1982), Nishide (1987), Peltomaki & Jantunen (2000), Portenko & Stübs (1971d), Rasmussen & Anderton (2005a, 2005b), Rogacheva (1992), Shkatulova (1962), Slack (2009), Snow & Perrins (1998), Stresemann & Stresemann (1969), Styblo & Mlikovsky (1992), Svensson (1992), Svensson *et al.* (2009), Takano *et al.* (2001), Väisänen *et al.* (1998), Votier & Bradshaw (1996), Zvonov (2005).

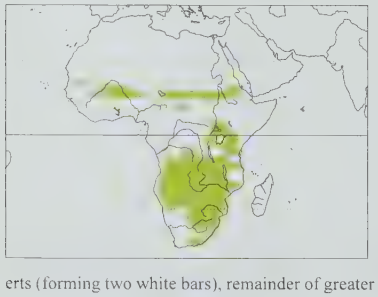
35. Golden-breasted Bunting

Emberiza flaviventris

French: Bruant à poitrine dorée **German**: Gelbbauchammer **Spanish**: Escribano Pechidorado
Other common names: African Golden-breasted Bunting, Yellow-bellied Bunting, Yellow-breasted Bunting(!)

Taxonomy. *Emberiza flaviventris* Stephens, 1815, Cape of Good Hope, South Africa.
Forms a superspecies with *E. poliopleura*. Geographical limits between some races disputed; proposed races *kalaharica* (described from Tsotsoronga Pan, in NE Botswana) and *carychroa* (Langata Forest, in SC Kenya) here included within nominate. Designated type locality of species may well be in error, as there is no evidence that the species ever occurred this far W. Three subspecies currently recognized.

Subspecies and Distribution.
E. f. flavigaster Cretzschmar, 1828 – Sahel from Mauritania E to N Ethiopia and Eritrea.
E. f. flaviventris Stephens, 1815 – S Sudan S through SC & E Africa to Botswana and South Africa.
E. f. princeps Clancey & Winterbottom, 1960 – S Angola and Namibia.



Descriptive notes. 15–16 cm; 15–28·3 g. Distinctive, with head boldly striped black and white, and flanks and lower belly whitish. Male nominate race has head black (including small area in front of and above eye) with prominent white median crownstripe, broad white supercilium and white stripe from bill back across cheek to side of nape (stripes may be washed brown in fresh plumage); hindneck grey, merging into chestnut on mantle, where variably striped paler brown; lower back and rump plain grey; tail blackish-brown, white tips on outer feathers; lesser upperwing-coverts blue-grey, white median coverts and tips of greater coverts (forming two white bars), remainder of greater coverts and flight-feathers blackish-brown with paler outer margins; chin white, throat, breast and central belly golden-yellow, washed orange on breast; flanks, lower belly and vent whitish; iris dark brown; upper mandible dark grey, lower mandible pink with dusky tip; legs pinkish. Distinguished from *E. poliopleura* by rather plain (not pale-streaked) mantle, scapulars concolorous with mantle, less white in face, and richer golden-yellow underparts; from *E. affinis* by larger size, prominent white wingbars, broader black facial stripes and plain grey (not brownish) rump; from *E. cabanisi* by slightly smaller size, obvious white cheekstripe, whitish flanks and belly, and orange wash on breast. Female is like male, but duller, with head markings washed brown and breast less richly coloured. Juvenile is even duller than female, with diffuse streaks on faded buffy-yellow breast, and rump washed brown. Race *flavigaster* is paler than nominate, with narrower black facial stripes, no black in front of eye, and plain rufous mantle; *princeps* is on average larger and paler than nominate. Voice. Male song a repeated series of sweet, clear whistles, "wee-ty, wee-ty, wee-ty, wee", "swee-ter, swee-ter, swee-ter" or "swee, swee, swee, swee-ter", sometimes ending with short trill. Calls include rather harsh "chok-weerrr" and high-pitched "tsip, tsip, tsip", given also in flight.

Habitat. Acacia (*Acacia*) and broadleaf woodland and savanna with sparse grass layer, typically in drier habitats than those preferred by *E. cabanisi*. Occurs in gardens locally, and moves into recently burnt areas within hours of fire. Persists in drainage lines invaded by mesquite (*Prosopis*) in Kalahari.

Food and Feeding. Diet includes grass seeds, soft green leaves, flower buds, and wide diversity of insects, including termites (Isoptera), hairless caterpillars, ants (Formicidae), mantids (Mantidae), small grasshoppers (Orthoptera), moths (Lepidoptera), flies (Diptera), and beetle (Coleoptera) and wasp (Vespidae) larvae. Forages on the ground in open areas; also in canopy of bushes and small trees. Takes grass seeds directly from seedheads. Singly and in pairs; may form small flocks when not breeding. Frequently visits water to drink and bathe, especially in dry season; peak visiting time early morning, with smaller peak in early afternoon.

Breeding. Season Jun–Sept in W Africa and Sahel and Sept–Apr (mainly Oct–Dec) in S Africa; varies regionally, linked to rains, in E Africa; up to three broods in a season. Monogamous; often retains same mate for several years. Breeds singly. Territorial, but moderately tolerant of other birds entering territory. Displaying male sings from elevated perch with crest raised, wings drooped, tail fanned and often orange breast feathers fluffed out; courts female by offering food and nesting material. Nest built by female, a loose cup of grass and plant stems, lined with fine material, often including animal hair, placed 0·5–2 m up in fork of bush or small tree. Clutch 2–4 eggs in most of range, only 1–2 in Sahel; white to pale greenish-blue marked around large end with black and sepia lines and dark dots and specks; incubation by female only, fed at nest by male, period 12–13 days; chicks fed by both sexes, both remove faecal sacs when chicks small (but sacs allowed to accumulate on nest rim when chicks larger), nestling period 12–17 days; adults defend brood vigorously, males occasionally performing distraction displays to lure predators from nest; juveniles continue to be fed by parents after fledging. Nests occasionally parasitized by Diederik Cuckoo (*Chrysococcyx caprius*); also, one nest with egg of Jacobin Cuckoo (*Clamator jacobinus*), thought to be case of egg-dumping by cuckoo in absence of usual hosts during drought. Breeding success variable; of eight nests studied in Zimbabwe, all failed; some chicks killed by Common Fiscal (*Lanius collaris*).

Movements. Largely resident; some local fluctuations in abundance. Sometimes wanders in small flocks outside breeding season, and may move out of areas during drought. Atlas reporting rates suggest regular movement into N Botswana from farther S in mid-summer.

Status and Conservation. Not globally threatened. Locally common. Typically tends to be the most common of the yellow-breasted buntings in Africa. Average densities in Swaziland 13 birds/km² in acacia savanna and 12 birds/km² in broadleaf woodland; in N South Africa, average of 5 pairs/km² in acacia woodland and 3 pairs/km² in broadleaf woodland. Caught for cagebird trade in some countries.

Bibliography. Armani (1985), Bannerman (1953), Borrow & Demey (2001), Brickell & Arnold (1990), Brickell & Konigkramer (1997), Byers, Olsson & Curson (1995), Chapin (1954), Clancey (1986), Clancey & Winterbottom (1960), Dean (1987, 2000), Dean *et al.* (2002), Elgood *et al.* (1994), Friedmann & Northern (1975), Fry & Keith (2004), Harrison *et al.* (1997), Hockey *et al.* (2005), Irwin (1981), Jerrard (2005), Lawson & Edmonds (1983), Lewis & Pomeroy (1989), Monadjem (2001, 2002), Oatley (2005), Panagis & Stutterheim (1985), Skead, C.J. (1995), Skead, D.M. (1960, 1975), van Someren (1956), Tarboton (1980, 2001), Urquart (1992), Vernon (1970, 1978, 1984), Vincent (1949).

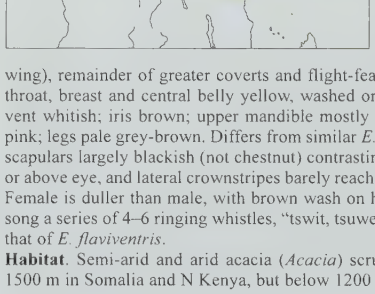
36. Somali Bunting

Emberiza poliopleura

French: Bruant de Somalie **German**: Somaliammer **Spanish**: Escribano Somalí
Other common names: Somali Golden-breasted Bunting

Taxonomy. *Fringillaria poliopleura* Salvadori, 1888, Soddè, Shewa, Ethiopia.
Forms a superspecies with *E. flaviventris*. Monotypic.

Distribution. Locally from Ethiopia and Somalia, also extreme SE Sudan and NE Uganda, S through Kenya to NE Tanzania.



Descriptive notes. 14–15 cm; 14–18 g. Male has head striped black and white, including prominent white median crownstripe (white stripes may be washed brown in fresh plumage); hindneck grey, mantle feathers chestnut with pale grey margins, appearing strongly streaked, scapulars with broad blackish centres then chestnut with narrow pale grey margins on outer webs, whitish-buff on inner webs; lower back and rump grey, back with diffuse blackish spots; tail blackish-brown, white tips on outer feathers; lesser upperwing-coverts grey, white median coverts and tips of greater coverts (forming two white bars on folded wing), remainder of greater coverts and flight-feathers blackish-brown with paler outer margins; throat, breast and central belly yellow, washed orange on central breast; flanks, lower belly and vent whitish; iris brown; upper mandible mostly dusky, with pink cutting edge, lower mandible pink; legs pale grey-brown. Differs from similar *E. flaviventris* in having strongly streaked mantle, scapulars largely blackish (not chestnut) contrasting with mantle, face whiter (no black in front of or above eye, and lateral crownstripes barely reach bill), slightly less white in tail, underparts paler. Female is duller than male, with brown wash on head. Juvenile is similar to female. Voice. Male song a series of 4–6 ringing whistles, "tswit, tsuwee tsuwee tsuwee", shorter and less variable than that of *E. flaviventris*.

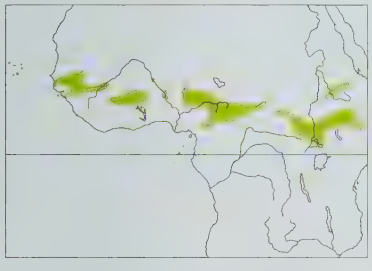
Habitat. Semi-arid and arid acacia (*Acacia*) scrub; to 2000 m in Ethiopian Rift Valley and to 1500 m in Somalia and N Kenya, but below 1200 m in C & S Kenya.

Food and Feeding. Diet mainly grass seeds; also some soft green leaves and insects, including termites (Isoptera), beetle larvae (Coleoptera) and moths (Lepidoptera). Forages mainly on ground. Often in small groups.
Breeding. Little known. Season mainly Apr–Jun (rarely Sept) in Ethiopia, Somalia and N Kenya, and Nov–Jan in S Kenya and Tanzania. Nest a cup of grass stems built in fork of bush. Clutch 2–3 eggs, white with grey-brown markings; incubation period in captivity 12 days; nestling period 16–18 days. No other information.
Movements. Presumably mostly resident. Occasionally attracted to lights at night in Kenya, and one extralimital record in NC Tanzania suggests some local movement.
Status and Conservation. Not globally threatened. Fairly common in most of fragmented range. Density 1 bird/ha in Tsavo East National Park, in Kenya.
Bibliography. Archer & Godman (1961), Armani (1985), Ash & Miskell (1998), Backhurst & Pearson (1977), Brickell & Konigkramer (1997), Byers, Olsson & Curson (1995), Fry & Keith (2004), Lack (1985), Lewis & Pomeroy (1989), Moreau & Moreau (1939).

37. Brown-rumped Bunting
Emberiza affinis

French: Bruant à ventre jaune **German**: Braunbürzelammer **Spanish**: Escribano Culipardo

Taxonomy. *Emberiza affinis* Heuglin, 1867, no locality = probably Dar Bertat, western Ethiopia. Four subspecies recognized.
Subspecies and Distribution.
E. a. nigeriae Bannerman & Bates, 1926 – Senegambia E to Nigeria and N Cameroon.
E. a. vulpecula Grote, 1921 – C Cameroon, S Chad and Central African Republic.
E. a. affinis Heuglin, 1867 – S Sudan, NE DRCongo, NW Uganda and (most likely this race) N Ethiopia.
E. a. omoensis Neumann, 1905 – S Ethiopia.

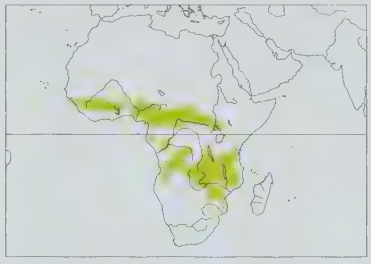


Descriptive notes. 13–15 cm; 14·5–18 g. A small bunting with rather slender bill, extensive white on face and extensively yellow below; lacks white wingbars of other African yellow-breasted buntings. Male nominate race has white head with black lateral crownstripe, black stripe extending from behind eye to back of ear-coverts, then continuing down to join up with slender black moustachial stripe; hindneck grey-brown, merging into chestnut on mantle and back, rump slightly paler, uppertail-coverts grey; tail blackish-brown, white tips on outer feathers; upperwing-coverts grey-brown with narrow pale margins, flight-feathers blackish-brown with narrow brown outer margins; chin whitish, throat and underparts yellow, washed rufous on breast, vent whitish; iris dark brown; upper mandible dusky grey, lower mandible paler greyish-blue; legs pale grey-brown. Female is slightly duller than male, white stripes on head with buff wash, dark stripe blackish-brown. Juvenile is duller than female, has brown lateral crownstripes streaked blackish, pale areas on face sandy brown, underparts dull buffy yellow. Race *vulpecula* is darker and plainer above than nominate; *omoensis* is dark brown above; *nigeriae* is paler, with grey-brown mantle streaked chestnut-brown, buff margins of greater upperwing-coverts forming pale wingbar in fresh plumage. Voice. Male song a short, buzzy trill lasting 1–1·5 seconds. Liquid contact call like that of a bulbul (Pycnonotidae) given from perch; short "chip" in flight.
Habitat. Mesic woodland, including riparian woodland fringe and locally around villages. Reportedly favours areas with large termitaria.
Food and Feeding. Diet of specimens from DRCongo contained insects, including termites (Isoptera); in captivity feeds on seeds of grasses and forbs, as well as beetle larvae (Coleoptera), crickets (Gryllidae) and spiders (Araneae). Forages on ground. Generally singly and in pairs.
Breeding. Little known. Only one nest reported, in Sudan in Mar; fledged chicks in Dec in Gambia. Nest not described; suspected as nesting in cavity in termitarium. In captivity, clutch 3–4 eggs, incubation period 12 days, nestling period 14–17 days. No other information.
Movements. Little known. Presumably mostly resident; most records in W Africa are in wet season, but this may simply reflect greater conspicuousness of males when breeding.
Status and Conservation. Not globally threatened. Generally local and scarce. May be locally common, with up to 8 males singing within 1 km.
Bibliography. Anon. (1995), Armani (1985), Bannerman (1953), Barlow *et al.* (1997), Borrow & Demey (2001), Brickell & Konigkramer (1997), Byers, Olsson & Curson (1995), Chapin (1954), Cheke & Walsh (1996), Elgood *et al.* (1994), Fry & Keith (2004), Grimes (1987), Lewis & Pomeroy (1989).

38. Cabanis's Bunting
Emberiza cabanisi

French: Bruant de Cabanis **German**: Cabanisammer **Spanish**: Escribano de Cabanis
Other common names: Cabanis's Yellow Bunting; Angola Bunting (*cognominata*); Three-streaked Bunting (*orientalis*)

Taxonomy. *Polymitra* (*Fringillaria*) *cabanisi* Reichenow, 1875, Cameroon.
Race *orientalis*, geographically separated from others, sometimes considered to represent a separate species; on other hand, *cognominata* sometimes synonymized with it. Three subspecies recognized.
Subspecies and Distribution.
E. c. cabanisi (Reichenow, 1875) – W Africa locally from Guinea and Sierra Leone E to Cameroon, Gabon, PRCongo, N DRCongo, S Sudan and NW Uganda.
E. c. cognominata (Grote, 1931) – C Africa from Gabon, PRCongo and Angola E to W Zimbabwe.
E. c. orientalis (Shelley, 1882) – Tanzania S to E Zimbabwe and Mozambique.
Descriptive notes. 16–17 cm; 18–27 g. A fairly large bunting with mostly dark head. Male nominate race has dark crown (little evidence of paler median stripe), white supercilium, and blackish ear-coverts and cheek contrasting with white throat; upperparts dark grey-brown, diffuse blackish streaks on mantle; tail blackish-brown, white tips on outer feathers; lesser upperwing-coverts dark grey-brown, median coverts and tips of greater coverts white (forming two white bars on folded wing), remainder of greater coverts and flight-feathers blackish-brown with paler outer margins; underparts yellow, sometimes tinged olive, with white undertail-coverts; iris dark brown; upper mandible blackish, lower mandible horn-coloured; legs horn-grey. Differs from other three African yellow-breasted buntings in dark side of head lacking white cheekstripe, grey (not chestnut-brown or brownish) mantle, lack of orange wash on breast. Female is duller than male, with brown-washed head and tawny wash on breast, wingbars less prominent (median coverts have blackish centres, and white tips of greater coverts reduced). Juvenile resembles a dull female, with brownish head, buff-washed supercilium and pale buff-yellow underparts. Race *orientalis* male has blacker head with more prominent pale median crownstripe (although still streaked blackish), mantle paler grey with more prominent streaking, yellow of breast extending onto throat, female more heavily streaked above, juvenile also has diffuse streaking on breast; *cognominata* is on average larger than previous, with rufous-washed crown and mantle. Voice. Male song varied, typically a repeated series of sweet, clear whistles, often reminiscent of that of *E. flaviventris*, but may also incorporate slow trills. Calls include ascending "burreee" and descending "tseeoo"; flight call "tsip".

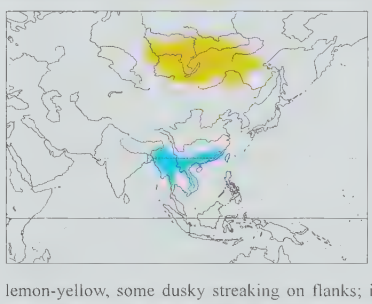


Habitat. Broadleaf woodland and well-wooded savanna, including guinean savanna in W Africa and miombo (*Brachystegia*) woodland in C Africa. Often in rocky areas or open woodland with little or no understorey. Also locally in degraded scrub and along fringe of riparian forest.
Food and Feeding. Diet mainly insects, especially small grasshoppers (Orthoptera), and grass seeds; also other insects, including beetle larvae (Coleoptera). Forages on ground, singly and in pairs; sometimes joins mixed-species parties.
Breeding. Season Jul–Aug in W Africa and Sept–Mar (mainly Oct–Nov) in SC Africa. Monogamous. Solitary nester. Nest constructed by female, male occasionally delivers material, a loose, shallow cup of twigs, dry leaves and grass, lined with fine grasses and rootlets, built 1–5 m up in bush or small tree, usually well concealed among dense foliage. Clutch 2–3 eggs, white to pale green with grey-brown markings; incubation by female, fed at nest by male, period 12–14 days; nestling period 16 days. Nests occasionally parasitized by Klaas's Cuckoo (*Chrysococcyx klaas*).
Movements. Largely resident, subject to local movements in relation to drought. Listed as a summer visitor (Mar–Aug) at Ibadan, in Nigeria.
Status and Conservation. Not globally threatened. Scarce or uncommon through much of its range; locally common in some areas.
Bibliography. Anon. (1993), Armani (1985), Benson (1941), Borrow & Demey (2001), Brickell & Arnold (1990), Brickell & Konigkramer (1997), Byers, Olsson & Curson (1995), Chapin (1954), Cheke & Walsh (1996), Clancey (1965), Dean (2000), Elgood (1959), Elgood *et al.* (1994), Fry & Keith (2004), Grimes (1987), Harrison *et al.* (1997), Hockey *et al.* (2005), Irwin (1981), Skead (1960), Tarboton (2001), Vincent (1949).

39. Chestnut Bunting
Emberiza rutila

French: Bruant roux **German**: Rötelammer **Spanish**: Escribano Herrumbroso
Other common names: Ruddy Bunting

Taxonomy. *Emberiza rutila* Pallas, 1776, Onon River and towards the Mongolian border.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. pusilla*, *E. rustica*, *E. aureola*, *E. sulphurata* and *E. spodocephala*, forming a subclade with them; it has been suggested that they form a polytomous group of species, probably the result of a rapid, "simultaneous" radiation. Proposed race *pamirensis* (described from Trans-Alai Range, in Pamir Mts) considered invalid, as based probably on vagrant birds. Monotypic.
Distribution. Breeds in C & E Siberia from Krasnoyarsk (N possibly to Podkamennaya Tunguska) E to S coast of Sea of Okhotsk, and S to L Baikal and Chita regions and NE China (Khingan Mts, in N Heilongjiang); probably also regularly in NE Mongolia (Khentii) and in Russian Far East (Sikhote Alin Range, in Ussuriland). Winters in Myanmar, S China, W Thailand, Laos and Vietnam.



Descriptive notes. 14–15 cm; 12–24 g. Medium-sized bunting with relatively short tail, longish bill and, in all plumages, yellow on underparts, unstreaked chestnut rump and almost no white on tail. Male breeding is distinctive, with head, breast and upperparts, including upperwing-coverts, uniformly chestnut, sharply demarcated from yellow of belly; tail feathers uniformly brown, small area of white at tip of outer rectrices; primaries and secondaries brown, narrow pale edges on primaries and chestnut edges on secondaries, tertials similar in colour to upperparts, but most of inner web brown; underparts below breast lemon-yellow, some dusky streaking on flanks; iris dark chestnut-brown; bill brown or bluish-horn, often paler bluish or dull pinkish-horn on most of lower mandible; legs typically pinkish, but variable. Male non-breeding (fresh plumage) is rather similar to breeding, with general chestnut colours concealed by pale fringes, especially on throat and superciliary area. Female breeding has crown greyish-brown, dark lateral crownstripe with some mixed chestnut, rather indistinct buff supercilium, rest of face dull buffish-brown, framed by brown postocular stripe which continues down and skirts ear-coverts to join narrow brown moustachial stripe, beneath which is pale buff submoustachial stripe, greyish to dusky brown malar stripe, and pale buff throat; nape greyish-brown with some indistinct streaks, mantle dark-streaked greyish-brown, back to uppertail-coverts plain rufous; lesser upperwing-coverts rufous-brown with some olive tinge, median and greater coverts with buffy tips (forming more distinct wingbars than in male plumages); breast and undertail-coverts often with some fine streaking, flanks with more prominent streaks; bare parts as on male. Female non-breeding is similar to breeding, but with upperparts and breast browner. Juvenile is in general similar to female non-breeding, but with more distinct streaks on crown and mantle, streaks on back and rump (absent in other plumages), breast buffish with prominent streaking, flanks, belly and undertail-coverts yellow, flanks with prominent black streaks; first-winter male similar to female non-breeding, but chestnut tones usually visible on crown, ear-coverts and/or breast, throat buffish without chestnut tones, mantle and scapulars olive grey-brown with brown streaks, lesser upperwing-coverts as on adult non-breeding, sometimes tinged olive, edges of median and greater coverts rather paler or buffish (but not forming visible wingbars); first-summer male similar to previous, but more evident chestnut tones on head and throat (paler fringes reduced by wear);

second-winter rather like male non-breeding, but with some features of first-winter, differs from adult in having broader fringes obscuring chestnut pattern of feather centres, buffish throat without chestnut base of feathers, wider pale tips on median and outer greater coverts (more obvious wingbars); presumed second-summer male similar to male breeding, but median coverts have dark bases and greater coverts dark centres, and both have wider pale tips (faint wingbar); first-winter female similar to adult, differing only in lack of rufous tones on lesser coverts, crown, mantle and scapulars. Voice. Song, from inconspicuous perch in tree, usually 3 slow pure notes followed by a characteristic thrilling, "tvia tvia tvia sre-sre-sre sisicha"; reminiscent of song of Pallas's Leaf-warbler (*Phylloscopus proregulus*) or of Olive-backed Pipit (*Anthus hodgsoni*); also somewhat similar to song of *E. spodocephala*, but more uniform and lower-pitched. Usual call "zick", similar to that of *E. pusilla*; also a thin high "teseep".

Habitat. Breeds in open forest with shrubby ground cover in S taiga, in coniferous forests of pine (*Pinus*) or larch (*Larix*), also in deciduous alder (*Alnus*) and birch (*Betula*), as well as in mixed forest, often on ridges of hills or slopes of mountains. In winter favours open forest, edges of woodlands and clearings, and cultivated land, from lowlands and foothills to 2500 m. During migration found also in grain fields, rice stubbles and bushes in cultivations, and open tall herb fields.

Food and Feeding. Diet during breeding season mainly invertebrates, such as caterpillars and other insects, as well as seeds; during migration and winter mostly seeds. Forages mainly on ground, flying up to branches of nearby trees when disturbed. Outside breeding season usually in small flocks.

Breeding. Season starts usually first half of Jun, very early after they arrive to the breeding territories. Nest built from grass blades, lined with thin rootlets, concealed on ground among shrubs. Clutch c. 4 eggs, white, tinged bluish, with brown streaks, black curls and some violet-brown streaks. No other information.

Movements. Migratory; winters in region from Myanmar E to SE China (Guangdong), S to W Thailand, Laos and Vietnam, less regularly in NE India (Manipur and N Cachar). Departure from breeding grounds mostly during Aug; speed of movement to S rather slow, since peak passage through Korea and NE China in Sept–Oct, although first migrants pass through this area earlier, and through lower Yangtze Valley during Oct–Nov, and in Hong Kong in Oct–Dec; scarce but regular migrant during Oct in Japan, where also some wintering records. Spring migration begins during Mar, with passage recorded in Hong Kong in Mar–Apr, and through E & NE China and Korea during Apr–May; arrives on breeding territories late May to early Jun. Vagrants recorded W to Tajikistan, Pakistan (Chitral), Ladakh, Nepal and Sikkim; also Europe (Norway, Finland, Britain Netherlands, Slovenia and Malta), where at least some records probably involve escaped cagebirds.

Status and Conservation. Not globally threatened. Common to locally fairly common. Global population not properly quantified, but species considered to be common during breeding season in S taiga and probably in most of its range. No evidence of any declines, and population considered stable, with no known imminent threats.

Bibliography. Alström *et al.* (2008), Brazil (2009), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Dorzhiev & Jumov (1991a), Flint *et al.* (1984), Glutz von Blotzheim & Bauer (1997), Groselj (1988), Hinskii (1981), Knystautas & Sibley (1987), Lewington *et al.* (1991), Macdonald & Wessels (1998), MacKinnon & Phillipps (2000), Nam Hyun-Young *et al.* (2011), Osborn & Harvey (1994), Pettomaki & Jantunen (2000), Rasmussen & Anderton (2005a, 2005b), Robson (2000), Rogacheva (1992), Shaw (2008), Snow & Perrins (1998), Sulpin (1932), Sultana & Gauci (1984–1985), Svensson (1992), Svensson *et al.* (2009), Tourenq *et al.* (1996), Valchuk (2003), Votier & Bradshaw (1996), Watanabe (2009), Yamanoguchi (1975), Zöphel *et al.* (2005).

40. Tibetan Bunting

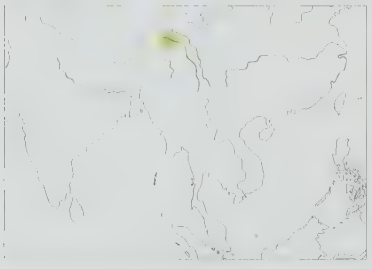
Emberiza koslowi

French: Bruant de Koslov **German**: Tibetammer **Spanish**: Escribano Tibetano
Other common names: Kozlov's/Koslow's Bunting

Taxonomy. *Emberiza koslowi* Bianchi, 1904, Dza Chu River, Lancang Jiang (Upper Mekong), east Xizang, China.

Affinities uncertain, perhaps a distant relative of *E. cioides*; has been thought to be closer to *E. leucocephalos* than to *E. rutila* or *E. melanocephala*. Monotypic.

Distribution. Upper reaches of R Lancang Jiang (Mekong), R Nu Jiang (Salween) and R Chang Jiang (Yangtze) in small area of NE Tibetan Plateau around Xizang–S Qinghai border of China.



Descriptive notes. 16 cm; c. 25 g. Distinctive stocky, rather bull-necked and relatively long-tailed bunting with prominent long supercilium. Male breeding has black crown bordered by wide white supercilia which narrowly meet on upper nape; lores and cheek to chin reddish-brown, ear-coverts black; nape greyish-brown, mantle and scapulars unmarked bright reddish-chestnut, back, rump and uppertail-coverts grey, washed olive; lesser and median upperwing-coverts grey, greater coverts and tertials reddish-chestnut, tertials with blackish centres; secondaries and primaries brownish-black; tail dark brown, central feather pair lighter, two outermost pairs with extensive white; throat, rear malar region and chest pure white, bordered below by black breastband, lower underparts grey, paling to whitish vent and undertail-coverts, latter with variable pinkish tinge; iris dark brown; bill blue-black; legs clear orange-yellow, toes darker. Male non-breeding is duller, with grey tips on feathers of crown and ear-coverts and dark mottling on rear supercilia and side of throat; breastband with greyish tipping, extending as weak streaking along flanks (most marked on rear flanks); upperparts weakly streaked to variable extent, with dark streaking on scapulars, rump and uppertail-coverts, but dull brown mantle streaked buff; lower mandible pale with dark tip. Female breeding has crown, nape, ear-coverts and side of neck olive-grey to reddish-grey, crown and nape finely streaked dark brown or reddish, darkish grey ear-coverts dulled by inconspicuous fine pale streaking, buff supercilium quite prominent, highlighted above by dark line along side of crown; lores to below eye pale yellowish-brown; mantle brownish-grey, streaked with black and variable amounts of chestnut, scapulars chestnut with dark shaft streaks, back, rump and uppertail-coverts light grey with olive wash; upperwing-coverts dark grey, medians with white tips (white wingbar), greaters with rufous edges and white tips, tertials blackish with rusty edges, flight-feathers brownish-black and narrowly edged buff; tail as on male; throat and upper breast whitish, washed light buff, with diffuse dark markings (forming inconspicuous malar stripe), weak collar of dark spots and streaks across upper breast separating pale grey of lower underparts from whitish throat; undertail-coverts light cinnamon-rufous; upper mandible grey, lower mandible paler. Non-breeding female in fresh plumage undescribed. Juvenile undescribed; first-winter male (worn late-winter plumage) similar to adult breeding, but duller above, mantle having broad buffy feather fringes, back, rump and uppertail-coverts greyish with strong olive wash, throat often with light buff wash, dark breastband obscured by greyish tips, merging with greyish-olive of lower underparts, paling towards vent, undertail-coverts pale yellow. Voice. Song, from stunted bushtop or boulder, an uncomplicated little phrase, has been transcribed as a twittering "tisp tsi tsi chiriree teetew", sometimes first note a little lower in pitch and phrase terminates in quiet jumble of notes, e.g. "chep chip chip chiriree chip-chee chuee tsi"; in general very similar to song of *E. godlewskii*. Two calls reported: one a drawn-out thin "seeee" (possibly as alarm, or a contact note given by foraging birds on ground); flight call a weak "tsip tsip".

Habitat. Relatively barren, steep scrubby slopes above tree-line. Favours mixture of dwarf alpine shrubs, notably cotoneaster (*Cotoneaster*), juniper (*Juniperus*), barberry (*Berberis*), *Ribes*, *Rosa* and *Cistus*, at foot of steep cliffs in areas of alpine grassland where seasonal grazing by yaks (*Bos grunniens*) can be heavy. Between 3600 m and 4600 m; marginal range overlap with *E. godlewskii*, but generally at higher elevations than latter.

Food and Feeding. Little information. Diet presumably various seeds, but in breeding season no doubt primarily insectivorous. Following prey items identified as brought to the one studied nest: several flies (Diptera), including a cranefly (Tipulidae), various small caterpillars and a small butterfly/moth (Lepidoptera), and a grasshopper (Orthoptera). Forages almost entirely on ground. Typically encountered in pairs or family parties; small flocks reported in winter.

Breeding. Virtually undocumented. Breeding thought not to commence until very end of Jun or early Jul. Following details based on one studied nest. Nest was composed of grass and herb stems up to 2 mm in diameter, cup lined with finer grasses, placed at ground level in small spiny *Astragalus* shrub (c. 20 cm tall), afforded some extra protection by nearby willow (*Salix*) clump c. 1 m in height; nest domed (unique among buntings), with roof of dome interwoven within twigs of the *Astragalus*. Nest held three nestlings c. 12 days old on 28th Jul; both parents fed young, majority of the 21 visits during 3·5-hour observation period by male, parents flew 200–300 m from nest to foraging areas, returning very cautiously, dropping to ground and walking to nest.

Movements. Assumed to be resident; perhaps descends a little in severe winter weather, but no evidence of this.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in the Eastern Tibet EBA. Rare and little known. Confined to E part of Qinghai–Tibetan Plateau, where several large valleys cut into the plateau, including those of R Tongtian (upper reaches of Chang Jiang, or Yangtze), R Lancang Jiang (upper Mekong) and R Nu Jiang (upper Salween); known from Qumarlab S to Chamdo and from Zadoi E to Yushu; in 1997 a healthy population was found on Kanda Shan Pass, 90 km SW of Yushu. Global population thought to be small. Appears to be rare and localized, existing in "pockets", and seemingly absent from extensive areas of suitable-looking habitat. Further research needed, not only in looking for new sites, but also in assessing the species' habitat requirements, with particular emphasis on effects of grazing by yaks and its winter survival techniques.

Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Collar *et al.* (1994), Olsson (1995), Robson (1986), Schäfer (1938), Schäfer & Meyer de Schauensee (1939), Stattersfield & Capper (2000), Thewlis & Martins (2000).

41. Black-headed Bunting

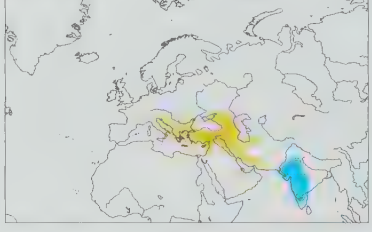
Emberiza melanocephala

French: Bruant mélanocéphale **German**: Kappenammer **Spanish**: Escribano Cabecinegro

Taxonomy. *Emberiza melanocephala* Scopoli, 1769, Carniola, Slovenia.

Forms a superspecies with *E. bruniceps*, and both sometimes placed in genus *Granativora*; recent phylogenetic study indicates that they are closely related to *M. lathami*. Hybridizes with *E. bruniceps* in area of Caspian Sea. Monotypic.

Distribution. Breeds in SE Europe from Italy and Balkans E to Black Sea coast, from E Ukraine (E of R Dnieper) and SW Russia E to NW Caspian region and S to N Caucasus region (absent from Greater Caucasus) and, in S, from Aegean islands and Turkey E to E Georgia, Azerbaijan and NE & SW Iran (in S locally E to Baluchistan) and S to Israel, W Jordan and N Iraq. Winters in W India.



Descriptive notes. 15·5–17·5 cm; 23–33 g. Fairly large bunting with rather long bill, lacking white in outer tail. Male breeding is distinctive, with head black, side of neck and throat bright yellow; nape and upperparts, including lesser upperwing-coverts, reddish-brown to bright chestnut; tail feathers black-brown, outer pair narrowly edged buff-brown; median and greater upperwing-coverts brown with pale buffish edges (forming two wingbars), flight-feathers and tertials black-brown with narrow pale buffish edges; bright yellow below, side of breast more rufous, occasionally with some rufous tinge on flanks; iris dark brown; bill rather long, lead-blue, often duskier on culmen; legs deep flesh-coloured. Male non-breeding (fresh plumage) is like breeding male, but black head feathers have sandy fringes, and colour of upperparts obscured by greyish-brown feather fringes. First-winter male has greyish crown streaked dark, supercilium, lores, side of neck and throat pale buff, ear-coverts, nape and most of upperparts greyish-brown and all faintly streaked, uppertail-coverts and lesser upperwing-coverts greyish-brown, breast tinged pinkish-buff, especially at side, belly paler with some yellowish wash, undertail-coverts pale yellow; very similar to *E. bruniceps* in similar plumage (often not separable in the field). Female breeding is similar to first-winter male, but paler and greyer; some have rufous tones on upperparts or side of breast as on male breeding. Female non-breeding is rather similar to breeding, thus similar also to first-winter male, but sometimes with yellow on throat, breast, belly and/or undertail-coverts; very similar to corresponding plumage of *E. bruniceps*, but forehead and crown on average more streaked (never unstreaked), and rump less yellow, also can appear shorter-tailed, larger-billed, with longer primary projection and more yellow below. First-winter female is virtually indistinguishable from first-winter male. Juvenile is rather similar to female breeding, but feathers on forehead, crown, neck, mantle and back brown with distinct buff edges, rump lacks obvious yellow or rufous (normally has a few tiny spots), chin to belly whitish, hint of a band across chest formed by dark brown shaft streaks, side of chest, side of belly and flanks on average more buffish-tinged. Voice. Song, normally from vantage point such as treetop, wire or rock, also in flight, usually a short series of "zrt" notes followed by a slightly accelerating phrase at low pitch, "zrit zrit srutt srutt-srutt sutteri-sutt sutterrih" or "zrt zrt priiprii chi-chiwu-chiwu ze-triiiuurr". On breeding grounds calls rather varied, e.g. "chiip", "chleep" or

"chlip" like those of House Sparrow (*Passer domesticus*), also "dzuu" or "prriu" like some notes of Eurasian Bullfinch (*Pyrrhula pyrrhula*); flight call "chuhp" like that of *E. citrinella*, also sharp "tsik" similar to that of *E. hortulana*. All vocalizations very similar to those of *E. bruniceps*, and normally very difficult or impossible to distinguish by human ear, being only a little less thin or less metallic than latter's.

Habitat. Breeds in open areas with dispersed trees, shrubs and hedges, from sea-level locally to c. 2000 m, exceptionally to 2900 m. Common in olive groves, orchards and vineyards, and in thickets or groves along field borders, in open forests with undergrowth, in open fields with thorny scrub, and on slopes of mountains with dense vegetation (for nest-sites) and vantage points (for songposts). Also, less commonly, in forested areas, maquis, wooded steppes and thickets, where it favours dense and tall bushy vegetation. Seems to avoid damp localities. In winter found on cultivated fields, also in scrub-jungle, roosting in thorn-scrub and thickets; mainly in plains.

Food and Feeding. During breeding season mostly invertebrates, also seeds and other plant material. Recorded invertebrates in diet include larval mayflies (Ephemeroptera), crickets (Orthoptera), earwigs (Dermaptera), cicadas (Cicadidae), larval Lepidoptera and Diptera, ants (Formicidae), beetles (Coleoptera) and hartvestmen (Opiliones). Among plant material recorded are seeds of bugloss (*Anchusa*) and *Salvadora*, and of grasses (Poaceae) including millet (*Pennisetum*, *Panicum*), wheat (*Triticum*), maize (*Zea*), *Sorghum* and rice (*Oryza*). Normally forages on the ground or in bushes or low in trees. Occurs singly and in pairs when breeding; postbreeding flocks in Israel can number a few dozen individuals to hundreds; on spring migration, flocks mostly of 10–30 (50) birds; in winter found in medium-sized to large flocks, sometimes numbering several thousand, often mixed with *E. bruniceps*; the two roost together in sometimes huge numbers, frequently associated with other passerines.

Breeding. Season starts mid-May and at peak during Jun; normally single-brooded, possibly sometimes two broods. Male performs song flight, flying on level course with shallow wingbeats and dangling legs, less often ascending at angle and parachuting down on spread wings. Territory size c. 17 ha per pair, and mean distance of 230 m between close territories. Nest built by female, a loosely constructed cup of grass and dead leaves, with lining of finer grass, rootlets, stems and hair, often brightly coloured flowerheads on outside of structure, located normally below 2 m under thorny shrub, low bush or vine, sometimes up to 3 m above ground in low tree; in study in Italy, preference for cardoon (*Cynara cardunculus*), common golden thistle (*Scolymus hispanicus*) and milk thistle (*Silybum marianum*) noted. Clutch 4–5 eggs, rarely 6 or 7, pale greenish-blue, finely spotted with dull reddish-brown; incubation by female, 10–16 days, usually 13–14 days; role of male in brood-tending unclear, in some studies reported as contribution very little or nothing, in others male fed chicks, nestling period 14–16 days; juveniles remained in vicinity of nest, less than 100 m from it, for 3–4 days before dispersing. Losses of clutches due mostly to adverse weather (storms) and the activity of snail-pickers.

Movements. Migratory; winters in W India, mainly in plains in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra and N Karnataka. Seems to be rather scarce visitor in Nepal, mostly in E lowlands. Leaves breeding grounds late Jul and Aug; flies on rather direct SE heading, apparently at good speed, as it can arrive in wintering areas in India as early as Aug–Sept. Vacates winter quarters during Mar–Apr; regular in low numbers on passage across Arabia. Regular spring vagrant in W Europe (records N & W to Iceland, Fennoscandia, Ireland, Britain and Spain) and N Africa (Morocco, Algeria, Tunisia); recorded also in C Asia (L Baikal area). Also, recorded recently with degree of regularly in E Asia, mainly offshore Korea and S Japan and mainland E China (Fujian), as well as Thailand, Laos, Hong Kong and Borneo.

Status and Conservation. Not globally threatened. Common to locally very common. Breeding population of Europe estimated at 2,800,000–9,300,000 pairs. Densities can be locally very high, reaching concentrations of 137 pairs/km², but usually 30–50 pairs/km² in areas of optimal habitat; in an Italian study, average of 1·2 males/10 ha, with an excess of males reported. Has bred in France and Switzerland. Regularity of records of supposed vagrants in E & SE Asia has led to speculation that this species may have an additional, as yet undiscovered breeding population in that part of world; further fieldwork required. Global population thought to be declining because of changes in agricultural practices and removal of hedges and shrubs in parts of its range. Conversion of richly structured fields to intensive agriculture, creating larger fields and at same time extending use of pesticides, has been particularly evident in Greece, where olive groves replaced by maize fields, and in Slovenia, where corn fields replaced by commercial fruit-growing. Large decrease in breeding numbers between 1970 and 1990, after which a slight increase noted during 1990–2000, mainly in Turkey, the species' stronghold; this small increase has not yet brought population back to its previous levels.

Bibliography. Alström *et al.* (2008), Antonov *et al.* (2008), Balát (1963), Baxter & Shaw (2007), Belousov (1999), Brambilla *et al.* (2004), Byers, Olsson & Curson (1995), Castell (1996), Castell & Castell (2009), Cramp & Perrins (1994), Dierschke (2007), Dontschev (1973), Duckworth *et al.* (1998), Dupuy & Dupuy (2000), Dupuy *et al.* (2002), Dymond (1999), Étchécopar (1961), Fairbank (1994), Géroudet (1967), Glutz von Blotzheim & Bauer (1997), Guerrieri *et al.* (1994), Haffer (1977), Hagemeijer & Blair (1997), Kirwan *et al.* (2008), Kumar (1988, 1997), Kumar & Tewary (1982), Kumar, Rani & Singh (2006), Kumar, Singh *et al.* (2001), Leader (1996), Makatsch (1979), Massa & Fontana (2004), Mauersberger (1960d), McCarthy (2006), Meiklejohn (1936), Millington (1995), Mishchenko (1983), Mishra & Tewary (1998, 1999a, 1999b, 2000), Nikolov & Spasov (2005), Owen (1977), Pätzold (1975), Pilgrim *et al.* (2009), Rani *et al.* (2006), Rasmussen & Anderton (2005a, 2005b), Rubinic (2002), Shapoval (1997), Shirihai & Gantlett (1993), Slack (2009), Snow & Perrins (1998), Stoyanov *et al.* (2005), Stresemann (1919), Svensson (1996), Svensson *et al.* (2009), Szabó-Szeley (2004), Tewary & Kumar (1982), Thewlis (1995), Vrezec (2001b).

42. **Red-headed Bunting**

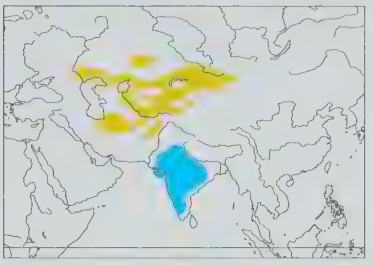
Emberiza bruniceps

French: Bruant à tête rousse **German**: Braunkopfammer **Spanish**: Escribano Carirrojo

Taxonomy. *Emberiza bruniceps* J. F. Brandt, 1841, Turkmenistan.

Forms a superspecies with *E. melanocephala*, and both sometimes placed in genus *Granativora*; recent phylogenetic study indicates that they are closely related to *M. lathami*. Hybridizes with *E. melanocephala* in area of Caspian Sea. This species has sometimes been referred to by name *E. icteria*, but present name has priority. Monotypic.

Distribution. Breeds from the Volga–Ural interfluve (S from just N of Caspian Sea, c. 51° N) E through Kazakhstan to S Altai Mts, W Mongolia and NW China (Xinjiang), and S to NE Iran, Turkmenistan, NW & E Afghanistan, Uzbekistan, Tajikistan and Kyrgyzstan. Winters in India.



Descriptive notes. 15–16·5 cm; 18–34 g. A fairly large bunting with relatively long tail, and without white on outer rectrices. Male breeding is very distinctive, with head down to breast red-brown, hindneck and most of upperparts yellowish-olive, mantle and back with dark streaks, scapulars with brownish outer webs, rump yellow, uppertail-coverts brown (often tinged yellowish); lesser upperwing-coverts yellow-olive, rest of wing feathers dark brown, median coverts with broad buff to whitish tips, greater coverts and flight-feathers (including tertials) with buff fringes, often bleaching to whitish at tips of greater coverts and forming a weaker second pale wingbar; side of neck and underparts below breast bright yellow; iris dark brown; bill blue-grey, a little darker on tip, sometimes tinged pinkish at base; legs pale flesh-coloured. Male non-breeding is similar to previous, but feathers of fresh plumage have pale fringes, concealing general bright pattern of summer plumage created by colour of feather centres; rufous apparent on breast and ear-coverts. First-winter male and female are broadly similar to female non-breeding, with less rufous tones on breast and upperparts, buffish-white breast, usually with fine streaks, and more streaked grey-brown upperparts without yellow-green tones of adult, especially on rump; normally inseparable from equivalent plumage of *E. melanocephala* under field conditions, but primary projection marginally shorter, with usually 3–4 exposed primaries beyond tertials (*E. melanocephala* normally 4–5, rarely 6), and bill marginally shorter. Female breeding is in general similar to first-winter, with less marked streaks on upperparts, bright yellow rump (absent in first-winter plumage on both sexes), and dirty yellowish-white underparts; many exhibit male characters, such as chestnut on forecrown, face, and chin to breast centre. Female non-breeding (after moult in winter quarters) is rather similar to breeding, but some have yellow more apparent on underparts. Juvenile is generally buffish in general appearance, including most of head feathers, with heavily dark-streaked golden-buff mantle (looking almost scalloped), some spots on breast, and with pale yellow undertail-coverts. Voice. Song, normally from top of bush or wire, often in flight, a rather monotonous repetition with few variations at accelerating rate with clear "r" sound, "zrit zrit srutt srutt-srutt sutteri-sut sutterih", finally dropping slightly in pitch, very similar to song of *E. melanocephala*. Calls are variations of "chip", "chuupp", "zriit" and sharp "tsit", also a quick series of clicks, "ptt-r-r-r"; much as calls of *E. melanocephala*.

Habitat. Isolated patches of bushes on pure steppes, also in semi-desert and desert oases; occupies all kinds of tall herbaceous vegetation and shrubs. Typical also of cultivated areas near water and irrigation. Generally in drier terrain, warmer and more sunny open country, with fewer trees or high bushes, than areas occupied by *E. melanocephala*. Can reach high altitudes, to 3000 m, during breeding season. On migration occurs in forest belts, riparian forest, groves, gardens and tall thickets. In winter quarters, found especially in cultivated fields with cereals and grains, often sharing habitat with *E. melanocephala*.

Food and Feeding. Takes seeds throughout year; during breeding season, feeds mostly on invertebrates. Among invertebrates recorded in diet are damselflies and dragonflies (Odonata), grasshoppers and crickets (Orthoptera), mantises (Mantodea), bugs (Hemiptera), lacewings (Neuroptera), adult and larval Lepidoptera, flies (Diptera), ants, wasps and bees (Hymenoptera), beetles (Coleoptera), spiders (Araneae), ticks (Acari), snails (Pulmonata). Among plant material recorded in diet are seeds and other parts of goosefoot (*Chenopodium*), and some grasses (Poaceae) such as millet (*Pennisetum*, *Panicum*), oats (*Avena*), wheat (*Triticum*), *Sorghum* and rice (*Oryza*). In winter probably feeds on same seeds as *E. melanocephala*, as the two exploit similar habitats. Feeds mostly on ground, but also in shrubs and bushes. Singly and in pairs when breeding. In winter typically found in medium-sized flocks, but sometimes of up to several hundred birds; often in large mixed flocks with *E. melanocephala*; the two roost together, sometimes in huge numbers, frequently with other passerines.

Breeding. Season May–Aug, including nests with eggs until mid-Jul; apparently single-brooded, but occasional second broods reported. Male performs song flight, flying on level course with shallow wingbeats. Distance between territories of different pairs often quite small. Nest built by female alone, escorted by male, taking 2–4 days, composed of old and green grasses, lined with dry herbs, leaves and shrubs, placed near ground or occasionally higher, up to 4 m above ground, in juniper (*Juniperus*) or other dense bush, or sometimes under grasses near tree cover. Clutch normally 2–5 eggs, rarely 6, pale bluish-white and delicately spotted; incubation by female, period 10–14 days; chicks fed by both parents, nestling period 12–13 days. Breeding success probably low, with likelihood of high levels of losses of first clutches.

Movements. Migratory; winters in most of NC & peninsular India. Nocturnal migrant. Autumn migration starts very early, with departure from N areas during second half Jul, and most having deserted breeding grounds by Aug; movement continues through end of Sept to beginning of Oct in S Kazakhstan, and first arrivals in Pakistan during end Jul, with passage still apparent until Sept. Spring migration begins in Mar, but conducted mostly during Apr–May, reaching S parts of breeding range during end Apr to mid-May and later, from second half May, in N part of range; breeding territories first occupied during early May. Recorded as extralimital in Sri Lanka, Nepal and Xizang (Tibet), and has reached E Asian coast on several occasions, e.g. Beijing (China), Korea and Japan. Recorded also in many countries in W Europe, including Iceland, where most considered to have involved escaped captives; recent analysis of records in Britain, France and Italy suggests that at least some could involve genuine vagrants, especially in cases of first-winter individuals in autumn.

Status and Conservation. Not globally threatened. Common to locally very common. Considered common in Kazakhstan. No evidence of any declines in any parts of breeding range, and global population considered stable. Appears common in non-breeding range.

Bibliography. Alström *et al.* (2008), Bakaev & Holboev (2003), Belousov (1999), Beresovikov & Kovshar (1992), Budki *et al.* (2009), Byers, Olsson & Curson (1995), Castell & Castell (2009), Chattopadhyay *et al.* (1994), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Dierschke (2007), Flint *et al.* (1984), Gavrilov & Gavrilov (2005), Glustchenko (1986), Glutz von Blotzheim & Bauer (1997), Haffer (1977), Hagemeijer & Blair (1997), Hale (1993), Kirwan *et al.* (2008), Kovshar, A.F. *et al.* (1986, 1987), Kovshar, V.A. & Gavrilov (1999), Kumar *et al.* (2006), Lewington *et al.* (1991), Mauersberger (1960e), McCarthy (2006), Nair *et al.* (1994), Prasad & Singh (2000), Prasad *et al.* (2001), Rani *et al.* (2005), Rasmussen & Anderton (2005a, 2005b), Sagitov *et al.* (1966), Sawjalow & Tabatschischin (2006), Shirihai & Gantlett (1993), Singh, J. *et al.* (2010), Singh, V.K. (2001), Snow & Perrins (1998), Svensson (1996), Svensson *et al.* (2009), Tebb *et al.* (2004), Vinicombe (2007), Yésou *et al.* (2003), Zavialov & Tabachishin (1999, 2007).

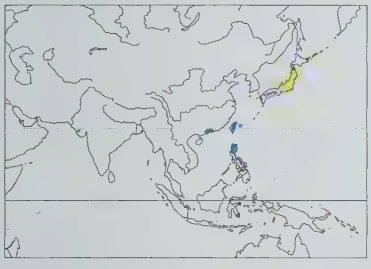

PLATE 44
inches 2
cm 5
43
♂
♀
ssp spodocephala
44
ssp sordida
ssp personata
45
46
ssp pallasi
47
ssp lusitanica
ssp lydiae
ssp zaidamensis
48
ssp schoeniclus
ssp reiseri

43. Japanese Yellow Bunting

Emberiza sulphurata

French: Bruant du Japon **German**: Schwefelammer **Spanish**: Escribano Japonés
Other common names: Japanese/Yellow Bunting

Taxonomy. *Emberiza sulphurata* Temminck and Schlegel, 1848, Japan.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. pusilla*, *E. rustica*, *E. aureola*, *E. rutila* and *E. spodocephala*, forming a subclade with them; it has been suggested that they form a polytomous group of species, probably the result of a rapid, "simultaneous" radiation. Monotypic.
Distribution. Breeds in mountains of N & W Honshu, in Japan. Main wintering area imperfectly known: includes N Philippines, probably also Taiwan and SE China (Fujian, Guangdong).



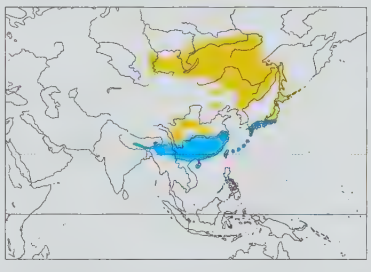
Descriptive notes. 13–14 cm; male average 15·2 g, female average 14·6 g. Rather small, undistinctive bunting. Male breeding has head uniformly greenish, with some grey tinge, white eyering, lores and chin black, throat yellowish; nape grey, tinged green, grading into greyish-green on upperparts, where mantle and scapulars with dark streaks (back to uppertail-coverts with streaks absent or very ill-defined); central rectrices dark brown, the rest blackish-brown, outer pair with much white on both webs, next pair with white wedge on inner web; lesser upperwing-coverts greyish-green, median coverts blackish with broad pale buff to whitish tips, greater coverts blackish with buffy fringes and pale buff to whitish tips (forming a second obvious wingbar), tertials blackish-brown with cinnamon-buff outer edges, primaries and secondaries brown with pale edges, those of secondaries more cinnamon-buff; underparts yellowish, tinged greenish, side of breast tinged greyish-green, rear flanks with dark streaks, undertail-coverts pale yellow; iris dark chestnut-brown; bill blue-grey; legs pinkish. Male non-breeding is very similar to breeding, but lores greyish, no black visible on chin, has ill-defined malar stripe, general colour of head is browner with greyish tinge (not so green as during breeding), mantle tinged brownish, uppertail-coverts tipped olive, wingbars are buffier and less prominent. First-winter male is similar to non-breeding, but browner tinge more apparent, especially on breast, and lesser upperwing-coverts tinged olive; iris dark grey-brown. Female breeding is similar to male, but with paler lores and no black on chin, upperparts more brown, less green, and underparts more buffish-yellow, breast tinged brown. Female non-breeding is similar to non-breeding male, but head and upperparts still browner compared with breeding plumage. First-winter female is rather similar to non-breeding adult, but with faint streaks on breast and lesser upperwing-coverts olive-tinged. Juvenile is similar to first-winter, crown showing some streaks, but in general head is plain, with no contrast between ear-coverts and submoustachial stripe, unlike *E. spodocephala*. Voice. Song, usually from inconspicuous perch high in tree, usually several twittering phrases alternated, "twee twee tsitsit prewprew zrii", and then "ziriritt zeezee tew" followed by "psew zereret zeetew", after such phrases sometimes a variable twittering, but usual ending a single "zrii" or low-pitched "tew"; similar to song of *E. spodocephala*, but shorter. Call a metallic "tsip", similar to that of *E. tristrami* and *E. rutila*, softer than similar note of *E. spodocephala*.
Habitat. During breeding associated with second growth and forest edges in deciduous and mixed forests, also in park-like areas with shrubs and thickets; foothills and lower slopes of higher mountains, usually at middle altitudes, 500–1500 m. On migration found in shrubby clearings in open woodland, as well as in cultivations with scattered bushes. During winter in weedy and bushy areas, grasslands and agricultural areas to 1500 m.
Food and Feeding. Diet not well known. Insects, such as beetles (Coleoptera) and caterpillars, also plant material, such as legume seeds. On Mindoro, in Philippines, seen to feed on yellowish grass seeds fallen to ground after burning of tall grasses. Forages on ground. During migration and in winter often in small flocks.
Breeding. Starts second half of May. Males congregate on areas of snow-free vegetation, awaiting later arrival of females. Nest made from coarse grass, normally placed on lower branch of bush usually below 2 m high, but not on ground. Clutch 3–4 eggs, pale brownish-white, smeared and mottled with lavender-grey and light brown, with some spots, irregular short lines and streaks. No other information.
Movements. Migratory; non-breeding quarters mainly in N Philippines, with irregular records Taiwan and Chinese coast (Fujian S to Hong Kong). Leaves breeding territories late Aug to Oct; in spring regularly recorded as scarce passage migrant in Hong Kong and Korea, especially during Apr, and several records in E China on Shaweishan I (off Shanghai) during spring migration; arrival on breeding grounds from late Apr, mostly in May. At least formerly, some individuals apparently remained all year in Japan, with scattered winter records in S Honshu S to Ryukyu Archipelago.
Status and Conservation. VULNERABLE. Restricted-range species: present in Central Honshu Montane Forests Secondary Area. Uncommon; declining. No reliable population estimates; further study needed. Has been suspected to breed locally in S Japan (Kyushu). Thought to have suffered moderate decline, since it has become rarer in traditional breeding areas, with more significant fall in numbers during 20th century. Decrease attributed mainly to habitat degradation and loss, chiefly through intensification of agriculture, and also trapping for cagebird trade in Japan in the past, but now probably more importantly in S China wintering/passage areas (where huge numbers of *E. aureola* still hunted for human consumption). Although not well documented, use of pesticides seems also to be correlated with this species' decline; it has caused similar problems in several Asian countries, and is especially linked with rapid decline of small passerines in rural areas of S mainland China. Use of toxic chemicals in cultivated fields probably one of key reasons for rapid decline in breeding numbers. Present during breeding season in several protected areas in C Honshu, including Asama National Protection Area (Gunma and Nagano Prefectures), Northern Alps National Protection Area (Toyama, Nagano and Gifu Prefectures) and Katano Duck Pond Protection Area and Special Protection Area (Ishikawa Prefecture); occurs during passage in other protected areas of Japan, as well as in Hong Kong (Mai Po marshes). Legally protected in Japan, North Korea and Hong Kong.
Bibliography. Alström *et al.* (2008), Anon. (2010c), Armani (1985), Austin & Kuroda (1953), Brazil (1991, 2009), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Collar *et al.* (1994), David *et al.* (2009), Jahn (1942), Kanouchi *et al.* (1998), Maki & Onishi (2000), Stattersfield & Capper (2000), Takano *et al.* (2001), Temme (1974), Tomek (1997, 2002), Vietinghoff-Scheel (1992), Xiong Lihu *et al.* (2006).

44. Black-faced Bunting

Emberiza spodocephala

French: Bruant masqué **German**: Maskenammer **Spanish**: Escribano Enmascarado
Other common names: Grey-headed Black-faced Bunting; Masked Bunting (*personata*)

Taxonomy. *Emberiza spodocephala* Pallas, 1776, Daurian Range, southern Chita, south-eastern Siberia, Russia.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species is closely related to *E. pusilla*, *E. rustica*, *E. aureola*, *E. rutila* and *E. sulphurata*, forming a subclade with them; it has been suggested that they form a polytomous group of species, probably the result of a rapid, "simultaneous" radiation. Distinctive race *personata* possibly represents a separate species; further study required. Nominate race exhibits slight clinal variation in colour, with increasing green on crown, nape and throat and more yellowish underparts from W to E, but individual variation also significant, and populations at extremes of cline not well differentiated; proposed races *oligoxantha* (described from Kuznetsk region of SC Siberia) and *extremiorientis* (from S Ussuriland) represent respective ends of this cline. Three subspecies recognized.
Subspecies and Distribution.
E. s. spodocephala Pallas, 1776 – breeds from C Siberia (Novokuznetsk and Krasnoyarsk) E to S coast of Sea of Okhotsk, N Sakhalin I and Sea of Japan coast, S to Sayan Mts, Altai, N Mongolia (Khentii Mts), Transbaikalia, NE China (Heilongjiang), SE Russia (Ussuriland) and N Korea; winters in S & E China (S Yunnan and Hainan E to Fujian) and Taiwan.
E. s. personata Temminck, 1836 – breeds S Sakhalin I, Kuril Is and Japan (Hokkaido S to C Honshu); winters from N Honshu S through Shikoku and Kyushu to Ryukyu Is and Izu Is.
E. s. sordida Blyth, 1845 – breeds EC China from N Gansu and NE Qinghai S to W Sichuan and N Yunnan (S to Yangtze Valley), E to N Hubei, and occasionally in C Guizhou and W Hunan; winters in area from C Nepal E to NE India, N Myanmar and N Indochina.



Descriptive notes. 13·5–16 cm; 13–27 g. Male nominate race breeding has head to breast olive-grey (becoming greener from W to E of range), contrasting blackish lores and chin, nape tinged brownish; mantle pale brown with black streaks, centre of mantle and scapulars darker, tinged chestnut, back like mantle with a few indistinct streaks, rump and uppertail-coverts plain grey-brown; tail dark brown, outer rectrices with extensive white; lesser upperwing-coverts grey-brown, median coverts blackish-brown with pale buffish tips, greater coverts with greyish-brown edges and light buff tips (forming a second, rather weaker wingbar), tertials blackish with brown fringes, primaries and secondaries dark brown, primaries with pale edges, secondaries with rufous edges; underparts below breast pale yellow (becoming darker towards E of range), well demarcated from grey of breast, some rufous streaks on flanks, streaks becoming darker posteriorly; iris dark chestnut-brown; upper mandible blackish with whitish-horn cutting edges, lower mandible pinkish with dark tip; legs pinkish-brown. Male non-breeding is similar to breeding, but slight differences in colour tones: freshly moulted feathers of crown and ear-coverts fringed chestnut, concealing to some extent general grey-olive appearance of plumage, and pale fringes of breast and throat feathers somewhat conceal general colour of these areas; breeding colour gradually appear as feather fringes increasingly abraded. First-winter male is very similar to non-breeding, except that head pattern more like that of female because of broader browner fringes on fresh feathers, streaking on breast less prominent than on female, iris grey-brown. Female breeding is similar to male breeding, but head pattern different, with some individual variation in extent of olive-grey saturation, nape browner, crown streaked dark chestnut, has pale lores (not black as on male), pale supercilium, submoustachial stripe and throat; some have olive-grey on breast. Female non-breeding and first-winter female are similar to female breeding, but with more prominent appearance of browner tones in general, first-winter with iris grey-brown. Juvenile is similar to first-winter female, but crown almost uniformly grey-brown with some indistinct dark brown streaks, ear-coverts uniform and darker brown, mantle and scapulars duller, throat finely spotted, throat and belly tinged brown, also fine streaks on breast. Races differ mainly in colour tones and head pattern: *personata* is distinctive, brighter than nominate, greener on crown, more yellow below, with centre of throat to breast pure yellow (or almost so) without greenish or greyish tones, breast and flanks often more heavily streaked, bill larger and wing longer; *sordida* resembles nominate in pattern, but green and yellow pigments darker and richer, similar to those shown by previous, and facial mask (lores and chin) of male better defined, larger and blacker. Voice. Song of nominate, usually from inside bush or low tree, consists of variable succession of ringing chirps and thrills, "chi chi chu chirri chu chi zeee chu chi chi", in some ways reminiscent of that of *E. schoeniclus*; song of *personata* similar, but tempo slower, broken into short phrases, and more monotonous. Call normally a thin, ticking and sharp "tzii", not unlike contact call of Song Thrush (*Turdus philomelos*).
Habitat. Breeds in shrubby and tall dense grass areas with interspersed trees along watercourses and floodplains, also in mixed forest and moist coniferous forest. Also in bushes and thickets in open areas in sparse woodland, gardens, and forest edges and clearings, avoiding densely forested areas. Occasionally in mountain forests, deciduous or coniferous, to at least 600 m in Altai and, in Japan, to 1500 m and sometimes in subalpine birch (*Betula*) forests at higher altitudes; to at least 1300 m in N Mongolia. In winter descends to lower areas, then present in foothills and lowlands, usually in hedges and shrubby areas near running water or on edges of wooded areas and clearings, as well as on rice stubbles, crops, edges of pools and riverbeds; also in gardens, urban and suburban parks, in forest undergrowth, tall grass fields, dwarf bamboo and sugar cane.
Food and Feeding. Adult diet during breeding mainly adult and larval invertebrates, such as small cicadas (Cicadidae) and other bugs (Hemiptera), flies (Diptera), ants (Formicidae), caterpillars (Lepidoptera), beetles (Coleoptera) and spiders (Araneae). Nestling diet similar. In study in riparian forest in Japan, found to feed mainly on small aquatic invertebrates. During migration and on wintering grounds, cereal grains and variety of other seeds. Forages mostly on ground. Outside breeding season generally in small groups, sometimes mixed with congeners.

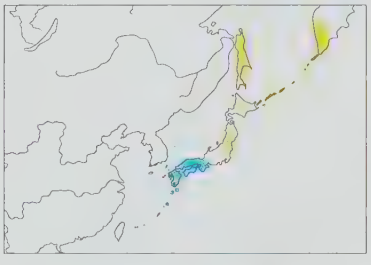
On following pages: 45. Grey Bunting (*Emberiza variabilis*); 46. Pallas's Bunting (*Emberiza pallasi*); 47. Ochre-rumped Bunting (*Emberiza yessoensis*); 48. Reed Bunting (*Emberiza schoeniclus*).

Breeding. Season starts usually between May and mid-Jun, depending on location and altitude, with fledglings as late as Sept; two broods. Nest, built apparently by female alone, of soft dry grass, lined with hair, placed on ground or in low bush or herb, for second clutches sometimes up to 1·5 m above ground. Clutch 4–5 eggs, pale greenish or bluish-white to pinkish-white, mottled dull maroon or umber, sometimes also with purplish-brown, covered with dark spots and lines; incubation by female, period 12–14 days; chicks fed by both sexes, nestling period 9–14 days.
Movements. Migratory. Leaves Siberian breeding grounds during early Sept and NE China (Heilongjiang) in Oct, but in Japan still present Oct–Nov, since many winter in S part of that country; main autumn passage in Korea during Sept–Oct. Present on wintering grounds Oct–May. Spring migration through NE China and Korea in Apr and May, reaching breeding grounds in Heilongjiang during Apr and N Siberia in May; return to breeding territories in Japan during Apr. Recorded as vagrant in W Europe (Britain, Netherlands, Germany, Norway, Finland and France), although captive origin of some of these not fully excluded; recorded also in Indonesia (Taliabu I, E of Sulawesi).
Status and Conservation. Not globally threatened. Common in suitable habitat throughout range; one of the commonest buntings in E Asia. Common also in non-breeding range. Global population not quantified, but no evidence of any declines and considered stable.
Bibliography. Alker (1997), Alström *et al.* (2008), Bradshaw (1992), Byers, Olsson & Curson (1995), Deng Wenhong & Gao Wei (2005), French (2001), Fu Tongsheng *et al.* (1998), Fujimaki (1984, 1989, 1994, 2010), Fujimaki *et al.* (1996), Glutz von Blotzheim & Bauer (1997), Golub (1983), Guo Jianrong *et al.* (2002), Handtke & Hrncirik (1979), Hough (1994), Iijima (1973), Ilinskii (1981), Ishimoto (1992), Koiwai (2003), Komeda & Ueki (2002), Konno & Fujimaki (2001), Kuroda (1964), Larionov & Germogenov (1980), Lewington *et al.* (1991), Meise (1938b), Murakami & Nakano (2001), Murose & Fujimaki (1999), Nam Hyun-Young *et al.* (2011), Nishi (2004), Patient (2001), Rasmussen & Anderton (2005a, 2005b), Rogacheva (1992), Roselaar *et al.* (2010), Slack (2009), Solbakken & Myklebust (2000), Stones *et al.* (1997), Sushkin (1925), Svensson (1994, 1996), Tamada (2007), Tamada & Umeki (2007), Toru (2007), Tsutsumi & Matsuzawa (1990), Wallace (1981), Yamagishi *et al.* (1973).

45. Grey Bunting
Emberiza variabilis

French: Bruant gris **German**: Bambusammer **Spanish**: Escribano Gris
Other common names: Japanese Grey Bunting

Taxonomy. *Emberiza variabilis* Temminck, 1836, northern Japan.
Sometimes placed in a separate genus, *Ocyris*. Recent phylogenetic study suggests that this species may be sister to *E. tristrami* and *E. chrysophrys*. Birds from Kamchatka sometimes separated as race *musica*. Monotypic.
Distribution. Breeds E Russia (S Kamchatka), Kuril Is, Sakhalin I and Japan (Hokkaido S to C Honshu). Winters mainly in S half of Honshu, Shikoku, Kyushu and Ryukyu Is (S to Okinawa).

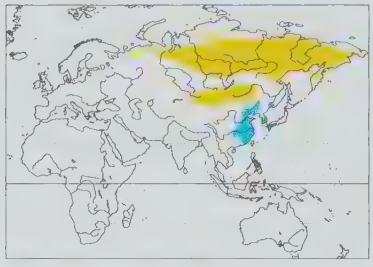


Descriptive notes. 14–17 cm; 20·9–30 g. Male breeding is distinctive, sometimes with dusky lores, otherwise entire head, upperparts and underparts dark slate-grey, mantle with some blackish-brown streaks, belly somewhat paler, undertail-coverts with whitish feather edges; tail dark brown, feathers with bluish-grey edges; upperwing-coverts also slaty grey, centre of each feather darker, tertials dark brown with greyish (on inner feather) to rufous-brown (outer tertial) edges, primaries and secondaries dark brown with grey-brown or brownish edges; iris dark chestnut-brown; upper mandible dark grey with pale pinkish cutting edge, lower mandible pale pinkish with blackish on tip and along part of underside; legs pinkish. Male non-breeding is very similar to breeding, but grey areas of plumage partly obscured by brownish or buffish fringes of fresh feathers; brown fringes may give impression of lateral crownstripes, and buffish fringes can help to produce impression of faint supercilium and median crownstripe. First-winter male has crown olive-grey, tinged rufous, slate-grey supercilium, ear-coverts, sides of neck and throat; mantle and scapulars olive grey-brown, streaked dark brown, back to uppertail-coverts slate-grey with rufous-chestnut feather tips (tips partly concealing general slaty pattern), greater and median upperwing-coverts blackish with blue-grey edges and buffish tips (two wingbars), blackish-brown flight-feathers, tertials with rufous outer edge at tip of inner web, primaries and secondaries with buff edges (more rufous on secondaries), tail blackish-brown, central pair of rectrices rufescent brown; underparts buffish-white mixed with pale slaty, palest on belly, some streaks on flanks; iris dark grey-brown. First-summer male is similar to male breeding, but with brownish cast, and rump shows some rufous. Female breeding is similar to first-winter male, lacking slaty tones on head, rump and underparts, has malar stripe greyish, throat and underparts whitish-buff with dusky streaks, belly whiter; iris dark chestnut-brown. Female non-breeding is similar to breeding, but with fresh plumage. First-winter female is similar to female non-breeding, but upperparts more rufescent, supercilium, submoustachial stripe and throat paler, and iris dark grey-brown. Juvenile has olive-buffish supercilium and lores, with ear-coverts and side of neck olive-brown, malar stripe dark greyish, mantle more diffusely streaked than in subsequent plumages, scapulars chestnut-brown with dark centres, back, rump and uppertail-coverts uniformly rufous-chestnut, breast olive-buffish with more prominent black streaks than in subsequent plumages, belly and flanks indistinctly streaked; iris dark grey-brown, legs pinkish. Voice. Song, from inconspicuous perch inside bush or undergrowth, usually starts with soft drawn-out note, and is slow, with 3–5 distinctive notes, "swee swee chi-chi-chi" or "hsuuu twis-twis-twis", or quicker versions e.g. "hsuuu tsisisisisis". Call a sharp "tzii", similar to that of *E. spodocephala*.
Habitat. Favours mixed deciduous and coniferous forest at middle and subalpine elevations, usually with dense vegetation, with undergrowth and thickets of dwarf bamboo (*Sasa paniculata*); also in alder (*Alnus*), willows (*Salix*) and birch (*Betula*) forests. In mountains and hills, from c. 1000 m to 1800 m. During winter found in dense vegetation, usually in evergreen-forest undergrowth near streams; also in parks and suburban gardens, even in centre of big cities (e.g. Tokyo), and in open cultivations where isolated stands of trees present.
Food and Feeding. Diet insufficiently known; appears to include small invertebrates, seeds and small fruits and berries. Usually forages on ground. Secretive. Generally singly and in pairs, including in non-breeding season; during migration sometimes in small groups of up to five or six individuals.
Breeding. Season begins during Jun, with peak in Jul. Nest built from twigs and dead leaves of dwarf bamboo, also grasses, located on stems of dwarf bamboo or in low bush, usually below 1 m. Clutch 3–5 eggs, greyish-white, with purple-greyish dashes at blunt end; incubation by both sexes, period 12 days; chicks fed by both parents, nestling period 11 days.
Movements. Migratory. Autumn migration begins in Aug in N part of range, but main passage in Kuril Is during Sept, with small number into Nov; leaves winter quarters during Mar and Apr, and main period of passage N in Kuril Is during second half May. Accidental in S Ryukyu Is (including Iriomote), and E coast of China (Shaweishan I, off Shanghai), Taiwan and Korea, also Commander Is, Vladivostok area of Russia, and Alaska (W Aleutians).
Status and Conservation. Not globally threatened. Uncommon in most of range; locally common. Global population not reliably estimated, but no signs of decrease and considered stable.
Bibliography. Alström *et al.* (2008), Armani (1985), Brazil (1991, 2009), Byers, Olsson & Curson (1995), Ezaki *et al.* (2007), Fujimaki & Hikawa (1978), Gibson & Hall (1978), Jahn (1939), Kanouchi *et al.* (1998), Koblik (1993), Kolomiitsev (1986), Konno & Fujimaki (2001), Kuroda (1932), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Nakamura, H. (1986), Nakamura, T. (1978, 1983), Nechaev (1978), Stepanyan (1979), Takano *et al.* (2001), Uemura (1989).

46. Pallas's Bunting
Emberiza pallasi

French: Bruant de Pallas **German**: Pallasammer **Spanish**: Escribano de Pallas
Other common names: Pallas's Reed Bunting; Mongolian Bunting (*lydiae*)

Taxonomy. *Cynchramus pallasi* Cabanis, 1851, near Selenga River, Transbaikalia.
This species, together with *E. yessoensis* and *E. schoeniclus*, sometimes placed in genus *Schoeniclus*. Recent molecular study indicates that it is a sister-species to *E. schoeniclus*, with *E. yessoensis* as sister to both. Race *minor* of *E. schoeniclus* sometimes included in present species. Significance of geographical variation not fully understood, and possibly linked to variation in habitat preferences; further study required. Race *lydiae*, differing from others vocally and in ecology, possibly a separate species. Race *polaris* exhibits partially clinal variation, with gradation towards darker plumage and more heavily streaked rump in E of range. Proposed race *montana* and its synonym *suschkiniana* (described from SE Russian Altai) considered synonymous with nominate, and *latolineata* (from Kolyma Peninsula) with *polaris*. Three subspecies recognized.
Subspecies and Distribution.
E. p. polaris Middendorff, 1853 – breeds NE European Russia E in Siberia (S to basins of R Angara, R Lena and R Aldan) to Chukotskiy Peninsula, Sea of Okhotsk coast and N Kamchatka; winters in NE & E China, extreme SE Russia (S Ussuriland) and Korea.
E. p. pallasi (Cabanis, 1851) – breeds from Altai and Sayan Mts E to Transbaikalia and W Amurland (S of Tukuringra Mts) and S to N Mongolia and NE China (NW Heilongjiang), also disjunctly in E Tien Shan; winters in W & N China (Xinjiang and Inner Mongolia).
E. p. lydiae Portenko, 1929 – breeds from S Siberia (Tuva and S Transbaikalia) through N, C & E Mongolia, probably to adjacent NE China (NE Inner Mongolia); non-breeding probably in N China. Probable isolated population (race uncertain) in Ordos Mts, in N China.



Descriptive notes. 12–13·5 cm; 10–20 g. Small bunting, bill comparatively short and narrow with straight culmen. Male nominate race breeding has black head and throat, conspicuous white submoustachial stripe and hindneck-collar joining on side of neck; feathers of mantle and scapulars blackish, with some chestnut, especially towards tip, all fringed pale buff (bleaching to whitish), back pale buffish-grey with blackish streaks, rump and uppertail-coverts pale buffish (wearing to greyish-white), coverts with faint black streaks; tail brown, central feather pair darker and broadly edged pale on inner webs outermost pair with much white on both webs, adjacent pair with less white (variable); lesser upperwing-coverts grey, median and greater coverts black with white or whitish tips (forming two clear wingbars), greaters also with pale edges, flight-feathers blackish, tertials with well-defined narrow pale yellowish edges, primaries and secondaries with narrow pale edges, these more light rufous-buff on secondaries (creating buffish pale panel on closed wing); underparts pale buffish-white, side of breast washed grey, few streaks on flanks; iris dark chestnut; bill blackish; legs pale flesh-coloured. Distinguished from similar *E. schoeniclus* mainly by smaller size, smaller bill with straight culmen, proportionately longer tail, generally colder plumage tones, more prominently streaked upperparts, grey (not rufous) lesser coverts, distinct pale wingbars (lacking reddish tones). Male non-breeding has black areas of plumage partly concealed by pale feather fringes, crown, ear-coverts and lores mostly sandy brown (instead of black) with dark streaks, superciliary area buffish, thin dark moustachial stripe, throat mottled black; upperparts brighter and more sandy-coloured, mantle with hint of rufous, wing feathers more broadly edged and tipped buffish (lesser coverts still grey), underparts strongly tinged yellowish-buff; lower mandible pinkish. First-winter male is like male non-breeding, but lesser coverts grey-brown (not ash-greyish), iris dark grey-brown. Female breeding is very similar to first-winter male, including grey-brown lesser upperwing-coverts and pinkish on lower mandible, but differs in having indistinct reddish-brown streaks on rump; iris dark chestnut, as on male breeding. Female non-breeding is very like male non-breeding, but with lesser upperwing-coverts grey-brown. First-winter female is almost identical to female non-breeding, differing only in more pointed rectrices and dark grey-brown iris. Juvenile is reminiscent of female breeding, but has dark-streaked olive-brown crown, paler supercilium, rufescent ear-coverts, blackish scapulars with buffish edges, pale sandy-brown rump with prominent brown streaks, grey-brown lesser coverts, usually prominent dark malar stripe, yellowish breast with bold, dense dark streaks, and dark grey-brown iris. Races differ mainly in darkness of plumage: *polaris* is on average slightly smaller and more heavily streaked than nominate, and in non-breeding plumage is somewhat darker on back, especially in E of range; *lydiae* is paler above than nominate during breeding, with upperwing-coverts and centres of back feathers brownish (instead of black) and edges pale buff. Voice. Song, normally from bushtop, also from top of tall grasses or herbs, a simple monotonous phrase containing series of same notes, e.g. "chi chi chi chi chi chi" or "srri srri srri srri srri srri srri"; song of *lydiae* similar in structure, but differing slightly in motif, "tsisi tsisi tsisi tsisi"; song of nominate apparently a little different, said to be not unlike a clear song phrase of Willow Tit (*Poecile montanus*) or *E. aureola*. Normal call a fine "chlip" or "tsilip", reminiscent of that of Eurasian Tree Sparrow (*Passer montanus*); also, a soft "dziuu" recorded from S birds breeding in the steppe.
Habitat. Breeds at high latitudes in tundra and forest-tundra with tall herbage, and shrubs (for songposts), and in river valleys in lowland tundra, with thickets of vegetation such as dwarf willow (*Salix*) or alder (*Alnus*); also in subalpine tundra in high mountains, e.g. in grasslands with dense *Rhododendron* and *Dasiphora* c. 1 m high at around 2000 m in Sayan Mts, S Siberia, and in patches of dwarf birch (*Betula nana*). Normally in drier and cooler areas than those favoured by *E. schoeniclus*. Race *lydiae* in drier habitats, mainly confined to stands of the tussock grass

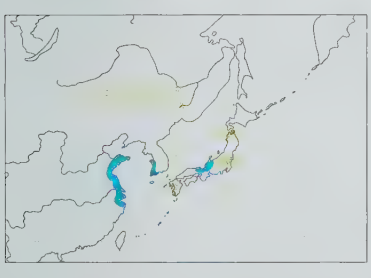
Achnatherum splendens at interface between wetlands and steppe/desert steppe. Outside breeding season found in lowlands and plains, selecting irrigated areas with scattered shrubs and presence of reeds near rivers and lakes; also in grassy fields, rice fields and other cultivation.
Food and Feeding. Mostly invertebrates during breeding, and seeds and other plant material throughout year. Insects taken also during winter. Invertebrates reported in diet include adult Lepidoptera, adult and larval flies (Diptera), larval sawflies (Symphyta) and beetles (Coleoptera); among plant material are seeds of alder, crowberry (*Empetrum*) and *Stipa* grasses. Forages on ground, also at tip of low vegetation such as *Stipa* grasses, where it collects seeds; mostly in wet meadows, but also in willows and other small trees and shrubs, *lydiae* in dry tussock. Generally alone or in pairs when breeding. Outside breeding season feeds in large flocks, often mixed with other buntings as well as with Common Redpolls (*Carduelis flammea*).
Breeding. Season Jun–Jul in N of range, to Aug in S. Nest made from grasses and sedges (*Carex*), lined with fine grasses and hair, sometimes also with dried leaves of tree such as larch (*Larix*), placed on ground or low in bush, *lydiae* in tussock. Clutch 3–5 eggs, creamy to reddish-brown with dark spots and some fine irregular streaks (similar to those of *E. schoeniclus*); incubation mainly by female, period 11 days; chicks fed by both parents, nestling period 10 days.
Movements. Migratory. Race *polaris* winters mainly E China (C Heilongjiang S to Yangtze Valley), extreme SE Russia (S Ussuriland) and Korea, and is very rare winter visitor in S Japan; nominate race migrates mainly to W & N China; winter quarters of *lydiae* uncertain, probably N China. Post-breeding dispersal begins during late Jul, and departure from breeding grounds normally starts during Aug and continues through Sept. In C Siberia recorded mostly from early Aug to end Sept, passing in loose flocks of 5–10 individuals, with sometimes high concentrations and densities of several hundred birds/km² during Sept peak; main passage in S Siberia mid-Sept to end Oct, and main passage in NE China through Oct. Wintering areas occupied between Oct and Mar, with some individuals still present in these areas sometimes until May. Main spring passage through NE China and S Siberia during second half of Apr; in C Siberia passes mostly during May to early Jun, exceptionally to end Jun; arrival in N parts of breeding range during Jun. Recorded as vagrant in Alaska, Hong Kong and Taiwan; also in W & S Europe (Britain, Portugal, Italy).
Status and Conservation. Not globally threatened. Locally common to very common. Has extensive breeding range across N parts of Eurasia; also a probable isolated population in Ordos Plateau region of NC China, which would represent S limit of distribution, but confirmation of breeding still required. Densities in some tundra and forest-tundra areas high, e.g. 32 birds/km² in R Bolshiye Ury basin in C Siberia and 69–76 birds/km² in Yenisey forest-tundra; less numerous in patches of willow thickets on Yenisey floodplains, with densities of only 2–7 birds/km², and in similar willow-thicket habitat in E Taymyr slightly higher densities of 10·5–20 birds/km². Although global population not quantified, believed to be stable, and no clear evidence of any decline or substantial threats in vast area occupied during breeding. Only problem of some concern is the extensive killing of buntings for food in Chinese wintering range, where this species could suffer from indiscriminate hunting of bunting flocks, with which it associates at that season. Possible effects of global warming should perhaps be considered; melting of glaciers could cause deterioration of mountain habitats, and in S of breeding range raised temperatures could result in desertification of desert-steppe/steppe areas.
Bibliography. Alström & Olsson (1994), Alström *et al.* (2008), Brazil (2009), Broad & Oddie (1980), Byers, Olsson & Curson (1995), Castell & Castell (2009), Cheng Tsohsin (1987), Colston (1978), Cramp & Perrins (1994), Dementiev *et al.* (1954, 1970), Dorzhiev & Jumov (1991a), Flint *et al.* (1984), Gavrilov & Gavrilov (2005), Gritschik *et al.* (2002), Hagemeijer & Blair (1997), Hough (1998), Johansen (1944), Kitson (1979, 1982), Koblik *et al.* (1997), Lewington *et al.* (1991), Loskot (1986), MacKinnon & Phillipps (2000), Mihara (2006), Moore & Armelin (1999), Morozov (1986, 1987), Olsen (1989), Ouwerkerk (1994), Peltomaki (1996), Portenko (1929), Prokopyeva *et al.* (2007), Rasmussen & Anderton (2005a, 2005b), Riddiford & Broome (1983), Robson (2000), Rogacheva (1992), Shigeta & Mano (1987), Slack (2009), Snow & Perrins (1998), Sodhi *et al.* (1999), Svensson (1992), Svensson *et al.* (2009), Tebb & Ranner (2002), Ullman (1997).

47. Ochre-rumped Bunting

Emberiza yessoensis

French: Bruant de Yéso **German**: Mandschurenammer **Spanish**: Escribano Culiocre
Other common names: Chinese Reed Bunting, Japanese (Reed) Bunting

Taxonomy. *Schoenicola yessoënsis* Swinhoe, 1874, near Hakodate, Hokkaido, Japan.
This species, together with *E. pallasi* and *E. schoeniclus*, sometimes placed in genus *Schoeniclus*. Recent molecular study indicates that it is a sister-species to both of those. Two subspecies recognized.
Subspecies and Distribution.
E. y. continentalis Witherby, 1913 – breeds in extreme E Mongolia, NE China (Heilongjiang) and S Russian Far East (Ussuriland); winters in coastal E China.
E. y. yessoensis (Swinhoe, 1874) – breeds in C & S Japan (N & C Honshu and Kyushu); winters in S Japan and Korea.



Descriptive notes. 14–15 cm; 13–14 g. Small bunting with pointed tail feathers. Male nominate race breeding has entire head to lower neck and upper breast glossy black, nape pinkish-tinged chestnut-brown, mantle and scapulars light grey-brown mixed with rufous with heavy black streaking, back to uppertail-coverts grey-brown with pinkish tinge; tail grey-brown, outer two pairs (occasionally also next pair) with white at tip and on inner web; lesser upperwing-coverts grey-brown to bluish-grey, median coverts black with broad rufous tips, greater coverts black along centre with rufous fringes broader on outer webs, tertials black with rufous edges, primaries and secondaries brown with thin light rufous edges on outer webs; underparts creamy white, breast with slightly darker wash; iris dark chestnut-brown; bill blackish; legs pink. Distinguished from *E. schoeniclus* and *E. pallasi* by lack of white submoustachial stripe. Male non-breeding is like male breeding, but pale fringes of recently moulted feathers partly conceal black of head, which often shows indication of paler supercilium and submoustachial stripe, and nape, side of neck, breast side and flanks washed rufous or orange-brown; bill has pinkish tones on cutting edges, and pinkish lower mandible. First-winter male is similar to male non-breeding, but fringes of feathers on crown and rest of head conceal even more of black pattern; iris dark grey-brown. Female breeding is similar to male non-breeding, but head mostly dark brown with some pale streaking, ear-coverts uniformly dark brown, submoustachial area and throat pale orange (wearing to white) with contrasting blackish malar stripe, latter often breaking up into black spots on side of breast; bill dark brown. Female non-breeding is similar to male non-breeding, but with darker tones; malar stripe still prominent, but usually not reaching base of bill. First-winter female is similar to female non-breeding, sometimes with some streaking on breast and flanks; iris dark brown, as on first-winter male. Juvenile has blackish crown with distinct pale median stripe, well-defined pale grey-brown supercilium, lores rather dark brown, ear-coverts light brown but blacker posteriorly, pale greyish-brown submoustachial stripe and throat, nape and upperparts yellowish-brown, mantle and scapulars heavily streaked, wing and tail similar to adult, breast yellowish with black spots, rest of underparts yellowish-white; iris dull brown. Race *continentalis* is very like nominate, but slightly paler and with pinker tones, less chestnut on upperparts and on wing, and to some extent less buffish below. Voice. Song, usually from tall herb or reed, a brief phrase containing short syllables, "tsui tsui chrin"; race *continentalis* slightly different, "chuwi chiwu siip pssriii dsiii". Call a short "tick"; flight call "bziu", similar to that of *E. schoeniclus*.
Habitat. Breeds in reedbeds and edges of marshes, wetland fringes with bushes, and tall herbs bordering rivers and lakes; in higher-lying areas also in wet meadows and drier grassland. In winter found in open cultivations and agricultural fields near water, as well as on coastal marshes.
Food and Feeding. Insufficiently known. During breeding recorded as taking seeds, beetles (Coleoptera) and caterpillars, also berries; in winter diet probably based mainly on seeds of grasses and marshland vegetation.
Breeding. Season May–Jul; double-brooded. Nest a small cup made from dry grasses, lined with grass, rootlets and hair, located on or very close to ground in grassy area. Clutch 3–5 eggs, ochraceous with brown spots and black lines; incubation by female, period 12–14 days; chicks fed by both parents, nestling period 10–13 days (mainly 11–12 days); parents begin second nesting attempt while still feeding fledglings of first brood.
Movements. Migratory. Mainland race *continentalis* migrates to coastal China (mainly from Jiangsu S to Fujian), and recorded exceptionally in Taiwan; nominate race in Japan makes post-breeding shift S to S & W Honshu and Korea. In C Honshu, arrival on meadows of Nagano generally not before May, and departure in Sept; was considered an early arrival on former breeding grounds on Hokkaido (N Japan). Phenology of movements along coastal E China insufficiently known. Recorded as vagrant in Hong Kong.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to rare, and local. Evidently extinct in some formerly inhabited areas, such as Hokkaido and the Kuril Is, where no reports of persistence of populations during recent decades. Breeding recently confirmed in E Mongolia. Given its general scarcity across the whole area of its distribution, this species is considered to have a moderately small population, and appears to be in decline. Was reported as more abundant a century ago. Although reasons for its decline not confirmed, every indication is that it is related to continuing general loss and degradation of wetlands across breeding range, and general destruction of coastal marshes on wintering grounds, mainly in E China. Breeding area in E Mongolia threatened by droughts and overgrazing.
Bibliography. Alström *et al.* (2008), Anon. (2010c), Brazil (1991, 2009), Butchart & Stattersfield (2004), Byers, Olsson & Curson (1995), Cheng Tsohsin (1987), Dementiev *et al.* (1954, 1970), Eda (1995), Flint *et al.* (1984), Gamova (2003a, 2003b), Jahn (1942), Kanouchi *et al.* (1998), Knystautas & Liutkus (1984), Knystautas & Sibnev (1987), MacKinnon & Phillipps (2000), Maki & Onishi (2000), Nakamura (1981a, 1981b), Nakamura, Iijima & Kagawa (1968), Nakamura, Iijima & Ushiyama (1970), Nazarov (1974), Nishide (1987), Redkin & Koblik (2001b), Shegolev (1974), Sodhi & Nagata (1996), Sodhi *et al.* (1996), Stattersfield & Capper (2000), Šulpin (1931), Takano *et al.* (2001), Tomek (2002), Toru *et al.* (1970).

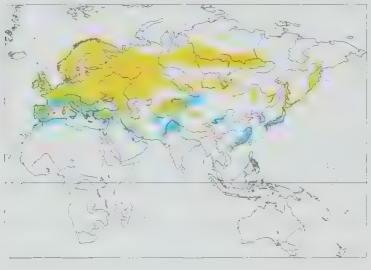
48. Reed Bunting

Emberiza schoeniclus

French: Bruant des roseaux **German**: Rohrammer **Spanish**: Escribano Palustre
Other common names: Common/Northern Reed Bunting ("northern group"); Dark Reed Bunting (*witherbyi*, *intermedia*, *tschusii*, *reiseri* and *caspia*); Pale Reed Bunting (*pyrrhuloides*, *harterti*, *centralasiae* and *zaidamensis*)

Taxonomy. *Fringilla schoeniclus* Linnaeus, 1758, Sweden.
This species, together with *E. pallasi* and *E. yessoensis*, sometimes placed in genus *Schoeniclus*. Recent molecular study indicates that it is a sister-species to *E. pallasi*, with *E. yessoensis* as sister to both. Race *minor* sometimes included in *E. pallasi*. Geographical variation complex and considerable within wide range; broadly, N races are smaller, with thinner bill, and S races larger, with thicker bill with strongly curved culmen, also clinal variation evident, birds becoming paler from W to E of species' range. For convenience, races can be divided into four groups, i.e. "northern group" (nominate, *lusitanica*, *passerina*, *parvirostris*), "eastern group" (*pyrrhulina*, *minor*), "intermediate group" (*stresemanni*, *ukrainae*, *incognita*, *pallidior*), and "southern group" (*witherbyi*, *intermedia*, *tschusii*, *reiseri*, *caspia*, *korejewi*, *pyrrhuloides*, *harterti*, *centralasiae*, *zaidamensis*); these perhaps represent more than one species, e.g. in N Italy apparent lack of interbreeding between thin-billed nominate race and thick-billed *intermedia* where the two meet, and clear (though weak) degree of genetic differentiation detected between them. Almost 40 races described, some representing points along a cline, others based on trivial differences, and these considered not to merit recognition. In addition, contradictory statements in the literature and, in some cases, inadequate information make delimitation of races difficult; ranges and descriptions given below are provisional and to some extent tentative, and should be treated with a degree of caution. Other proposed races include *goplanae* (described from Warsaw, in Poland), *mackenziei* (from South Uist, in Outer Hebrides) and *turonensis* (from Mézières en Brenne, in Indre department of C France), all synonymized with nominate, and *pallidissima* (from Verkhy Karelina, in upper R Nizhnyaya Tunguska, and Olekminsk, in WC Siberia) treated as synonym of *parvirostris*. Thorough review required. Twenty subspecies currently recognized.
Subspecies and Distribution.
E. s. schoeniclus (Linnaeus, 1758) – breeds Europe from Scandinavia E to Pechora Basin and Urals, S to British Is, most of France, W Austria, N Italy, and across SW Russia; winters S to N Africa and SW Asia.
E. s. passerina Pallas, 1771 – breeds NW Siberia from lower R Ob E to lower R Yenisey and lower R Khatanga (in Taymyr); winters in S Asia E to N India and W China.
E. s. parvirostris Buturlin, 1910 – breeds C Siberia (E to C Yakutia); winters in NW & N China.
E. s. pyrrhulina (Swinhoe, 1876) – breeds E Siberia (Kamchatka) and N Japan (Hokkaido); winters in C Japan, Korea and E China.
E. s. minor Middendorff, 1853 – breeds Transbaikalia E to Russian Far East and NE China (Heilongjiang); winters in E China.
E. s. stresemanni F. Steinbacher, 1930 – E Austria, Hungary and N Serbia.
E. s. ukrainae (Zarudny, 1917) – Ukraine and adjacent SW Russia.
E. s. incognita (Zarudny, 1917) – SE European Russia E to N Kazakhstan.
E. s. pallidior E. J. O. Hartert, 1904 – breeds SW Siberia (in basins of R Tobol and R Irtysh) E to L Baikal; winters in SW & SC Asia.

E. s. witherbyi von Jordans, 1923 – Mediterranean coast of France, Sardinia, Balearic Is, Spain (except NW) and N Africa (NW Morocco).
E. s. lusitanica F. Steinbacher, 1930 – NW Spain and Portugal.
E. s. intermedia Degland, 1849 – Italy and Adriatic coast S to NW Albania.
E. s. tschusii Reiser & Almásy, 1898 – R Danube in Bulgaria and Romania, and in N Black Sea region and Sea of Azov coast.
E. s. reiseri E. J. O. Hartert, 1904 – SE Albania, NW Greece, S Macedonia and W & C Turkey.
E. s. caspia Ménétriés, 1832 – E Turkey E to E Transcaucasia and N & NW Iran, possibly also in Syria.
E. s. korejewi (Zarudny, 1907) – SW & SE Iran and S Turkmenistan.
E. s. pyrrhuloides Pallas, 1811 – breeds N Caspian Sea region (from R Terek) E to W Mongolia, L Balkhash (SE Kazakhstan) and C Tien Shan; non-breeding also to SW & C Asia.
E. s. harterti Sushkin, 1906 – extreme S Russia (S Tuva), extreme E Kazakhstan and extreme NW China (NW Xinjiang).
E. s. centralasiae E. J. O. Hartert, 1904 – Tarim Basin E to Lop Nur, in Xinjiang (W China).
E. s. zaidamensis Portenko, 1929 – Zaidam Depression, in NW Qinghai (W China).



Descriptive notes. 14–16·5 cm; 10–28 g (C Europe). Small to medium-sized or rather large bunting, variable both in body size and in bill size. Male nominate race breeding is distinctive, has blackish head and throat, with prominent white submoustachial stripe and white hindneck-collar meeting on lower neck side; mantle grey-brown mixed with rufous and heavily streaked blackish, scapulars blackish with rufous feather edges, back and rump greyish with dark streaks, uppertail-coverts browner; tail blackish-brown, central feather pair paler, outermost pair with extensive white, adjacent pair with smaller white area; lesser upperwing-coverts red-brown, median and greater coverts blackish-brown with rufous-brown tips, flight-feathers blackish-brown, tertials with rufous edges, primaries and secondaries with narrow pale buffish edges, edges on secondaries brighter and more rufous; underparts dirty white, variable indistinct streaking on side of breast and flanks; iris dark chestnut-brown; bill relatively small, culmen almost straight, blackish; legs brown. Male non-breeding has head pattern largely obscured by grey-brown fringes of new feathers, has buffish supercilium, pale brown lores and ear-coverts, darker brown eyestripe, moustachial stripe and rear edge of ear-coverts, also submoustachial stripe present but not so cleanly white, chin buffish, black malar stripe, throat whitish; nape grey-brown (giving hint of pattern to be acquired during breeding), upperparts, wing and tail much as when breeding, but upperparts somewhat paler; underparts whitish, breast and flanks tinged yellow-buff and streaked brownish; lower mandible blue-grey. First-winter male is almost identical to male non-breeding, except for subtle details, such as more worn wing feathers (not yet moulted), more pointed outer rectrices; iris dark grey-brown. Female breeding is rather similar to male non-breeding, but with nape pale grey-brown to whitish; malar stripe prominent, broader at base than on male non-breeding, breast and flanks distinctly streaked dark, bill blackish. Female non-breeding and first-winter female are very like male in corresponding plumages, except for subtle differences in pattern of crown feathers. Juvenile resembles female, but has chestnut crown with abundance of dark streaks, broader blackish malar stripe, yellowish-buff upperparts streaked and spotted dark, breast heavily streaked and belly and flanks spotted; iris dark grey-brown. Races differ mainly in size and bill size, also in details of plumage, but variation not well understood: *lusitanica* is darkest race, otherwise similar to nominate; *passerina* is paler above and with narrower streaks above and below than nominate; *parvirostris* is small and rather pale, with reduced streaking above, few or no streaks on flanks; *pyrrhulina* is slightly bigger and paler than last, with comparatively large bill with convex culmen; *minor* is very like previous; *stresemanni* is similar to nominate, but with heavier bill, slightly paler rump; *ukrainae* is stronger-billed and paler than nominate; *incognita* is very pale like *pyrrhuloides*, but somewhat greyer above, with smaller bill; *pallidior* also is very pale, like last, but smaller in size and with smaller bill; *witherbyi* is large, with large bill, very dark plumage; *intermedia* is similar to previous, but somewhat smaller; *tschusii* is medium-sized, paler than nominate (especially on rump) and more narrowly streaked above; *reiseri* is large and very dark, with comparatively huge bill; *caspia* is similarly large, but rather pale (close to *intermedia*), with bill comparatively large; *korejewi* is similar to *pyrrhuloides*, perhaps larger-billed, but plumage somewhat darker; *pyrrhuloides*, is large and large-billed, with plumage noticeably very pale, almost greyish-white above; *harterti* is very like previous, but perhaps a little smaller; *centralasiae* also is very similar, but on average smaller; *zaidamensis* is large, about the same as *pyrrhuloides*, but plumage distinctly more buffish (less grey), no streaks below. Voice. Song, from top of bush or reeds, normally a short series of repetitive units, delivered as brief and simple verse, e.g. "sripp srip srriia srrissriisrii" or "zrrit zrrit zrrit zrrururu". Normal contact call a characteristic "siuu", falling in pitch; on migration a "brzii" given by birds in flight.

Habitat. Generally in marshy areas where areas of scrubby growth around reeds, and in areas of tall herbage near wetlands: fens, bogs, riversides and inland waters. In general, associated with humid soils where are dense types of vegetation grow. In Siberia breeds in willow (*Salix*) thickets in floodplains along forest-tundra, but avoids taiga zone. During winter found in similar types of habitat, and also in open fields, cultivations and agricultural areas, in woodland clearings and in weedy areas, often away from water. Will visit gardens in some areas, e.g. parts of Europe. Mostly in lowlands.

Food and Feeding. During breeding season mostly invertebrates; diet otherwise mainly seeds and other plant material. Large-billed races mostly insectivorous all year. In W Palearctic, invertebrates recorded as eaten are springtails (Collembola), mayflies (Ephemeroptera), adult and larval damselflies and dragonflies (Odonata), stoneflies (Plecoptera), grasshoppers and allies (Orthoptera), bugs (Hemiptera), lacewings (Neuroptera), adult and larval Lepidoptera, caddis flies (Trichoptera), adult and larval flies (Diptera), ants (Formicidae), beetles (Coleoptera), spiders (Araneae), harvestmen (Opiliones), ticks (Acari), crustaceans, snails (Pulmonata), bivalve molluscs (of family Sphaeriidae); among plants taken are seeds or other parts of spruce (*Picea*), birch (*Betula*), alder (*Alnus*), nettle (*Urtica*), knotgrass (*Polygonum*), dock (*Rumex*), orache (*Atriplex*), goosefoot (*Chenopodium*), amaranth (*Amaranthus*), chickweed (*Stellaria*), mouse-ear (*Cerastium*), buttercup (*Ranunculus*), rape and allies (*Brassica*), shepherd's-purse (*Capsella*), gold-of-pleasure (*Camelina*), pennycress (*Thlaspi*), meadowsweet (*Filipendula*), lupin (*Lupinus*), flax (*Linum*), willowherb (*Epilobium*), cowberry (*Vaccinium*), scarlet pimpernel (*Anagallis*), forget-me-not (*Myosotis*), basil (*Clinopodium*), potato (*Solanum*), plantain (*Plantago*), mugwort (*Artemisia*), bur-marigold (*Bidens*), hawk's-beard (*Crepis*), sow-thistle (*Sonchus*), *Galinsoga*, mare's-tail (*Hippuris*), water-plantain (*Alisma*), sedges (Cyperaceae), rushes (Juncaceae), reedmace (*Typha*) and grasses (Poaceae). Forages mostly on ground, also in low vegetation. In winter large-billed races extract invertebrates from inside reed stems, a foraging technique that allows them to remain in areas where winter temperatures can drop to below minus 30°C. Singly and in pairs when breeding; at other times in small groups and loose flocks of up to c. 200 individuals, occasionally more.

Breeding. Season early Apr to end Aug, depending on latitude and altitude; in European Russia eggs laid late Jun to early Jul, and in Siberia and Mongolia from beginning Jun and during whole of Jul, whereas in S latitudes breeding begins Apr and lasts sometimes to Aug; up to three broods in S of range. Monogamous; polygyny recorded in some areas. Nest built entirely by female, using twigs, grass, sedges, moss, and reed stems and leaves, lined with finer stems of plants, reed flowers, moss, rootlets and hair, e.g. wild boar (*Sus scrofa*) hair, normally placed on ground, on tussock or on base of a shrub, sometimes up to 4 m above ground in shrub. Clutch 4–5 eggs, olive-grey to pale purple, sparsely marked with dark spots and some fine lines; incubation by both sexes, period 12–15 days; chicks fed by both parents, nestling period 9–12 days.

Movements. Those breeding in S of range resident, or making only short movements. Populations in N, from Scandinavia and Poland E across Russia to Kamchatka and N Japan and, in S, to Ukraine, N Kazakhstan and China almost entirely migratory, although some remain in breeding areas (especially when winters less harsh). In W Europe, most individuals breeding in areas with mean Jan temperature below 0°C are migratory, and those breeding where it is 5°C or above are mostly sedentary; movement may be linked with probability of snowfall and consequent lack of access to seeds on ground (rather than temperature itself), since in N Black Sea region and in C Asia, where precipitation less common, average winter temperature is below freezing but the species remains during winter. Main period of autumn passage during mid-Sept to mid-Nov. Migrants winter in Britain and Ireland, most of continental Europe, N Africa, Mediterranean islands, Turkey, Asia Minor, Levant, S Ukraine and S European Russia, Transcaucasia, Iraq, and N Iran E to Pakistan and NW India; in E, main wintering areas in China (especially N & E) and C & S Japan (N Honshu S to S Kyushu, rarely reaching Ryukyu Archipelago S to Miyako Is), rarely S Korea. Ring recoveries in W Europe suggest differential migration, more females than males moving S. Migration N to breeding areas begins as early as Feb, and is stronger during Mar, and in Apr only late individuals still on wintering grounds; passage in Siberia mainly during May to early Jun. Recorded as vagrant in Iceland, Svalbard, Egypt, Kuwait, UAE, Nepal, Taiwan, Hong Kong and Alaska.

Status and Conservation. Not globally threatened. Generally common or locally common. Estimated European population towards end of 20th century a minimum of 4,800,000 pairs, with largest concentrations in Sweden (650,000), Poland (530,000), Norway (420,000), Germany (400,000) and European Russia (316,000); was thought to be stable during 1970–1990. Declines reported in, especially, Norway and Sweden during 1990–2000, and German population estimated in 2005 to number 300,000–380,000 pairs; populations across most of Europe, including key ones in Russia and Romania, appeared to be stable. Nevertheless, trends in European monitored populations reveal a moderate decline since 1980; moreover, some races evidently giving cause for concern, e.g. both *witherbyi* and *lusitanica* classified in Spain as "endangered". No quantitative data available for Asian part of range, where the species appears to be locally common.

Bibliography. Alström *et al.* (2008), Atienza *et al.* (2003), Baranovski (2006), Belda *et al.* (2009), Bell (1970), Bell & Hornby (1969), Blümel (1982), Brickle & Peach (2004), Byers, Olsson & Curson (1995), Castell & Castell (2009), Copete *et al.* (1999), Cramp & Perrins (1994), Crick *et al.* (1994), Dixon *et al.* (1994), Ehrengruber *et al.* (2006), Estrada *et al.* (2004), Fry & Keith (2004), Garner (2002), Gavrilov & Gavrilov (2005), Glutz von Blotzheim & Bauer (1997), Grapputo *et al.* (1998), Gruar *et al.* (2006), Grujbarova *et al.* (2005), Hagemeijer & Blair (1997), Haukioja (1971a), Hermann (1983), Herrando *et al.* (2011), Hirokawa *et al.* (2003), Isenmann (1990), Kasparek (1979, 1980), Kerèek (2009), Kirwan *et al.* (2008), Kleven *et al.* (2006), Kvist *et al.* (2011), Leader (1994), Madroño *et al.* (2004), Marthinsen *et al.* (2005), Martí & del Moral (2003), Martínez-Vilalta *et al.* (2002), Matessi, Dabelsteen & Pilastro (2000, 2001), Matessi, Griggio & Pilastro (2002), Matessi, Pilastro & Marin (2000, 2004), Mayer *et al.* (2009), McCarthy (2006), Meyrom *et al.* (2001), Mezquida & Villarán (2006), Mlikovsky (2009), Nemeth (1996), Nikolov *et al.* (2008), Okulewicz (1989), Olioso (1988), Orlowski (2005), Orlowski & Czarnecka (2007), Pasinelli & Schiegg (2006), Peach *et al.* (1999), Pesente *et al.* (1997), Pisulinska (2008a, 2008b), Pollo (2005), Prokopchuk & Petrusenko (1976), Prys-Jones (1977, 1984), Rasmussen & Anderton (2005a, 2005b), Robson (2000), Rogacheva (1992), Sage *et al.* (2010), Schiegg *et al.* (2007), Schmitz & Steiner (2006), Schmitz *et al.* (2007), Shirihai (1996), Snow & Perrins (1998), Surmacki (2004), Suter, Ermacora *et al.* (2009), Suter, Keiser *et al.* (2007), Svensson (1992), Trnka & Prokop (2006), Ulbricht (1975), Vera *et al.* (2009), Villarán (1999), Villarán & Pascual-Parra (2003), Walter (2007), Wernham *et al.* (2002), Wingelmaier *et al.* (2007a, 2007b), Yom-Tov (1992), Zink *et al.* (2008).

PLATE 45 ➤



PLATE 45

inches 3
cm 8

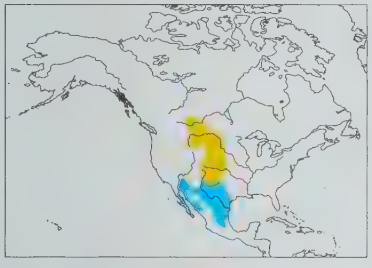
Genus *CALAMOSPIZA* Bonaparte, 1838

49. Lark Bunting

Calamospiza melanocorys

French: Bruant noir et blanc **German**: Prärieammer **Spanish**: Chingolo Albinegro

Taxonomy. *Calamospiza melanocorys* Stejneger, 1885, plains of Platte River = Nebraska, USA.
Genus perhaps close to *Chondestes*, and in a clade that includes also *Amphispiza* and *Spizella*. Plumage dichromatism and elaborate aerial displays reminiscent of *Calcarius ornatus* and *Rhynchophanes*, but apparently not closely related. Monotypic.
Distribution. Breeds S Canada (S Alberta E to SW Manitoba) and S in Great Plains of USA (E to W Minnesota) to SE New Mexico, N Texas, W Oklahoma and C Kansas; has bred in wet years in E California. Non-breeding from SE Utah and S Arizona E to SW Kansas, W Oklahoma and C & W Texas, S in Mexico to S Baja California, N Sinaloa, Coahuila (uncommon), NE Jalisco and C Tamaulipas.



Descriptive notes. 14–18 cm; 29·5–51·5 g. A large sparrow with large, conical bill and relatively short, notched tail. Male breeding is mostly black, sometimes flecked with white on belly; primaries black, narrowly edged white, secondaries white-tipped, tertials boldly edged white; lesser upperwing-coverts black, median coverts white with variable extent of black at base, greater coverts mostly white, the inner ones black with white outer web or fringes; outer web of lateral rectrices white, inner webs of outer five pairs of rectrices tipped white; iris reddish-brown to black; bill dark bluish or black; legs dull pinkish, usually with darker, greyer feet. Male non-breeding resembles female, but wing blackish and with large whitish patch (as in breeding plumage), ear-coverts blackish, throat black with few pale streaks, underparts more heavily marked with darker, blackish streaking; bill bluish. Female has brown crown and nape streaked darker brown, pale supercilium and lores, brown ear-coverts paler in centre and with pale spot at rear edge; thin moustachial stripe and broad malar stripe dark brown, submoustachial stripe and throat pale brown to buffish-white; upperparts brown, streaked darker brown; tail brown, all except central pair of rectrices tipped dull white, especially on inner webs; upperwing dark brown, median and greater coverts with broad pale buff to white edges and tips (forming paler wing patch, smaller than male's), tertials broadly edged buff to pale white; underparts whitish with sandy brown tinge on sides and flanks, broadly streaked darker brown, undertail-coverts with dark brown centres. Juvenile is similar to female, but with yellowish cast and broad buffy edges on feathers of neck, back and scapulars, giving scaly impression, large pale buffy patch evident on wing. VOICE. Song, often in flight, a musical mixture of short notes and slurred phrases, "kazee kazee kazee kazee, zizizizi zoo quit quit quitquit too wewewewewewew tur tur quit quit quit quit" or "sweet sweet sweet sweet toot toot toot toot toot chug chug chug tr-r-r-r-r". Call a gentle "who-tee-ee", "whee-ta-wer" or "hoo-ee".
Habitat. Short-grass prairie with bare ground and sparse, scattered shrubs e.g. sagebrush (*Artemisia*), also stubble fields and alfalfa (*Medicago*). In non-breeding season found in dry weedy fields, desert scrub and open farmland; often visits cattle-feed lots. Sea-level to high plains.
Food and Feeding. Diet in summer more than 60% animal items, especially short-horned grasshoppers (Acrididae) and beetles (Coleoptera), particularly scarabs and chafers (Scarabaeidae) and weevils (Curculionidae), also other rather small insects, including ants (Formicidae), as well as spiders (Araneae); plant foods consist of seeds of oats (*Avena*), Indian ricegrass (*Oryzopsis*), smartweed (*Polygonum*), buffalo grass (*Bouteloua dactyloides*), sunflowers (*Helianthus*), three-awn grass (*Aristida*), etc. Winter diet not well known; probably mostly seeds, and, when available, takes insects. Forages principally on or near ground or low in vegetation. Typically in small groups; in non-breeding season in flocks, often very large ones.
Breeding. Nest-building and egg-laying from early to middle of May in S part of range and late May in N, but can be delayed by up to two weeks in years with cold spring; very rarely lays second clutch within a season. Monogamous, occasionally polygynous. Male performs stiff-winged display-flight with song. Nest constructed by female alone, taking 2 days, loose in structure, made from dry grass, rootlets and alfalfa stalks, lined with fine grasses and hair, placed on ground underneath shrub or other taller vegetation. Clutch 2–5 eggs, commonly 4, unmarked and with colour ranging from whitish-blue to greenish or greenish-blue; incubation strictly by female, period 12 days; young leave nest at 8–9 days of age, when still cannot fly. Nests sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*), but frequency very low.
Movements. Migratory; routes largely through Great Plains and S Canadian Prairies. Earliest N departures from Mexican wintering grounds occur in Feb, in Sonora some remain into Apr, rarely into May; arrival in Texas may be as early as early Mar, but numbers increase in late Apr and peak in first two weeks May; at N edge of US range and in Canada arrival in late May. Males arrive on territory approximately a week earlier than females. Adult males migrate S earlier than females or young, and adult females appear to move S generally earlier than immatures. In Arizona migrants found as early as Jul, sometimes in good numbers by late Jul, but departure from S Canada (Alberta) does not begin until late Jul and early Aug, suggesting that N populations migrate later; at Big Bend (Texas) migration peaks in early Sept, although first arrivals in early Aug; in much of breeding range migration over by late Sept. Arrival on wintering grounds of Sonora, in Mexico, by early Aug, with larger flocks visible by mid-Aug. A decidedly later spring migrant and earlier autumn migrant than *Calcarius*. Vagrant on W coast in both seasons, more often in autumn; coastal records more likely in autumn, spring records often farther inland, or farther N (British Columbia). Vagrants E of regular range both in spring and in autumn; recorded in most states/provinces in E, predominantly as vagrant in coastal sites.
Status and Conservation. Not globally threatened. Classified as "Declining" in the USA (Yellow WatchList priority species for conservation). Often common or very common in appropriate habitat. Distribution varies annually according to rainfall; in USA, has bred in E California in wet years. Has suffered loss, fragmentation and degradation of habitat owing to conversion of grasslands to agriculture; overgrazing by cattle in short-grass prairies, and absence of natural fire regimes and herbivores, also pose problems; in addition, is vulnerable to poisoning by pesticides (especially diazinon, used for controlling grasshoppers). Nevertheless, despite declines, this species remains numerous in most parts of range.
Bibliography. Adams, Skagen & Adams (2001), Adams, Skagen & Savidge (2007), Armani (1985), Beadle & Rising (2002), Bradshaw (1934), Chaine & Lyon (2008a, 2008b), Harper (1958), Hellmayr (1938), Howell & Webb (1995), Lebbin *et al.* (2010), Miller *et al.* (1957), Nero (1983), Pleszczynska (1978), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Sealy (1999), Shane (2000), Shane & Seltman (1995), Urban (1959), Wilson (1976).

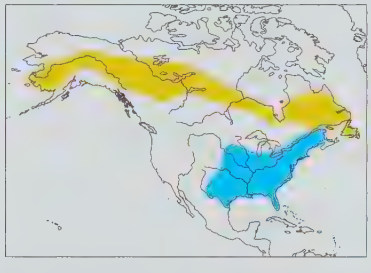
Genus *PASSERELLA* Swainson, 1837

50. Red Fox-sparrow

Passerella iliaca

French: Bruant fauve **German**: Fuchsammer **Spanish**: Chingolo Zorruno

Taxonomy. *Fringilla iliaca* Merrem, 1786, North America = Quebec, Canada.
Genus sometimes subsumed in *Zonotrichia*. This species and *P. schistacea*, *P. megarhyncha* and *P. unalaschcensis* are often treated as conspecific. Some molecular data suggest that *P. arborea* may be sister-taxon of these four. Probably hybridizes occasionally with *P. unalaschcensis* near L Iliamna, at E end of Alaska Peninsula. Geographical variation largely clinal, making delimitation of races difficult; nominate race and *zaboria* intergrade into each other, and many individuals cannot safely be assigned to either race. Two subspecies recognized.
Subspecies and Distribution.
P. i. zaboria Oberholser, 1946 – breeds NW and interior Alaska and in W Canada from N Yukon and NW & CE Northwest Territories E to N Manitoba, S to N British Columbia, C Alberta, C Saskatchewan and S Manitoba; winters in SE USA chiefly E of Great Plains, from E Kansas and S Iowa S to S Texas, Louisiana, Mississippi, Alabama and N Georgia.
P. i. iliaca (Merrem, 1786) – breeds in E Canada from NE Manitoba E to N Labrador, S to NC Ontario, SE Quebec and S Newfoundland; winters in SE Canada (S Ontario and New Brunswick) and E USA from S Wisconsin and S Michigan E to N Vermont, S to S Mississippi, Alabama and C Florida.



Descriptive notes. 15–17 cm; 29·6–49 g. Large sparrow with long wings and relatively short tail. Nominate race has top of head grey with bright rusty-chestnut streaks, grey supercilium, whiter before eye, ear-coverts mixed buff or whitish, rufous and grey, bold moustachial stripe rusty or brownish rusty, submoustachial stripe white with rufous streaking, malar stripe rusty; upperparts grey, mantle and upper back with rusty streaking, lower rump and uppertail-coverts bright rufous; tail rusty, feathers with browner tips; upperwing blackish, most feathers with broad rufous edges, greater and median coverts with narrow whitish tips (indistinct pale wingbars); throat creamy white; underparts white, breast and flanks heavily streaked reddish-brown, streaks becoming small chevrons on lower breast; iris dark red-brown; upper mandible mostly dark greyish-horn, lower mandible mostly yellow; legs pink. Sexes similar. Juvenile has crown and back brown, centres of feathers dark brown or rusty brown, upperwing-coverts and tertials broadly edged rusty, underparts paler and streaked; moults before migrating. Race *zaboria* lacks streaks on crown or has only faint dull reddish-brown marks, back more faintly streaked than nominate, underparts less streaked/spotted and spotting not so brightly reddish-brown. VOICE. Primary song a series of loud, clear, slurred ringing whistles on different pitches, usually ending with buzzy whistle, often sounding rather like "aujourd'hui"; female occasionally sings; occasionally sings in winter. Contact call a faint "tsip"; alarm a loud "smack", "tchek" or "chick".
Habitat. Breeds in dense deciduous thickets, commonly alders (*Alnus*) or willows (*Salix*), in bogs, and dwarf spruce (*Picea*), balsam fir (*Abies balsamea*) or tamarack (*Larix laricina*). On migration and in winter generally in low, moist areas with rank, tall brush, and brush piles, often at woodland edge, streamside thickets, or in wet woods.
Food and Feeding. During breeding season a wide variety of arthropods, including beetles (Coleoptera), fly larvae (Diptera), caterpillars (Lepidoptera), ants (Formicidae) and bees (Apoidea), scale insects (Coccoidea), spiders (Araneae) and millipedes (Diplopoda), as well as small molluscs (Bivalvia and Gastropoda), also seeds, berries (*Amelanchier*); will take dead fish. In winter, feeds on variety of fruits, seeds and buds. Forages on ground and low in vegetation. Often uses both feet together to scratch in litter, thereby exposing concealed prey. Singly and in small groups; in non-breeding season often in flocks with other sparrow species, and occasionally forms large flocks.
Breeding. Season early Apr through early Jul; in Newfoundland egg-laying commences as early as late Apr, most clutches begun in May and early Jun, few not until Jul, and some juveniles fledge in early Jun; single-brooded. Apparently monogamous, but details of mating poorly known. On arrival in breeding area, male quickly begins territorial defence, and pair formation occurs within a week; territory size in Newfoundland 0·25–1 ha. Nest built from dry grass, twigs, moss or bark, lining of finer grasses, moss, lichens, feathers and hair, placed on ground, or usually below 1·5 m above ground in bush or tree, most nests in Newfoundland under conifer. Clutch 2–4 eggs, usually 3, ground colour variable, tends to be pale bluish or greenish, with brownish or rusty spots and scrawls, particularly concentrated at large end; incubation by female, period 12–14 days; nestling period 10–11 days. Nests (of race *zaboria*) parasitized extremely rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Migratory. Most winter E of Great Plains; uncommon on W coast and in S Arizona and New Mexico. Ringing studies reveal average migration distance between breeding and wintering sites to be c. 1100 km. Those breeding in Maritime Provinces winter along mid-Atlantic coast of USA, those from farther W winter largely in SE USA. A late autumn migrant and early migrant in spring. Leaves breeding grounds from Sept, arriving Great Lakes region by middle to late Sept;

On following pages: 51. Slate-colored Fox-sparrow (*Passerella schistacea*); 52. Thick-billed Fox-sparrow (*Passerella megarhyncha*); 53. Sooty Fox-sparrow (*Passerella unalaschcensis*); 54. American Tree Sparrow (*Passerella arborea*); 55. Volcano Junco (*Junco vulcani*); 56. Yellow-eyed Junco (*Junco phaeonotus*); 57. Dark-eyed Junco (*Junco hyemalis*).

arrival in wintering areas in Texas and Louisiana in second half Oct. Departure from wintering grounds by late Mar, although rarely some hang on much later, until early May. Spring arrival in Great Lakes area early Mar, and most have moved through by late Apr; farther N & E, in Newfoundland, arrival in early Apr. Rare vagrant on Pacific coast, most apparently of race *zaboria*; nominate race recorded rarely W to Colorado and S to S Florida. Accidental to Greenland, Iceland, Northern Ireland, Germany (possibly ship-assisted) and Italy.

Status and Conservation. Not globally threatened. Fairly common throughout range in suitable habitat. Breeds in fairly remote areas that have been little disturbed by humans, and wintering habitat also has been little affected by human activities. No indication that this species' numbers are in decline.

Bibliography. Armani (1985), Beadle & Rising (2002), Bent & Austin (1968), Brewer *et al.* (2000), Garrett *et al.* (2000), Glutz von Blotzheim & Bauer (1997), Koblik *et al.* (2006), Lewington *et al.* (1991), McCarthy (2006), Pyle (1997), Ridgway (1901), Rising (1995), Rising & Beadle (1996), Ryan (1974), Swarth (1920), Threlfall & Blacquiere (1982), Wacker *et al.* (2010), Weckstein *et al.* (2002), Williamson & Peyton (1962), Zink (1986, 1991, 1994, 2008).

51. Slate-colored Fox-sparrow

Passerella schistacea

French: Bruant ardoisé **German**: Schieferammer **Spanish**: Chingolo Pizarroso

Taxonomy. *Passerella schistacea* S. F. Baird, 1858, "Head of the Platte" = south fork of Platte River, about 25 miles [c. 40 km] east of north-eastern corner of Colorado, in Nebraska, USA.

Genus sometimes subsumed in *Zonotrichia*. This species and *P. iliaca*, *P. megarhyncha* and *P. unalaschcensis* are often treated as conspecific. Some molecular data suggest that *P. arborea* may be sister-taxon of these four. Race *altivagans* sometimes treated as a race of *P. iliaca*; looks similar to race *zaboria* of latter and also to *P. unalaschcensis*, probably reflecting low-level introgression with both species, though molecular-genetic studies suggest that frequency of such interbreeding is low. Race *fulva* sometimes placed in *P. megarhyncha*. Six subspecies recognized.

Subspecies and Distribution.

P. s. olivacea Aldrich, 1943 – breeds SW Canada (SC & SW British Columbia) S to NW USA (C & E Washington); non-breeding in SW USA (interior California) and extreme NW Mexico (N Baja California).

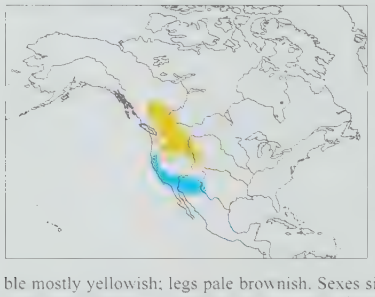
P. s. altivagans Riley, 1911 – breeds in interior C & SE British Columbia and SW Alberta; non-breeding principally SW USA (Cascades and Sierra Nevada, in California, and SW Arizona) and extreme NW Mexico (NW Baja California).

P. s. schistacea S. F. Baird, 1858 – breeds extreme S Canada (extreme SE British Columbia and SC Alberta) S in USA through NC & E Oregon and N Idaho to NC & NE Nevada, E to W Montana, SW Wyoming and C Colorado; non-breeding in interior of N California, C Arizona and N New Mexico S to N Baja California, S Arizona and W Texas.

P. s. swarthi Behle & Selander, 1951 – breeds W USA (SE Idaho and NW Utah).

P. s. fulva Swarth, 1918 – breeds W USA (E side of Cascade Range in C Oregon S to Modoc Plateau, in NE California); non-breeding in SW California and N Baja California.

P. s. canescens Swarth, 1918 – breeds C Nevada and extreme CE California (White Mts); non-breeding in S California, N Baja California and S Arizona.



Descriptive notes. 15–18 cm; 26–35 g. Large sparrow with relatively long tail. Nominate race has head slate-coloured, pale lores, whitish submoustachial stripe with dark streaks; upperparts grey, washed brown, lower rump and tail rusty brown; upperwing black, most feathers broadly edged rufous, greater and median coverts sometimes with very narrow whitish tips (indistinct pale wingbars); throat and underparts white, breast and flanks heavily marked with blackish arrowhead-shaped spots, these becoming smaller and browner posteriorly; iris dark red-brown; upper mandible mostly dark greyish-horn, lower mandible mostly yellowish; legs pale brownish. Sexes similar. Juvenile resembles adult, but upperparts more distinctly tinged with brown; moults before migrating. Races differ minimally: *olivacea* is relatively small, with crown and back uniformly greyish-olive with reddish tinge; *swarthi* has crown uniformly darker greyish-olive, and heavy brown spots on breast and belly; *fulva* is similar to previous, but bill larger; *canescens* is small, with relatively small bill, and with crown and back uniformly pale grey; *altivagans* is browner above than others, mantle and back slightly streaked rusty, malar stripe and markings below browner with slight rusty tinge. Voice. Song clear and ringing, starting with 2–3 syllables on different pitches, "too-wheet-whoo tweek-tsuck-tseeka tsew!", with alternate notes emphasized; several elements may have buzzy quality, and many incorporate short warbles; individuals may have 2–5 different songs, not singing same twice in a row. Call a distinctive metallic "chink", "chek" or "klink", or faint "seet".

Habitat. Breeds in impenetrable riparian thickets of mountain meadows, with alder (*Alnus*), water birch (*Betula occidentalis*), willows (*Salix*), currants and gooseberries (*Ribes*), and roses (*Rosa*); in SE British Columbia and SW Alberta in dense clumps of alpine dwarf spruce (*Picea*). Mainly in wooded habitats with dense understorey in non-breeding season.

Food and Feeding. In breeding season primarily insects, e.g. beetles (Coleoptera), probably also other invertebrates, seeds and berries when available. In winter, probably a variety of fruits, seeds and buds, and when available insects. Forages on ground or low in vegetation.

Breeding. Season mid-May to mid-Jul; probably single-brooded. Probably monogamous. Nest construction requires two days; nest made from dry grass, twigs, moss or bark, lining of finer grasses, moss, lichens, feathers and hair. Clutch variable, typically 5 eggs, ground colour variable, tends to be pale bluish or greenish, with brownish or rusty spots and scrawls; incubation period 12–14 days; no information on nestling period. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).

Movements. Most populations migratory, spending non-breeding season in interior of California, C Arizona and New Mexico S to N Baja California, N Sonora and W Texas; non-breeding range of race *swarthi* not known. S populations may perform altitudinal movements, rather than true migration. Migratory routes little known, but include major river valleys, particularly in spring (when highlands may still be snow-covered), and montane meadows in autumn; all within W mountains of North America. Rare on Pacific coast, although regular in drier scrubby sites immediately E of coastal mountains in C California. Migrates much earlier, both in spring and in autumn, than *P. iliaca*. Arrives on breeding grounds as early as late Mar, and autumn migrants seen as early as late Aug in Arizona and New Mexico. Casual in CS Canada (Manitoba) and W Nebraska.

Status and Conservation. Not globally threatened. Fairly common throughout its range in suitable habitat. No indication of any change or reduction in numbers.

Bibliography. Aldrich (1943), Armani (1985), Beadle & Rising (2002), Garrett *et al.* (2000), McCarthy (2006), Pyle (1997), Ridgway (1901), Rising (1995), Rising & Beadle (1996), Swarth (1920), Weckstein *et al.* (2002), Williamson & Peyton (1962), Zink (1986, 1991, 1994, 2008).

52. Thick-billed Fox-sparrow

Passerella megarhyncha

French: Bruant à bec épais **German**: Dickschnabelammer **Spanish**: Chingolo Picogrueso
Other common names: Large-billed Fox-sparrow

Taxonomy. *Passerella megarhynchus* S. F. Baird, 1858, Fort Tejon, Kern County, California, USA.

Genus sometimes subsumed in *Zonotrichia*. This species and *P. iliaca*, *P. schistacea* and *P. unalaschcensis* are often treated as conspecific. Some molecular data suggest that *P. arborea* may be sister-taxon of these four. Geographical variation very slight; species sometimes treated as monotypic. Proposed race *mariposae* (described from Yosemite Park, in California) included within nominate. Race *fulva* of *P. schistacea* sometimes included in present species. Four subspecies tentatively recognized.

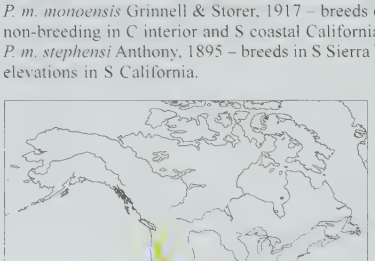
Subspecies and Distribution.

P. m. megarhyncha S. F. Baird, 1858 – breeds W USA from extreme SW Oregon S to CN California (including Sierra Nevada); non-breeding in C & S California S to extreme NW Mexico (NW Baja California).

P. m. brevicauda Mailliard, 1918 – breeds in interior N coast ranges of California S to Colusa County; non-breeding C & S coastal California.

P. m. monoensis Grinnell & Storer, 1917 – breeds on E slope of Sierra Nevada (in EC California); non-breeding in C interior and S coastal California, and NW Baja California.

P. m. stephensi Anthony, 1895 – breeds in S Sierra Nevada (in S California); non-breeding at lower elevations in S California.



Descriptive notes. 15–18 cm; 29–38 g. Large sparrow with large bill and relatively long tail. Nominate race has slate-coloured head and upperparts washed with brown, rump brown, tail rusty brown; submoustachial stripe streaked whitish and black, malar stripe blackish; upperwing mostly reddish-brown; throat and underparts whitish, lower throat to breast and flanks spotted with blackish; iris dark brown; bill steel-grey, with dusky grey culmen (non-breeding, steel-grey replaced with yellowish); legs brownish. Sexes similar. Juvenile resembles adult, but upperparts more distinctly tinged with brown; moults before migrating. Races differ very little, chiefly in bill size: *brevicauda* is similar to nominate, but bill even larger, crown and back uniformly greyish-brown, spotting on breast and belly sparse; *monoensis* has noticeably smaller bill than last; *stephensi* has very large and broad bill, largest bill of all races. Voice. Song clear and ringing, starting with 2–3 syllables on different pitches, "too-wheet-whoo tweek-tsuck-tseeka tsew!", every other note emphasized. Call a distinctive metallic "chink", "chek" or "klink", and faint "seet".

Habitat. Deciduous thickets, sometimes thick, scrubby conifers, generally along streams, brushy fields, burnt forest (c. 10 years after fire) and montane chaparral, especially with greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*) and bush chinquapin (*Castanopsis sempervirens*); 1200–3000 m. In S Sierra Nevada also in elderberry (*Sambucus*) thickets. In winter found in chaparral and streamside thickets, mostly on warmer S-facing slopes dominated by chamise (*Adenostoma fasciculatum*).

Food and Feeding. In breeding season feeds primarily on insects, and probably also on other animal items; will also take seeds and berries when they are available. In winter probably eats variety of fruits, seeds and buds, also insects when these available. Forages on ground or low in vegetation.

Breeding. Season mid-May to mid-Jul; probably single-brooded. Probably monogamous. Nest built by female, of dry grass, twigs, moss or bark, lined with finer grasses, moss, lichens, feathers and hair, most placed on ground and often concealed by low vegetation, including conifers, oaks (*Quercus*) or *Ceanothus* shrubs, up to 20% of nests may be in low vegetation, often in fork of low branch near ground, but always very well concealed. No information on clutch size, eggs variable, ground colour tends to be pale bluish or greenish, with brownish or rusty spots and scrawls; incubation by female, period 12–14 days; no information on nestling period. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).

Movements. Most, if not all, populations migratory, some perhaps moving very short distance or performing largely altitudinal movements; more research needed. Migrates earlier than other members of genus. S-bound migration noted from middle to late Aug, majority heading S in Sept; some remain in breeding areas into mid-Sept. Nearly all winter in S California and N Baja California. In spring, N-bound migrants appear in desert oases by mid-Feb, and peak migration late Mar to late Apr.

Status and Conservation. Not globally threatened. Locally common. Little information available on numbers.

Bibliography. Armani (1985), Beadle & Rising (2002), Burns & Hackett (1993), Garrett *et al.* (2000), Mailliard (1921), McCarthy (2006), Pierce (1921), Pyle (1997), Ridgway (1901), Rising (1995), Rising & Beadle (1996), Swarth (1920), Weckstein *et al.* (2002), Williamson & Peyton (1962), Zink (1986, 1991, 1994, 2008).

53. Sooty Fox-sparrow

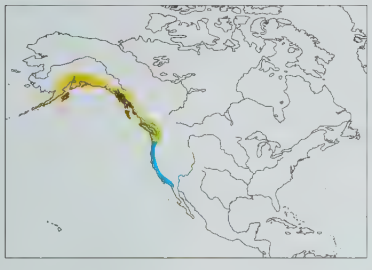
Passerella unalaschcensis

French: Bruant fuligineux **German**: Aleutenammer **Spanish**: Chingolo Fuliginoso

Taxonomy. *Emberiza unalaschcensis* J. F. Gmelin, 1789, Unalaska, Aleutian Islands, Alaska, USA.

Genus sometimes subsumed in *Zonotrichia*. This species and *P. iliaca*, *P. schistacea* and *P. megarhyncha* are often treated as conspecific. Some molecular data suggest that *P. arborea* may be sister-taxon of these four. Nominate race probably hybridizes occasionally with *P. iliaca* near L Iliamna, at E end of Alaska Peninsula. When placed in genus *Zonotrichia*, race name *insularis* invalid, as preoccupied, and replaced by *ridgwayi*. Geographical variation appears to be mainly clinal. Seven subspecies recognized.

Subspecies and Distribution.
P. u. unalaschcensis (J. F. Gmelin, 1789) – breeds from Aleutian Is (E from Unalaska) E, including Shumagin Is and Semidi Is, to Alaska Peninsula; non-breeding from extreme SW Canada (SW British Columbia) S in W USA to California.
P. u. insularis Ridgway, 1900 – breeds in Kodiak Is group, in Alaska; non-breeding coastal S California.
P. u. sinuosa Grinnell, 1910 – breeds Kenai Peninsula and Prince William Sound, and on Middleton I (Alaska); non-breeding from SW British Columbia S to extreme NW Mexico (NW Baja California).
P. u. annectens Ridgway, 1900 – breeds near Yakuatat Bay, in S Alaska; non-breeding from C coastal California (also, less commonly, from SW British Columbia) S to C interior & S California.
P. u. townsendi (Audubon, 1838) – breeds from SE Alaska (including mainland N of R Stikine) S to Queen Charlotte Is (W British Columbia); non-breeding from SE Alaska and S coastal British Columbia S in W USA to coastal N & C California.
P. u. fuliginosa Ridgway, 1899 – breeds from coast of SE Alaska and coastal British Columbia (except Queen Charlotte Is) S to extreme NW USA (NW Washington); non-breeding from SW British Columbia S on coast to C California.
P. u. chilcatensis Webster, 1983 – breeds from R Chilkat area of Alaska SE to Stewart area of British Columbia; non-breeding from coastal Oregon S to N California.

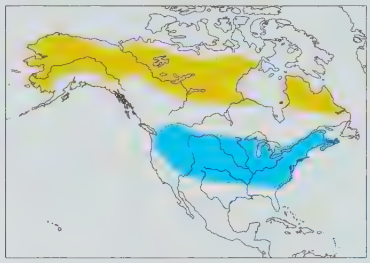


Descriptive notes. 15·5–18·5 cm; 25·3–42·1 g. Large, very dark brown sparrow. Nominate race has most of head uniformly dark grey-brown, a few beige flecks sometimes evident in submoustachial stripe and on lores, weakly defined greyer supercilium and side of neck; moustachial stripe bold rusty or brownish rusty, malar stripe dark brown; upperparts plain dark brown; tail dull rufous-brown to dark brown; upperwing brown or dark brown, hint of rusty colour in scapulars, tertials and wing-coverts; throat pale, heavily spotted or streaked with dark brown; underparts whitish, heavily streaked brown to dark brown; iris dark; bill mostly dusky-grey above, orange-yellow below; legs brownish. Sexes similar. Juvenile is like adult, but pale areas buff or dark buff; moults before migrating. Races differ little, mainly in coloration and to lesser extent in size and bill size, nominate largest and with relatively large bill, and palest: *sinuosa* has thinner bill than nominate, and ashy tinge on side of neck and back; *insularis* somewhat brighter and redder than previous, with buff wash on undertail-coverts; *fuliginosa* is darkest, dark sooty brown to blackish-brown above; *annectens* is smaller than previous and not quite so dark; *townsendi* also is smaller, and is brighter and less sooty than *fuliginosa*; *chilcatensis* blacker than previous but duller than *fuliginosa* and tail shorter. Voice. Song a loud series of rather staccato notes, rising and falling on different pitches, "she she shut u-you tu-you"; many of the notes slurred. Common call a loud "tik", "thick" or sharp "zitt".
Habitat. Breeds especially in dense deciduous thickets, commonly alders (*Alnus*), willows (*Salix*) or blackberry (*Rubus*), often in lush growth along creeks or at edge of bogs and ponds; from beach to timber-line. On migration and in winter generally in low, moist areas with rank, tall brush, and brush piles, often at woodland edge, or in wet woods; in California, in winter, found in chaparral, especially dense arborescent chaparral; in British Columbia, generally in dense understorey.
Food and Feeding. Little information available. During breeding season probably eats wide variety of arthropods, as well as small molluscs (Bivalvia and Gastropoda), seeds and fruit. In winter variety of fruits, seeds and buds no doubt consumed, as well as animal items when these available. Forages on ground and low in vegetation. Often uses both feet together to scratch in litter, thereby exposing concealed prey.
Breeding. Season early Apr to Aug. Apparently monogamous, though courtship poorly known. Nest made from dry grass, twigs, moss or bark, lining of finer grasses, moss, lichens, feathers and hair, placed up to 4 m above ground in bush or low in tree, sometimes on ground. Clutch commonly 4 eggs, variable, ground colour tends to be pale bluish or greenish, with brownish or rusty spots and scrawls; incubation by female, period 12–14 days; no information on nestling period. Nests parasitized extremely rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. A "leap-frog migrant", populations breeding farther N wintering farther S than more S breeders. S breeders essentially resident or very short-distance migrants. Ringing studies indicate that wintering individuals (in San Jose area of California) return to same site year after year. N populations migrate mostly along Pacific coast, Alaskan populations S (perhaps directly over ocean) to California. Those breeding in Aleutians and Alaska Peninsula (nominate race), Kodiak I (*insularis*) and SW Alaska (*sinuosa*) winter in S California; those from Alaska panhandle (*annectens*) and coastal British Columbia (*townsendii*) winter on coast S to C Oregon; and those breeding on Vancouver I (*fuliginosa*) are apparently non-migratory. Arrival in autumn in C California by early Sept, in S California by mid-Sept, but peak migration pulse in early Oct. N-bound passage in California between late Mar and early Apr, some reaching breeding areas by late Apr/early May. Most winter on Pacific Coast from British Columbia S to N Baja California; casual in SE Arizona. Recorded as accidental in Japan, Pribilofs and St Lawrence I, and at Point Barrow (N Alaska), Nunavut (NC Canada) and North Dakota (N USA); nominate race recorded in Russian Far East (Chukotka, Wrangel I and Commander Is).
Status and Conservation. Not globally threatened. Locally common. This species' preferred habitats seem to have been little affected by recent human activities. No clear evidence of any changes in population sizes.
Bibliography. Armani (1985), Beadle & Rising (2002), Bell (1997), DeSante & Ainley (1980), Garrett *et al.* (2000), Grinnell (1910), McCarthy (2006), Pyle (1997), Ridgway (1901), Rising (1995), Rising & Beadle (1996), Swarth (1920), Wacker *et al.* (2010), Weckstein *et al.* (2002), Williamson & Peyton (1962), Zink (1986, 1991, 1994, 2008).

54. **American Tree Sparrow**
Passerella arborea

French: Bruant hudsonien **German**: Baummammer **Spanish**: Chingolo Arbóreo
Other common names: Tree Sparrow

Taxonomy. *Fringilla arborea* A. Wilson, 1810, eastern Pennsylvania = Philadelphia, USA.
Traditionally placed in genus *Spizella*, which it resembles. Recently published molecular studies suggest that this species is best placed in present genus, possibly as sister to the four other members. Geographical variation weakly marked. Two subspecies tentatively recognized.
Subspecies and Distribution.
P. a. ochracea (Brewster, 1882) – breeds Alaska and in W Canada from N Yukon and NW Northwest Territories S to NW British Columbia and probably NC Alberta; winters in S Canada (W Saskatchewan) and N & W USA from South Dakota and N Iowa S to NE California, W & N Nevada, N Arizona, C New Mexico and C Texas.
P. a. arborea (A. Wilson, 1810) – breeds in NC & E Canada from C & E Northwest Territories and W Nunavut E to Labrador, S to N Saskatchewan, N Manitoba, N Ontario and C Quebec; winters in E USA (from Minnesota, Wisconsin and N Michigan S to Oklahoma, Arkansas, Tennessee, North Carolina and Virginia) and SE Canada (S from C Ontario and SW Quebec, E to New Brunswick and Nova Scotia).



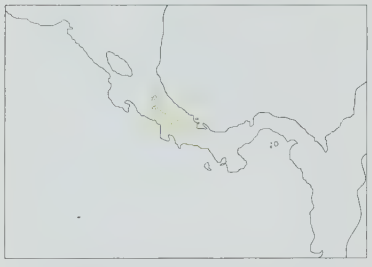
Descriptive notes. 13·5–14·5 cm; 12·6–27·7 g. A slim sparrow with fairly long, notched tail. Nominate race has crown rusty, rusty post-ocular stripe, rest of head grey, indistinct rusty submoustachial line, narrow whitish eyering; upperparts tawny-rufous, mantle and scapulars with blackish streaks, rump and uppertail-coverts grey with olive tinge; tail feathers blackish with narrow pale edges, outermost pair with greyish-white outer web; median and greater upperwing-coverts blackish with broad rufous edges and broad white tips (two wingbars), flight-feathers blackish with narrow pale edges, tertials with broad rufous edges and small white tips; throat whitish; underparts pale grey, side of upper breast rusty, central breast with variable dusky spot, flanks buffy; iris dark red-brown; bill blackish, lower mandible except tip yellow. Sexes similar. Juvenile resembles adult, but streaked brown (perhaps tinged with rusty) on crown, nape and side of neck, and heavily streaked blackish-brown on underparts (except for lower belly); in first autumn resembles adult, but may have streaks on crown. Race *ochracea* averages slightly (but not significantly) larger, and is paler, especially on nape. Voice. Song, in summer often delivered at night, is a clear, sweet and musical "tsee tsee-tsi tsi tsi", with final note lower in pitch. Call "tseet".
Habitat. Breeds in dwarf spruce (*Picea*) and birch (*Betula*) habitat at the edge of the tree-line. During non-breeding season found in hedgerows and urban parks, and in oldfields, down to sea-level.
Food and Feeding. In summer, consumes variety of arthropods and also seeds of alder (*Alnus*), redroot pigweed (*Amaranthus retroflexus*) and mustard (*Brassica*). In winter, appears to feed on seeds of pigweed, common ragweed (*Ambrosia artemisiifolia*), beard grass (*Andropogon virginicus*) and others; also eats beetles (Coleoptera) and other insects and arthropods when these available. Studies suggest that percentage of animal items close to 100% during breeding season, but close to zero in winter. Forages mainly on ground. In winter, individuals forage by scratching in dried grasses. In summer, picks seeds from ground, also gleans insects from bushes, and occasionally makes flycatching sallies for aerial insects.
Breeding. Nest-building begins early to middle Jun, egg-laying mid-Jun to early Jul, fledglings late Jun through early Aug; generally single-brooded. Monogamous. Pair formation occurs on breeding grounds. Nest construction slow, requiring up to 7 days, nest a thick cup made from dry grasses, twigs and moss, lining of finer grasses and ptarmigan (*Lagopus*) feathers, placed on or near ground, usually at base of shrub, tree or grass tussock. Clutch 4–6 eggs, usually 5, pale greenish, blue or even buff or cream, heavily spotted or blotched with dark brown, rusty or purplish; incubation by female, period 10·5–13·5 days; chicks fed by both sexes, nestling period 8–10 days; both parents attend to young.
Movements. Migratory; entire population migrates S, males wintering farther N than females. Migratory routes not well known, most members of W breeding populations appear to move S & E towards Mississippi Valley, rather few winter S along Pacific coast or W mountain region. E populations appear to migrate without much of an E–W component. Departure from wintering grounds begins in late Feb; peak N-bound passage in Mississippi Valley late Mar to early Apr, slightly later, into mid-Apr, in New York. Arrivals on breeding grounds of Churchill (in Manitoba) mainly late May to early Jun, timing depending on snow melt in the particular year; timing of arrival in W breeding areas (in Alaska and Yukon Territory) similarly in late Apr to early May; males arrive shortly before females. S-bound movements from breeding grounds begin early to middle Sept; arrival in S Ontario and N states of USA by early Oct; wintering areas farthest S occupied by early Nov. Non-breeders recorded occasionally S to Rio Grande Delta, W Louisiana, N Alabama, South Carolina and Georgia; race *ochracea* recorded in Russian Far East (Chukotka, Wrangel I and Kamchatka).
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat throughout most of range. Estimated global population has been put at 10,000,000–20,000,000 pairs.
Bibliography. Anon. (1998), Armani (1985), Baumgartner (1937, 1942, 1968a), Beadle & Rising (2002), Brooks (1985), Dance (1986), Dunning (2008), Graul (1967), Hellmayr (1938), Koblik *et al.* (2006), Naugler (1993), Peck & James (1987), Pyle (1997), Rising & Beadle (1996), West & Peyton (1972), Willoughby (1991).

Genus *JUNCO* Wagler, 1831

55. **Volcano Junco**
Junco vulcani

French: Junco des volcans **German**: Streifenwinterammer **Spanish**: Junco de los Volcanes

Taxonomy. *Zonotrichia vulcani* Boucard, 1878, Volcán de Irazú, 10,000 feet [c. 3050 m], Costa Rica.
Molecular data point to close relationship between this genus and *Zonotrichia*. Recent molecular-genetic analyses indicate that present species is basal in genus, its closest relative being race *alticola* of *J. phaeonotus*. Monotypic.
Distribution. Volcanic summits in Costa Rica and W Panama (Volcán de Chiriquí).
Descriptive notes. 15·2–16·6 cm; 28 g (Costa Rica). A large junco with no white in tail. Has crown to upper mantle olive-brown with faint darker streaking, black lores and line behind eye, grey side of head and narrow grey superciliary stripe; lower mantle to uppertail-coverts dull olive-brown, lower mantle, back and scapulars dark-streaked; tail dusky, feathers with narrow greyish edges, outer feathers tipped grey; upperwing blackish-brown, wing-coverts and tertials with wide tawny-brown edges, primaries and secondaries with narrow grey-brown edges; black speckling on chin, throat slightly paler grey than breast, underparts grey with olive-buff tinge, especially on flanks



and vent; iris yellow to golden-yellow; bill pinkish; legs yellowish-pink to brownish-grey. Sexes similar. Juvenile has brown of upperparts more reddish, with more streaking, underparts buff, streaked with brown, except on centre of belly. Voice. Song consists of short, choppy phrases containing squeaky or buzzy notes, e.g. "k'cheew chu k'wee, chip-chip ts'chew tsi'weet". Calls notes a repeated "tchup", also "tsee", "cher-wi" and similar.
Habitat. Open, grassy areas with stunted scrub, second growth, or overgrown pastures, also along roadsides; commonest above treeline. At 2600–3000 m.

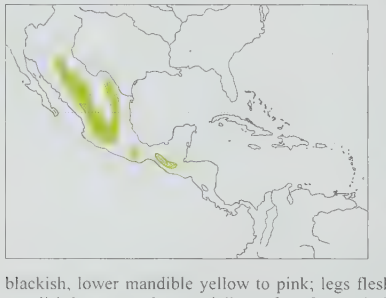
Food and Feeding. Diet seeds and berries; also arthropods, including insects and spiders (Araneae). Forages principally on or near ground or low in vegetation; hops and runs. Usually in pairs.
Breeding. Nest found during Apr, and fledged young observed in May and Jun. One nest described, a cup of dry grasses, lined with fluff from thistle, as well as hair, placed on mossy overgrown embankment, moss overhanging and forming canopy over nest; contained 2 eggs, pale blue, with lilac dots concentrated about large end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Not common; local. No estimates of global population available; total population cannot be large, and is fragmented. Numbers thought to be stable.
Bibliography. Armani (1985), Barrantes (1994b), Garrigues & Dean (2007), Hellmayr (1938), Milá *et al.* (2007), Miller (1941), Ridgway (1901), Sassi (1939), Stiles & Skutch (1989), Wetmore *et al.* (1984).

56. Yellow-eyed Junco

Junco phaeonotus

French: Junco aux yeux jaunes **German**: Rotrückenammer **Spanish**: Junco Ojilumbre
Other common names: Mexican Junco (*phaeonotus* and *palliatus*); Baird's Junco (*bairdi*); Chiapas Junco (*fulvescens*); Guatemala Junco (*alticola*)

Taxonomy. *Junco phaeonotus* Wagler, 1831, Mexico.
Molecular data indicate close relationship between this genus and *Zonotrichia*. Recent molecular-genetic studies suggest that genus spread quickly N from Central America in post-glacial period; although morphological divergence high, molecular divergence not so well marked; on the other hand, the farther S in Central America, the older is the lineage, and the more distinctly characterized it is molecularly. Present species closely related to *J. vulcani*, but its N populations are genetically very close to *J. hyemalis*; unpublished molecular data suggest that Guadalupe taxon *insularis*, generally included with latter, may be better placed with present species. Races form four groups, one represented by nominate and *palliatus*, the other three being single-subspecies groups formed by, respectively, *bairdi*, *fulvescens* and *alticola*. These sometimes treated as four separate species; indeed, Guatemala population (*alticola*) appears genetically well differentiated from all other taxa in genus, and further work may support its elevation to species rank. Race *palliatus* intergrades with nominate in C Mexico from Nayarit, Durango, Coahuila and Nuevo León S to Guanajuato. Five subspecies recognized.
Subspecies and Distribution.
J. p. palliatus Ridgway, 1885 – mountains of SW USA (S Arizona and extreme SW New Mexico) and NW Mexico from NE Sonora, Chihuahua and Coahuila S to N Jalisco, Guanajuato, San Luis Potosí and NW Tamaulipas.
J. p. phaeonotus Wagler, 1831 – mountains of C & S Mexico from Nayarit, Durango, Coahuila and Nuevo León S to Oaxaca and Veracruz.
J. p. bairdi Ridgway, 1883 – Cape District of S Baja California (W Mexico).
J. p. fulvescens Nelson, 1897 – mountains of interior of Chiapas, in SE Mexico.
J. p. alticola Salvin, 1863 – mountains of SE Chiapas (Mexico) and W Guatemala.



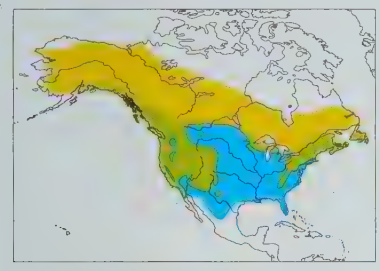
Descriptive notes. 13·5–17·2 cm; 18·3–22 g (Arizona). A medium-sized sparrow, grey and white in coloration, with white in outer tail. Nominate race has head and neck slate-grey, blackish lores; mantle and back bright cinnamon-rufous, rump and uppertail-coverts grey; tail dark grey, outer two feather pairs mostly white; upperwing grey, median coverts and inner greater coverts rufous, flight-feathers blackish with narrow paler edges, tertials with broad rufous edges; chin and throat to breast and flanks pale grey, rear flanks faintly tinged olive-buff, belly and undertail-coverts paler greyish-white; iris yellow; upper mandible blackish, lower mandible yellow to pink; legs flesh-coloured or pinkish, sometimes with darker purplish-brown wash, especially on feet. Sexes similar in colour, male slightly larger than female. Juvenile has thin dark streaking on crown and underparts, some rusty colour on back. Races differ mainly in plumage tones and in extent of white in tail: *palliatus* is paler than nominate, head paler ashy grey, back somewhat brighter, more white in tail; *bairdi* is smaller and paler than others, has less black on face, browner back grading into buffish rump, paler below, flanks warm brown; *fulvescens* is duller than nominate, has dull slate-brown head, olive-brown back, light olive flanks tinged with buff posteriorly, less white in tail; *alticola* is like *fulvescens*, but slightly darker, has even less white in outer rectrices. Voice. Song, typically from perch 3–5 m high or treetop, characteristically consists of two or three parts contrasting in rhythm and pitch, "chip chip chip wheedoe iee iee iee iee iee", reminiscent of that of a New World warbler (Parulidae). Call a sharp "chip".
Habitat. Montane conifer and pine–oak (*Pinus–Quercus*) forests; some populations move to lower elevations in winter. In S Baja California (Mexico), *bairdi* occurs in semi-arid oak and pine–oak woodlands. At 1600–3500 m in USA and most of Mexico; 1200–1900 m in S Baja California; 2000–3500 m Guatemala and adjacent Mexico (Chiapas).
Food and Feeding. Feeds on insects and other arthropods, and seeds; during breeding season mostly insects, especially Lepidoptera, beetles (Coleoptera), ants (Formicidae) and flies (Diptera), and in winter mainly seeds. In pairs; small flocks outside breeding season. Forages principally on or near ground or low in vegetation, usually not far from cover. Runs or hops on the ground; uncovers seeds, insects and other foods by double-scratching (using both legs together) or by scratching with one leg. In autumn and winter may glean seeds from grasses. Occasionally flycatches.
Breeding. Nests found between mid-Apr and early Aug in S USA (Arizona) and in May and early Jun in SC Mexico (Morelos); up to three broods in a year. Following information almost strictly from N population of nominate race (in Arizona); little known about Mexican and Central American populations. Apparently monogamous; pairs form by mid-Apr in Arizona, pair formation by first-year individuals may occur in wintering flocks. Nest-building takes up to 9 days, begins several weeks after pair formation, nest made from dry grasses and mosses, lined with hair and finer grasses, placed on ground, generally under tuft of grass and typically on slope, rather than on level ground; rarely, nest placed off ground on branch of conifer. Clutch usually 3–4 eggs (1–5), pale blue or greyish-white with dark brownish or reddish spotting typically concentrated around wide end (sometimes relatively well spread over egg); incubation solely by female, period 11–15 days (usually 13 days); chicks fed by both parents, nestling period 10–13 days, at which age young can fly weakly and for short distance.
Movements. Mostly sedentary; in Arizona often moves to lower elevations in winter. In Chiricahua Mts (SE Arizona), descends in Aug and Sept and return upslope in Feb; exhibits site-fidelity to wintering and breeding areas. Curiously, if mild winter weather occurs, will venture up to higher-lying breeding sites, coming back down when bad weather returns.
Status and Conservation. Not globally threatened. Common or abundant in appropriate habitat in many parts of range. In N part of range, numbers seem to decline during times of drought.
Bibliography. Armani (1985), Beadle & Rising (2002), Bent & Austin (1968), Caraco *et al.* (1990), Griscom (1932), Hainsworth *et al.* (1998), Hellmayr (1938), Horvath & Sullivan (1988), Howell & Webb (1995), Kirkpatrick & Conway (2010), Kirkpatrick *et al.* (2009), Lamm & Luepke (1982), Leary & Sullivan (1991), Milá *et al.* (2007), Miller (1941), Miller *et al.* (1957), Pulliam *et al.* (1974), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Rowley (1962), Sullivan (1988a, 1988b, 1990, 1999), Sullivan & Roper (1996), Sullivan & Weathers (1992), Sullivan *et al.* (1989), Weathers & Sullivan (1989a, 1989b, 1991a, 1991b, 1993).

57. Dark-eyed Junco

Junco hyemalis

French: Junco ardoisé **German**: Winterammer **Spanish**: Junco Pizarroso
Other common names: Slate-colored Junco ("*hyemalis* group"); Oregon Junco ("*oreganus* group"); Grey-headed Junco ("*caniceps* group"); White-winged Junco (*aikeni*); Guadalupe Junco (*insularis*); Pink-sided Junco (*mearnsi*); Red-backed Junco (*dorsalis*)

Taxonomy. *Fringilla hyemalis* Linnaeus, 1758, South Carolina, USA.
Molecular data indicate close relationship between this genus and *Zonotrichia*. Nominate race has hybridized with *Zonotrichia albicollis*. Recent molecular-genetic studies suggest that genus spread quickly N from Central America in post-glacial period; although morphological divergence high, molecular divergence not so well marked; on the other hand, the farther S in Central America, the older is the lineage, and the more distinctly characterized it is molecularly. Taxonomy of present species complex; races molecularly very close to each other, and more closely allied to N races of *J. phaeonotus* than to S populations of latter; S races of present species very similar morphologically to *J. phaeonotus*, and unpublished molecular data suggest that Guadalupe race *insularis* may be better placed with that species. Races form six groups: "*hyemalis* group" (nominate, *carolinensis*, *cismontanus*), "*oreganus* group" (*oreganus*, *shufeldti*, *montanus*, *thurberi*, *pinosus*, *pontilis*, *townsendi*), "*caniceps* group" (*caniceps*, *dorsalis*, *mutabilis*), and three single-subspecies groups, i.e. "*aikeni* group", "*insularis* group" and "*mearnsi* group"; these sometimes treated as six separate species, but hybridization occurs among them and several races intergrade with others from different group (*cismontanus* often considered a hybrid between nominate and "*oreganus* group"). In the past, race *dorsalis* sometimes treated as a separate species. Proposed race *eumesus* (from Blue Mts of Washington) included within *shufeldti*. Availability of name *shufeldti* has been disputed, and replacement name *simillima* proposed. Sixteen subspecies currently recognized.
Subspecies and Distribution.
J. h. hyemalis (Linnaeus, 1758) – breeds Alaska and across Canada from C Yukon, NW & C Mackenzie and SW Nunavut E to N Quebec, Labrador and Newfoundland and S to NE British Columbia, C Alberta, C Saskatchewan, S Manitoba and NE USA (S to C Minnesota, SE Wisconsin, C Michigan, W & N Pennsylvania, SE New York, Connecticut and Massachusetts); non-breeding from S edge of breeding range S (mostly E of Rocky Mts) to NW Mexico (N Baja California, N Sonora and C Chihuahua) and Gulf Coast (S Texas E to NE Florida).
J. h. cismontanus Dwight, 1918 – breeds SC Yukon S to C interior of British Columbia and WC Alberta; non-breeding from S coastal British Columbia S to extreme NW Mexico (N Baja California) and SW USA (S to Arizona and New Mexico, E to Minnesota, Wisconsin, Nebraska, Kansas, Oklahoma and C Texas.
J. h. oreganus (J. K. Townsend, 1837) – breeds SE Alaska S to Calvert I, in CW British Columbia; non-breeding also S along coast to C (rarely S) California.
J. h. shufeldti Coale, 1887 – breeds on W slope of coastal ranges from SW British Columbia S in W USA to W Oregon (to c. 43° N); non-breeding S to S California, sparsely also to SE Idaho, Colorado, W Texas and N Mexico (Chihuahua).
J. h. montanus Ridgway, 1898 – breeds in C interior British Columbia and SW Alberta S in W USA to E Oregon, W Montana and C Idaho; non-breeding to S British Columbia, W Montana and South Dakota S to N Mexico (N Baja California, N Sonora and C Chihuahua) and S USA (to C Texas and E Kansas).
J. h. thurberi Anthony, 1890 – breeds S Oregon and California (S on coast to San Francisco, and in interior mountains to San Diego County); non-breeding also in adjacent lowlands E to Arizona and SW New Mexico and S to NW Mexico (Baja California and Sonora).
J. h. pinosus Loomis, 1893 – coastal ranges of C California (from San Francisco S to San Benito and S Monterey County).
J. h. pontilis Oberholser, 1919 – Sierra Juárez, in N Baja California (NW Mexico).
J. h. townsendi Anthony, 1889 – Sierra San Pedro Mártir, in N Baja California.
J. h. aikeni Ridgway, 1873 – breeds SE Montana, W South Dakota, NE Wyoming and NW Nebraska; non-breeding also S to SW Colorado, W Kansas, N New Mexico and W Oklahoma.
J. h. mearnsi Ridgway, 1897 – breeds extreme S Canada (SE Alberta and SW Saskatchewan) S in USA to E Idaho, C Montana and NE Wyoming; non-breeding from N Utah, NW Wyoming and W & C Nebraska S to N Mexico (N Sonora, C Chihuahua and Durango) and W Texas.
J. h. insularis Ridgway, 1876 – Guadalupe I, off NW Baja California (NW Mexico).
J. h. caniceps (Woodhouse, 1853) – breeds in mountains of S Idaho and S Wyoming S to C & E Nevada, S Utah, W & C Colorado and N New Mexico; non-breeding also E to W Nebraska, W Kansas and W Texas, S to N Mexico (Sonora, N Sinaloa, Chihuahua and N Durango).
J. h. dorsalis Henry, 1858 – breeds in mountains of New Mexico, extreme W Texas and N Arizona; non-breeding also slightly farther S.
J. h. mutabilis van Rossem, 1931 – mountains of S Nevada and adjacent SE California.
J. h. carolinensis Brewster, 1886 – breeds E USA in Appalachian Mts (from NW West Virginia and W Maryland S to N Georgia); winters in breeding area, and adjacent lower elevations.



Descriptive notes. 13–17 cm, 14·3–25·4 g ("*hyemalis* group", Pennsylvania); 14–15·4 cm, male average 18 g, female 17·8 g ("*oreganus* group", Oregon), male *townsendi* average 18·8 g; 14·9–16·8 cm, average 22 g (*aikeni*); 13·8–15·5 cm, 15·5–23·5 g (*mearnsi*); 13·6–14·4 cm (*insularis*); 13·9–16·3 cm, 18–23 g ("*caniceps* group"). A medium-sized sparrow with white outer tail feathers. Male nominate race has plumage slate-grey, except for white belly and undertail-coverts (grey continuing from breast down flanks to thigh feathers), outer two pairs of tail feathers and variable area near tip of adjacent pair white, wing feathers with indistinct paler edges and tips; iris red-brown to dark ruby-red; bill pinkish-white; legs flesh-coloured to deep purplish-brown, feet often duller and darker, sometimes markedly so. Female is somewhat paler than male, often washed with brown, edges of wing feathers (especially tertials) browner; occasionally has white tips on upperwing-coverts. Juvenile is like adult, but much more brownish. Races differ mainly in plumage coloration and pattern, also in size: *cismontanus* has hood darker, blacker, and back browner than nominate; *carolinensis* is a little larger and paler (more blue-grey) than nominate, also bill darker; in "*oreganus* group", *oreganus* is relatively small, male with blackish hood, reddish-brown upperparts, grey rump, pinkish-cinnamon flanks, *shufeldti* is somewhat paler and duller than *oreganus*, *montanus* is like previous but wing and tail shorter, *thurberi* also is similar but very slightly paler, *pinosus* resembles previous but a little paler, *townsendi* has pinkish area on flanks narrower, *pontilis* is intermediate between previous and *thurberi*; *aikeni* is largest race, relatively large-billed, paler grey than nominate, lores usually contrastingly dark, more white in tail (outer three pairs all white, two adjacent pairs usually with some white near tip), usually two conspicuous white wingbars, sexes similar, juvenile usually with white wingbars; *mearnsi* is large, has head and breast light grey, lores dark slate, back dull brown, flanks (sometimes also breast) pinkish cinnamon-brown, more white in tail (like previous race), and has paler grey hood than *insularis*, with duller upperparts and somewhat paler pinkish sides and flanks; *insularis* is like members of "*oreganus* group", but wing and tail shorter, bill proportionately longer, and plumage in general (especially on head) paler, on average less white in tail than most other races; in "*caniceps* group", *caniceps* is medium-sized, mostly pale grey (much paler than nominate), with dark lores and black area around eye, mantle dark rusty red, tail grey with white lateral rectrices, belly and vent white (little contrast with grey of breast and flanks), bill all yellow, *dorsalis* is very similar but with dark upper mandible, *mutabilis* is somewhat darker and with mantle duller rufous, flanks pinkish. Voice. Song, used commonly during breeding season and given throughout year, usually from tree perch, generally a simple trill on one pitch. Call a simple "tit tit tit", also a smacking "tack tack tack". Some geographical variation, e.g. *insularis* song less trilling and more varied, including some buzzing notes, also "*caniceps* group" said to have more varied song; further study needed.

Habitat. Breeds in variety of woodlands, especially open woodlands with conifers, and cut-over woodlands; common after burns. Sea-level to 2040 m in E, to 3775 m in Rocky Mts; race *townsendi* above 1800 m. In W of range, common in urban parklands and gardens; in Allegheny Mts (Appalachians) most common in brushy edge habitats at up to 900 m. Members of "*oreganus* group" breed in open coniferous forests, moist redwood (*Sequoia*), dry pine (*Pinus*) forests, aspens (*Populus*), compact low conifers at timber-line, also in live oak (*Quercus agrifolia*), oak–madroño (*Quercus–Arbutus*) associations, digger pines (*Pinus sabiniana*) and Coulter pines (*Pinus coulteri*), Monterey cypress (*Cupressus macrocarpa*), eucalypts (*Eucalyptus*), and on coast also in city parks and gardens. Race *aikeni* generally in pine forest, but can be found also in spruce (*Picea*) and aspen; "*caniceps* group" often in conifers, e.g. spruce, Douglas-fir (*Pseudotsuga*) and lodgepole pine (*Pinus contorta*), and fir (*Abies*), but also in variety of hardwoods, e.g. aspen, oak and mountain mahogany (*Cercocarpus*), and more likely than the others to be found in rather arid woodlands; *mearnsi* breeds most commonly at edge of pine woods, but occurs also in other edge habitats. Race *insularis* mostly limited to Monterey pine–island oak (*Pinus radiata–Quercus tomentella*) and Guadalupe cypress (*Cupressus guadalupensis*) groves at N end of Guadalupe I, at up to 1400 m, but can be found also in *Nicotiana* scrub at sea-level. In non-breeding season, occupies a variety of edge habitats and open woods with brushy understorey, and often visits feeders; in winter members of "*oreganus* group" mainly in pinyon–juniper (*Pinus–Juniperus*) woods, sage (*Artemisia*) and urban gardens.

Food and Feeding. In studies in W USA (California), diet for all months combined (except May) consisted of 24% animal items and 76% vegetable matter. Insects comprise most of animal food, but some spiders (Araneae) also taken; insects most commonly eaten are beetles (Coleoptera), adult and larval Lepidoptera, also ants and wasps (Hymenoptera) and flies (Diptera). Seeds, which comprise 62% of diet, include those of chickweed (*Stellaria*), pigweed (*Amaranthus*), alfilaria (*Erodium*), knotweed (*Polygonum*) and sorrel (*Rumex*); plant material 76% of diet of "*hyemalis* group" in Nov–Mar, 40% in Apr–May, 93% in Jun–Aug and 92% in Sept–Oct; for "*oreganus* group in California, percentage figures for same time periods were, respectively, 74%, 52%, 95% and 91%. Forages principally on or near ground or low in vegetation; also in trees, males on average higher up than females. In E of range in breeding season, finds most food in leaf litter. On migration and in winter feeds almost exclusively on ground, where it hops and occasionally runs. Outside breeding season usually in flocks, sometimes large ones; sometimes mixes with other seed-eating species.

Breeding. Apr–Aug on coast and from Jun in interior in British Columbia, May–Jul in Ontario, Apr–Aug in Virginia, and from as early as Jan on Guadalupe I (race *insularis*); May in Sierra San Pedro Mártir (*townsendi*); generally double-brooded in S parts of range. Monogamous; rarely polygynous (two of more than 200 colour-marked individuals of race *carolinensis*). Nest-site chosen by female, she also builds nest, taking 3–7 days, a coarse grass foundation, with cup composed of finer dry grasses, rootlets and moss, lining often includes softer grasses, hair and moss, placement variable, usually in cavity on slope, bank, under rock or roots, sometimes under bush or fallen tree or even beneath deck or elevated building; c. 10% of nests placed above ground in artificial structure, root mass or similar. Clutch 3–5 eggs, usually 4, (clutch size varies geographically, smaller in high-elevation populations), white to pale bluish with red-brown and purplish-grey specks and spots; incubation by female, period 12–13 days (rarely, 11 days); chicks fed by both sexes roughly at equivalent rates, nestling period 9–12 days. Nests in S of range commonly parasitized by Brown-headed Cowbird (*Molothrus ater*); in some California populations c. 30% of nests parasitized, and in Appalachians (race *carolinensis*) up to 40%.

Movements. Mostly migratory; males migrate earlier than females, and tend (in E) to winter farther N, but analysis of other climatic variables reveals that, both in W and in E, the best predictor of male skew in wintering sex ratio is greater severity of weather. Some populations (such as *carolinensis* and some S montane populations in W) are sedentary, short-distance migrants or altitudinal migrants; these include some *pontilis*, *townsendi* and *dorsalis*, lower-elevation and coastal breeding races such as *pinosus*, *shufeldti* and *thurberi*, and island race *insularis*. Generally, autumn migration begins mid-Aug in S Canada and N USA, but N breeders typically begin to move S from Sept into late Oct/Nov; arrival in wintering sites from early Oct, completed by start of Dec. Females (which move farther S on average than males) begin migration earlier; similarly, younger females (which winter farther N than adults) trail in their migration timing, and ringing analysis shows that females on second S-bound migration move farther S than they did in first autumn. In spring, N-bound movements from wintering areas noted by start of Mar, with peak mid-Mar to early Apr; males arrive before females, from a few days to a week earlier. Overall, migration in E much more clearly understood than variety of complex movements (both to N and to S, altitudinally, often through areas where some populations resident) in W. Specific examples of migration timing include the following: arrival in Alaska in late Apr or early May; in N boreal forests of British Columbia, autumn migration begins mid-Aug, most have left taiga plains by end Sept and N parts of the province by end Oct, arrival in spring in first week Apr and migration continues into mid-May; in Ontario, migration takes place Mar to early May and Sept to early Dec; in Virginia, spring migration Feb–Mar and autumn migration Sept–Nov; in N Mexico (Sonora), arrival by mid-Oct and departure by mid-May. Migration commonly takes place at night, and generally involve as single individuals, but often gathering in small foraging flocks during day. Occurs casually N to arctic coast of Alaska and in N Canada on Banks I, Baffin I and Southampton I, and S to E Mexico (Veracruz), Bahamas, Jamaica and Puerto Rico; nominate race recorded in Russian Far East in Chukotka and on Wrangel I, and race *oreganus* recorded Wrangel I. Vagrants recorded in Iceland, British Is (34 records), Norway, Denmark, Netherlands, Poland, Italy and Gibraltar.

Status and Conservation. Not globally threatened. Race *insularis* often treated as a separate species, of restricted range: present in Guadalupe Island EBA. Often common or very common in appropriate habitat throughout range. Forest-management practices and fires can affect numbers during breeding season, but this species is so abundant, and has such varied ecological preferences in different parts of its range, that no conservation measures (in terms of management) have been designed specifically to benefit it. Apparently does well after fires and logging, although in the short term this would destroy habitat locally. Can breed commonly in regenerating clear-cuts. Cowbird parasitism decreases the number of young fledged, but no evidence of adverse influence at population level; heavily parasitized Californian populations appear to sustain healthy numbers over time.

Bibliography. Beadle & Rising (2002), Bears (2004), Bears *et al.* (2008), Bent & Austin (1968), Butchart & Stattersfield (2004), Campbell *et al.* (2001), Caraco (1981), Cardoso *et al.* (2009), Chandler & Mulvihill (1990), Clotfelter *et al.* (2003), Corbitt & Deviche (2005), Cramp & Perrins (1994), Cristol (1992), Cristol, Nolan & Ketterson (1990), Cristol, Reynolds *et al.* (2003), Curtis (2008), Davis (1973), van Els *et al.* (2009), Gabrielson & Lincoln (1959), Glutz von Blotzheim & Bauer (1997), Greives *et al.* (2007), Grindstaff *et al.* (2001), Grinnell (1915), Hellmayr (1938), Hirschfeld (2007), Holberton *et al.* (2008), Howell & Webb (1995), Hubbard (1972a), Hubbard & Crossin (1974), Keiser *et al.* (2005), Ketterson & Nolan (1976, 1978, 1979), Ketterson *et al.* (1998), Koblik *et al.* (2006), Lewington *et al.* (1991), Lima *et al.* (1999), McCarthy (2006), Milá *et al.* (2007), Miller (1941), Miller *et al.* (1957), Mulvihill & Chandler (1991), Newman *et al.* (2008), Nolan *et al.* (2002), O'Neal *et al.* (2008), Prescott (1978), Pulliam *et al.* (1974), Pyle (1997), Raouf *et al.* (1997), Rasner *et al.* (2004), Redkin & Koblik (2001a), Ridgway (1901), Rising & Beadle (1996), Roberts & Weigl (1984), Russell & Monson (1998), Sabine (1952), Smith (1988), Smith & Andersen (1982), Sprunt (1924), Stattersfield & Capper (2000), Swanson (1990), Terrill (1987), Theimer (1987), Thompson *et al.* (1987), de Vries (2011), Weathers & Sullivan (1993), Whittaker *et al.* (2009), Wiedenmann & Rabenold (1987), Wiley (1990), Wiley & Hartnett (1979), Wood (1951), Yaukey (1994).

PLATE 46


inches 3
cm 8
ssp capensis
58
ssp antillarum
ssp australis
59
white-stripe morph
ssp leucophrys
61
tan-stripe morph
ssp nuttalli
60
ssp melodia
ssp maxima
62
ssp samuelis
63
ssp morphna
64
ssp fallax
67
♀
65
♂
68
ssp sandwichensis
66
ssp princeps
69

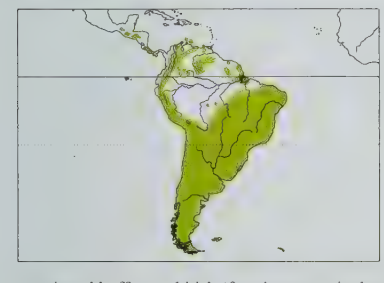
Genus *ZONOTRICHIA* Swainson, 1832

58. **Rufous-collared Sparrow**

Zonotrichia capensis

French: Bruant chingolo **German**: Morgenammer **Spanish**: Chingolo Común
Other common names: Central American Crowned Sparrow (Central American races); Andean Sparrow (Andean races)

Taxonomy. *Fringilla capensis* Statius Müller, 1776, Cape of Good Hope; error = Cayenne, French Guiana.
Genus probably close to *Junco*. Has been suggested that present species more closely related to *Melospiza* than to current congeners. Geographical variation both in size and in coloration, although size variation not so pronounced as in some other New World sparrows; excluding very pale *insularis* (S Caribbean), birds from farthest S parts of range (*australis*) are palest and those from highlands of Brazil (*macconnelli*) darkest; morphologically the most divergent is the large and very long-winged *australis*. Numerous races have been proposed, but many are poorly differentiated; *orestera* may be better treated as a synonym of *costaricensis*, and *mellea* perhaps better subsumed in *hypoleuca*; at present, *perezchinchillorum* (described from Cerro Marahuaca, in S Venezuela) and *bonnetiana* (Sierra Chiribiquete, in S Colombia) subsumed into *roraimae*, and *markli* (lowland NW Peru) into *huancabambae*. Comprehensive revision of subspecific taxonomy required. Twenty-five subspecies presently recognized.
Subspecies and Distribution.
Z. c. septentrionalis Griscom, 1930 – highlands of S Mexico (Chiapas) S to Honduras and El Salvador.
Z. c. costaricensis J. A. Allen, 1891 – mountains of El Salvador, Costa Rica and W Panama (E to Veraguas); Santa Marta Mts (N Colombia) and Andes from Venezuela (S from C Lara) S to Ecuador.
Z. c. antillarum (Riley, 1916) – Cordillera Central, in Dominican Republic.
Z. c. orestera Wetmore, 1951 – Cerro Campana (extreme SW Panamá Province), in C Panama.
Z. c. insularis (Ridgway, 1898) – Curaçao I and Aruba I, in Netherlands Antilles.
Z. c. venezuelae Chapman, 1939 – N & C Venezuela (coastal mountains from Yaracuy E to Miranda, and Anzoátegui E to Sucre; Quiribana de Caicara, in NW Bolívar).
Z. c. inaccessibilis Phelps, Sr & Phelps, Jr, 1955 – headwaters of R Yatúa, on Cerro de la Neblina (S Amazonas), in S Venezuela.
Z. c. roraimae (Chapman, 1929) – Sierra de la Macarena (Meta), in C Colombia; E & S Venezuela (NW Amazonas and tepuis and Gran Sabana of SE Bolívar) and adjacent W Guyana and N Brazil.
Z. c. macconnelli Sharpe, 1900 – summit of Mt Roraima, in SE Bolívar (SE Venezuela).
Z. c. capensis (Statius Müller, 1776) – lower R Oyapock, in NE French Guiana; presumably also adjacent NE Brazil (Amapá).
Z. c. huancabambae Chapman, 1940 – arid subtropics of N & C Peru (Piura, Cajamarca, Amazonas and San Martín S to Junín).
Z. c. illescasensis Koepcke, 1963 – Cerro Illescas (Piura), in NW Peru.
Z. c. peruviensis (Lesson, 1834) – arid coastal Peru from La Libertad S to Tacna, and inland on W slope of Andes.
Z. c. carabayae Chapman, 1940 – E slope of Andes from C Peru (Junín) S to Bolivia (La Paz and Cochabamba).
Z. c. pulacayensis (Ménégaux, 1908) – Pulacayo and Pampas de Pazña, in L Poopó region (Oruro department), in W Bolivia.
Z. c. tocantinsi Chapman, 1940 – lower Amazonia (along R Tocantins and probably along lower Amazon E from Monte Alegre), Brazil.
Z. c. matutina (M. H. C. Lichtenstein, 1823) – NE & C Brazil (from Maranhão S to N & C Mato Grosso and Bahia) and adjacent E Bolivia (Santa Cruz).
Z. c. subtorquata Swainson, 1837 – SC & SE Brazil (from S Mato Grosso and Espírito Santo) S to E Paraguay, NE Argentina (Misiones) and Uruguay.
Z. c. mellea (Wetmore, 1922) – C Paraguay (W side of R Paraguay) and N Argentina (Formosa).
Z. c. hypoleuca (Todd, 1915) – E & S Bolivia (E Cochambama, Santa Cruz, Chuquisaca, Tarija, possibly also C La Paz) and *llanos* of N Argentina (Salta and La Rioja S to San Luis, Córdoba and S Buenos Aires).
Z. c. antofagastae Chapman, 1940 – Tarapacá and Autofagasta, in N Chile.
Z. c. chilensis (Meyen, 1834) – C Chile (sea-level to *puna* zone) from Atacama S to Guaitecas Is, and W Argentina on E slopes of Andes (Mendoza and Neuquén, and Río Negro).
Z. c. sanborni Hellmayr, 1932 – High Andes of Coquimbo and Aconcagua (Chile) and San Juan (W Argentina).
Z. c. choraules (Wetmore & J. L. Peters, 1922) – lowlands and foothills of W Argentina in Mendoza, E Neuquén and Río Negro.
Z. c. australis (Latham, 1790) – breeds S Chile (S from Aysén) and S Argentina (S from S Neuquén and Río Negro); migrates N probably as far as N Bolivia.



Descriptive notes. 11·8–13·4 cm; 16·8–31 g. A medium-sized sparrow with often peaked-looking crown, and a medium-sized conical bill. Nominate race has grey head, including grey median crownstripe, with black lateral crownstripe, postocular stripe and lower edge of ear-coverts; nape and side of neck rufous (forming rufous collar), this colour often extending to side of breast, where bordered above by black patch; upperparts brown, mantle streaked blackish, upper back and scapulars; tail feathers brown with rufous-brown edging; upperwing brown, feathers edged rufous, median coverts tipped whitish and greater coverts tipped buffy to whitish (forming two wingbars); throat white, breast greyish-white, becoming whitish below, flanks to undertail-coverts buffy; iris reddish-brown; bill horn-coloured to greyish, with black culmen and tip; legs brownish-pink. Sexes similar in coloration. Juvenile has face pattern buff and brown (not grey and black) and somewhat streaky, lacks black breast patch and rufous collar, and is extensively streaked below. Races vary mainly in depth of coloration and in head pattern, also in size: *costaricensis* is well streaked above, rufous collar well defined, black breast-side patches bigger and more or less meeting on centre of breast; *septentrionalis* is similar to previous, but less streaked above, and rufous collar less well defined; *antillarum* is like last, but black breastband broader and more complete, rufous collar smaller, yellow at bend of wing; *orestera* is very like *costaricensis*, but on average darker; *insularis* is palest of all races, greyish above, less contrasting and less distinct head pattern than other tropical races, and restricted black on breast side; *venezuelae* is similar to *costaricensis*, but paler below, also slightly paler than nominate but with more extensive black on breast side; *macconnelli* is darkest race, crown essentially blackish with almost no grey median stripe; *inaccessibilis* is like previous, but darker rufous collar, darker grey on breast and darker on flanks, has noticeably rufous edgings on flight-feathers; *roraimae* also is like *macconnelli*, but smaller and paler, less black on crown, is darker and more heavily streaked above than nominate; *tocantinsi* is like nominate, but has less black on side of breast, browner flanks, brighter rufous neck collar; *matutina* resembles nominate, but paler, with more grey than black on crown, very little black on breast side; *subtorquata* is like nominate, but with yellow bend of wing; *hypoleuca* is paler than previous, has white bend of wing (like *matutina*, but smaller, and less rufous above); *mellea* is barely different from last; *huancabambae* is rather small, resembles *costaricensis*, but somewhat larger-billed and slightly paler below; *peruviensis* resembles last, but larger and more heavily streaked, whiter below, and relatively short-tailed; *illescasensis* is similar to preceding two races; *carabayae* has bright rufous upperparts, making rufous collar less contrasting, underparts greyish; *antofagastae* is rufous above, like last, with strong buff wash on flanks to undertail-coverts; *pulacayensis* is slightly larger, a little less bright and more heavily streaked above than previous, and less buff below; *chilensis* is rather pale, has greyish-looking head very narrowly dark-striped; *sanborni* is like previous, but larger, with paler upperparts, creamy-washed underparts; *choraules* also resembles *chilensis*, but paler, with narrower crownstripes, less black on breast side; *australis* is large and very long-winged, has head almost uniformly grey with only traces of black. Voice. Song simple, a series of whistles and a terminal trill. Can be sweet and plaintive, e.g. "see-seeur tee-te-e-e-e, seeeeur tse-e-e-e-e", in some places with trill reduced to a few notes. In S temperate populations males apparently sing only one stereotyped song, but in Ecuador and Costa Rica males may have repertoire of various (up to seven) songs; populations lacking trills tend to be more tropical and based at forest edge; some montane-grassland populations give two terminal trills in songs. This is one of main species studied to support Acoustic Adaptation Hypothesis (which suggests that song variation may be due to variation in acoustic landscape of different habitats); in grasslands gives higher-pitched trills, and in forest edge more prominent are slowly delivered and lower-pitched whistles. Call a sharp "chip" or "chink", varying geographically.
Habitat. Open spaces, from sea-level to high elevation, c. 4600 m. Often on roadsides, in parks, and near dwellings; also in cleared areas, in blackberry (*Rubus*) and wild rose (*Rosa*) thickets, and in old clearings with bracken (*Pteridium*) and pines (*Pinus*). Race *inaccessibilis* to 1900 m, *roraimae* at 1100–2200 m, *macconnelli* to 4300 m, *antofagastae* sea-level to 2500 m, *pulacayensis* at 4200 m, *peruviensis* sea-level to 4300 m in *puna* zone.
Food and Feeding. Little information on diet; probably feeds on seeds, fruit and arthropods, depending on season and availability. Forages principally on or near ground and low in vegetation. Immatures and non-breeding individuals gather in small flocks.
Breeding. Breeds at all times of year throughout range, but with defined seasons locally, and nesting cycles may be defined by climatic cycles: in El Salvador breeding by May and in Costa Rica breeds in Feb–Apr and Jun–Aug; in Argentina seemingly breeds twice in a year. Monogamous. Nest a compact cup of grasses and plant fibres, lined with finer material, including hair, placed on ground or up to 1 m above it in Costa Rica; in El Salvador nest commonly placed in epiphytes on isolated tree in cleared area. Clutch 2–3 eggs in El Salvador and Costa Rica, 4–5 in Argentina, pale greenish-blue with dense brown spots and blotches; no information on incubation and nestling periods.
Movements. Mostly resident. Patagonian race *australis* migratory, moving N in May after breeding and returning S in Sept; exact location of non-breeding quarters not known. Otherwise, mountain populations in C Chile and Argentine Andes experience extreme cold and snow during winter in regions where they breed; presumably descend to lower elevations, but not yet studied. Montane populations farther N remain in breeding areas all year, as conditions during winter months not nearly so harsh.
Status and Conservation. Not globally threatened. Often common or abundant in appropriate habitat. No indications of any decrease in numbers, and no obvious threats.
Bibliography. Alessio *et al.* (2005), Anon. (1998), Avelino & Vielliard (2004), Beadle & Rising (2002), Busch *et al.* (2004), Chapman (1940), Cheviron & Brumfield (2009), Cheviron *et al.* (2008), Dickey & van Rossem (1938), Dunning (2008), Griscom (1932), Handford (1980, 1981, 1985, 1988), Handford & Lougheed (1991), Handford & Nottebohm (1976), Hellmayr (1938), Howell & Webb (1995), Keith *et al.* (2003), King (1972, 1973b, 1974), Lewis *et al.* (1974), Lougheed & Handford (1992, 1993), Mezquida (2003), Miller *et al.* (1957), Moore *et al.* (2004), Nottebohm (1969, 1975a), Nottebohm & Selander (1972), Novoa, Bozinovic & Rosenmann (1994), Novoa, Veloso *et al.* (1996), Piloni (2001, 2004a, 2004b), Ridgely & Tudor (1989), Ridgway (1901), Simonetti *et al.* (1996), Skutch (1967a), Stiles & Skutch (1989), Tubaro & Segura (1994), Tubaro, Gabelli *et al.* (1996), Tubaro, Handford & Segura (1997), Wetmore *et al.* (1984), Zink, Dittmann & Rootes (1991).

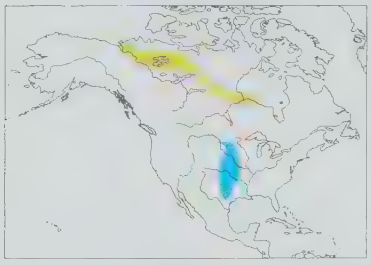
59. **Harris's Sparrow**

Zonotrichia querula

French: Bruant à face noire **German**: Harrisammer **Spanish**: Chingolo de Harris

Taxonomy. *Fringilla querula* Nuttall, 1840, few miles west of Independence, Missouri, USA.
Genus probably close to *Junco*. Monotypic.
Distribution. Breeds in Canada from N Mackenzie (possibly from Yukon) E to C Nunavut, S to NE Saskatchewan, N Manitoba and NW Ontario. Winters in C & S USA primarily from SW South Dakota, N Nebraska and C Iowa S, E of foothills and W of R Mississippi, to SC & C Texas.
Descriptive notes. 16–19 cm; 28·4–48·8 g. A large sparrow with long tail. Has crown, eyestripe, face, chin and throat black, eyestripe brownish-buff in fresh (autumn) plumage; above and around eyestripe, including ear-coverts and side of neck, grey, with black patch or spot at back of ear-coverts; nape brownish; back and scapulars brown, broadly streaked brownish-black, rump brownish; upperwing brownish, tips of median and greater upperwing-coverts edged with white or buffy

On following pages: 60. White-crowned Sparrow (*Zonotrichia leucophrys*); 61. White-throated Sparrow (*Zonotrichia albicollis*); 62. Golden-crowned Sparrow (*Zonotrichia atricapilla*); 63. Song Sparrow (*Melospiza melodia*); 64. Lincoln's Sparrow (*Melospiza lincolnii*); 65. Swamp Sparrow (*Melospiza georgiana*); 66. Savannah Sparrow (*Passerculus sandwichensis*); 67. Belding's Sparrow (*Passerculus guttatus*); 68. Large-billed Sparrow (*Passerculus rostratus*); 69. San Benito Sparrow (*Passerculus sanctorum*).



white (forming two wingbars); tail brown, slightly notched; iris deep brown; bill pink; legs fleshy-pink to fleshy-brown. Sexes similar, male slightly larger and perhaps on average brighter than female. Juvenile has forehead and crown streaked black, side of head creamy buff with some black streaking, nape and upperparts dull chestnut or mottled with dark, back streaked and mottled, rump greyer and mottled with black; upperwing blackish, feathers narrowly edged buff, median and greater upperwing-coverts narrowly tipped white (two wingbars); chin and throat white, spotted with black; centre of breast with conspicuous black spot, chin and flanks buffy and heavily streaked, belly whitish. VOICE. Song consists of one to several clear whistled notes in same minor key, often following other notes that may be in different key, sometimes ending with slow trill. Call a loud "chip" or "wink".

Habitat. Found at forest–tundra interface in islands of white spruce (*Picea glauca*), black spruce (*Picea mariana*) and tamarack larch (*Larix laricina*), with scattered dwarf willow (*Salix*), birch (*Betula*), alder (*Alnus*), Labrador tea (*Rhododendron*), and lichens. In non-breeding season in various shrubby edge situations, and commonly visits suburban backyards and bird-feeding stations. Sea-level to low elevations.

Food and Feeding. Invertebrates, also spruce needles; in winter eats seeds and fruits. Forages principally on or close to ground; in breeding season also gleans and chases arthropods, and makes aerial sallies to catch insects.

Breeding. Season mid-Jun to mid-Jul, nest-building beginning when snow-melt has occurred (typically, first half Jun); single-brooded. Monogamous. On arrival on breeding grounds males form territories, and pair formation follows. Nest built by female, requiring 2·5 days, constructed from sedges, grasses, moss and lichens, lined with softer grasses and sedges, placed on ground, usually beneath small shrub (alder, spruce, Labrador tea) and typically close to stand of conifers. Clutch normally 4 eggs, clutch size on average slightly larger in N part of range, eggs variable, typically pale green with brownish spots; incubation by female, period 12–15 days, normally 13 days (more only in cold-weather years); chicks fed by both parents, nestling period 8·5–10 days, commonly 9 days.

Movements. Migratory; entire population migrates through a relatively narrow corridor between breeding and wintering areas, largely bordered by E Saskatchewan and Manitoba, the Dakotas and W Minnesota. Begins to leave wintering sites late Feb and early Mar, but peak movements N of wintering areas not noted until late Apr and early May; arrival on breeding grounds at sites as distant as in Northwest Territories and in Manitoba (Churchill) occur typically in last week of May, but cold spring weather can delay arrival, and males and females arrive together. First S-bound movements from breeding sites late Aug/early Sept, peak movements in S Canada and N USA in Oct, and arrival in wintering areas not until mid-Nov to early Dec. Autumn migration appears to be slower than that in spring; one ringed individual from Saskatchewan was found in C USA (Iowa) 21 days later, having travelled an average of 61 km per day. Despite narrow migratory and wintering range through centre of North American continent, occurs as a vagrant on both coasts; also casually in N Alaska, and accidental in N Canada on Banks I (Northwest Territories) and Jenny Lind I (Nunavut), and in SE USA S to Florida.

Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. Relatively little known. Breeds in remote and isolated places where there is little human interference, and winters in old fields and woodland edge. Winter Christmas Bird Count data indicate a general decline in numbers since 1970s, but confirmation of this trend, and study of causes, remain to be made.

Bibliography. Anon. (1998), Baumgartner (1968b), Beadle & Rising (2002), Brewer *et al.* (2000), Graul (1967), Harkins (1937), Harris (1919), Hellmayr (1938), Howell & Webb (1995), Jehl & Hussell (1966), Jehl & Smith (1970), McCarthy (2006), Myres (1959), Norment (1992, 1994, 1995, 2003), Norment & Fuller (1997), Norment & Shackleton (1993), Park (1936), Peck & James (1987), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Semple & Sutton (1932), Shackleton *et al.* (1991), Shore-Baily (1931a, 1931b), Swenk & Stevens (1929), Wyman (1911), Zink (1982), Zink, Dittmann & Rootes (1991).

60. White-crowned Sparrow

Zonotrichia leucophrys

French: Bruant à couronne blanche **German**: Dachsammer **Spanish**: Chingolo Coroniblanco
Other common names: California White-crowned Sparrow (*nuttalli*); Pacific White-crowned Sparrow (*pugetensis*)

Taxonomy. *Emberiza leucophrys* J. R. Forster, 1772, Severn River, west shore of Hudson Bay, Canada.

Genus probably close to *Junco*. Present species perhaps most closely related to *Z. atricapilla*, with which it hybridizes; hybrids with *Z. albicollis* and *Melospiza melodia* also recorded. Coastal races *pugetensis* and *nuttalli* differ from others morphologically, vocally, in breeding habitat, and in migration distance; biologically they are dissimilar, and it has been suggested that they would be better treated as two separate species. In Canada, race *gambelii* intergrades with *oriantha* in SE British Columbia and with nominate in N Manitoba. Proposed race *aphaea* (described from Idaho, presumably on migration) included within nominate. Five subspecies currently recognized.

Subspecies and Distribution.

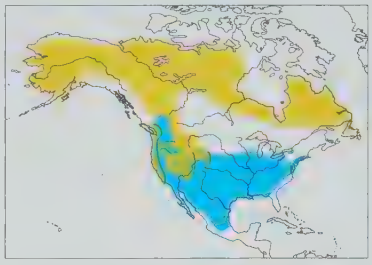
Z. l. gambelii (Nuttall, 1840) – breeds Alaska and W Canada (E to Nunavut and N Manitoba, S to S British Columbia, SW Alberta and N Saskatchewan; non-breeding quarters in S British Columbia and W USA (E to NE Kansas, S to California) and Mexico (S to Nayarit, Aguascalientes and San Luis Potosí).

Z. l. leucophrys (J. R. Forster, 1772) – breeds in C & E Canada from N Manitoba and N Ontario E through N & NC Quebec to N Labrador and N Newfoundland; winters in S & SE USA (S from Kansas, Missouri, Kentucky and North Carolina) and N Mexico (S to Sonora).

Z. l. pugetensis Grinnell, 1928 – breeds extreme SW Canada (SW British Columbia) S along US coast to NW California; non-breeding S to SW California.

Z. l. nuttalli Ridgway, 1899 – coastal & C California (from Mendocino County S to Santa Barbara County).

Z. l. oriantha Oberholser, 1932 – breeds in mountains of SW Canada (SE British Columbia, S Alberta and SW Saskatchewan) and W USA (N Idaho S through SC Oregon to C & E California and SC Nevada, E to Wyoming, Utah, Colorado and CE Arizona); non-breeding SW USA (S California and S Arizona E to C Texas) and Mexico (S to S Baja California, Jalisco, Michoacán, Querétaro, San Luis Potosí and Nuevo León).



Descriptive notes. 14·0–17·0 cm; 21·0–38·5 g. A fairly large, long-tailed sparrow. Nominate race has broad white median crownstripe extending from back of head nearly to bill, black lateral crownstripes, narrow black eyestripe; side of face grey; nape greyish, upperparts boldly streaked brownish (feather centres) and grey; tail brown; median and greater upperwing-coverts with broad rufous edges and whitish tips (forming two wingbars); throat and underparts greyish, buff wash on flanks, undertail-coverts buff; iris dark brown; bill reddish-pink to yellow; legs fleshy-orange to pinkish-brown, often duller on feet. Sexes similar. Juvenile is like adult, but with head markings rusty brown where adult black and buffy where adult white. Races fairly well marked: *gambelii* is relatively large, with small bill, white supraloral area, bill pinkish with dark tip; *pugetensis* is shorter-winged than previous and nominate, has whitish supraloral area, browner (less greyish) above and below, bill yellowish or yellowish-orange with dark culmen and tip; *nuttalli* is similar in coloration to previous, but even shorter-winged, less slim, with larger bill, also often retains brown in crown into first summer (mature slightly later); *oriantha* is very like nominate, but marginally smaller, perhaps a shade paler above, bill perhaps very slightly darker pink. VOICE. Song variable, with many regional dialects, but distinctive, characteristically consists of 2 (1–4) clearly whistled notes, the second slightly lower than the first, followed by 3 descending buzzy or husky notes, "dear-dear buzz buzz buzz"; along Pacific coast usually starts with a long, clear whistle that is higher-pitched than rest of song. Call a hard "pink" or "tsit", somewhat flatter in tone on Pacific coast than elsewhere.

Habitat. In N parts of range breeds at tree-line in dwarf spruce–birch (*Picea–Betula*) and tamarack (*Larix laricina*) woods; in Rocky Mts in alpine meadows; on W coast found in coastal fog zone, usually in coastal scrub or edge habitats, sometimes in urban areas. In non-breeding season, N migrants found in brush and woodland edge; in Midwest often in hedgerows and grassy edges of woodland. Where coastal and interior races winter together, such as in C California, *gambelii* tends to occupy more open and arid habitats, while *pugetensis* prefers moister and more shrubby and closed habitats. Sea-level to 2500 m.

Food and Feeding. Diet during breeding season primarily arthropods, including larval Lepidoptera, beetles (Coleoptera) and bugs (Hemiptera). In winter eats small seeds (e.g. *Amaranthus*), buds and fruits, also arthropods when available. Forages principally on or near ground or low in vegetation. In pairs and small groups, often mixed with *Z. albicollis* and *Z. atricapilla* and with *Junco hyemalis*; on migration, often in moderately large flocks.

Breeding. Season varies geographically, breeds mid-Jun through Jul in C Canada (Manitoba and Ontario), and in USA begins late Apr to early May in Oregon, from late May through mid-Jun in mountains of Arizona and early Mar through early Apr in coastal California; generally single-brooded in N, multi-brooded on Pacific coast. Monogamous, occasionally polygynous (*nuttalli*). Nest built by female, taking 3–8 days, a cup of dry grasses, sticks, dead leaves or moss, lining includes finer grasses and hair, placement variable, in coastal areas often in low bush such as in coastal chaparral or scrub, farther N and in highlands tends to be on ground and concealed by overhanging branches of small tree or shrub such as spruce, tamarack, fir (*Abies*), crowberry (*Empetrum*) or Labrador tea (*Rhododendron*). Clutch 3–7 eggs, clutch size larger in N and smaller in S (nominate and *gambelii* typically 5 eggs, *oriantha* and *pugetensis* 4, *nuttalli* 3), eggs pale greenish to bluish and marked with brownish to reddish spots; incubation by female, period 11–13 days (normally 12 days); chicks fed by both parents, nestling period 8·5–10 days. Brood parasitism by Brown-headed Cowbird (*Molothrus ater*) most frequent in S populations of race *oriantha*, also for *nuttalli* in California (where parasitism rates can be quite high), but not recorded in N (e.g. *gambelii*).

Movements. N and montane populations entirely migratory; S coastal *nuttalli* sedentary, while more N *pugetensis* is migratory. In C California ringing data show that individuals, having chosen wintering area during first winter of life, return each year to same site. Overall, migration on broad front, although in W spring migration restricted to lower-elevation valleys (as highlands still under snow), whereas autumn passage through highland meadows (quite productive at this season) likely. S-bound migration may begin as early as early Aug in extreme N, reaching much of S Canada and N USA from middle to late Sept, and in S part of wintering areas arrival begins in early Oct and largely finished by mid-Nov; in C California arrival of wintering populations occurs by early Sept, and is broad scale by mid-Sept; on average, arrival of *pugetensis* in coastal C California slightly earlier than that of N race *gambelii*, and in spring *gambelii* may remain in wintering areas slightly later than *pugetensis*. Average stopover time for 382 migrating *gambelii* in autumn in California was 3·6 days, and mass gain was 0·4 g/day for 4–5 days, but c. 33% of individuals failed to put on weight. In spring, migration is progress throughout much of USA by early to late Mar, with peak in mid-Apr towards Canadian border and further pulses to early May; males reach breeding grounds on average a few days before females, but much overlap, and experienced breeders arrive before inexperienced ones. Comparative studies of survival of wintering *pugetensis* (shorter-distance migrant) and *gambelii* (longer-distance migrant) in San Jose (California) reveal that migration distance appears not to have negative effect on survival rates. Race *gambelii* is casual in Pribilof Is and Alaska and accidental in Japan; nominate race casual S to Florida, C Mexico (Aguascalientes), Cuba and Jamaica. Vagrant to Greenland, Iceland, Azores, Britain, France and Netherlands.

Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. Logging often benefits this species, as it thrives in young second growth on Pacific coast. Most of breeding range in N lies in areas with low human population densities, and in habitats little used by people.

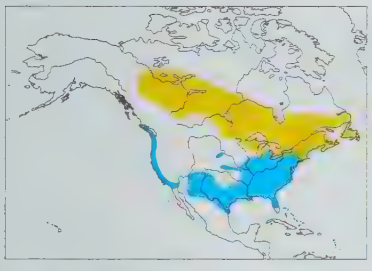
Bibliography. Anon. (1998), Baker (1975), Baker & Mewaldt (1979), Baker *et al.* (1981), Banks (1963), Baptista (1976), Beadle & Rising (2002), Caraco (1983), Chilton (2003), Chilton & Lein (1996a, 1996b), Chilton *et al.* (1995), Clement (1968), Cortopassi & Mewaldt (1965), Coverdill *et al.* (2008), Cramp & Perrins (1994), Derryberry (2009), Dunning (2008), Farner *et al.* (1980), Fugle *et al.* (1984), Glutz von Blotzheim & Bauer (1997), Hafner & Petersen (1985), Hahn *et al.* (2004), Harwood (2009), Hellmayr (1938), Hough *et al.* (2000), Howell & Webb (1995), Kern (1979), King & Mewaldt (1982), King *et al.* (1963), Lein & Corbin (1990), Lewington *et al.* (1991), Lewis *et al.* (1968), McCarthy (2006), Mead & Morton (1985), Mewaldt & King (1977), Miller *et al.* (1957), Morton (1967a, 1967b, 1992, 1997), Morton & Pereyra (1987), Morton & Welton (1973), Morton, Horstmann & Osborn (1972), Morton, Orejuela & Budd (1972), Nelson & Poesel (2009), Nelson & Soha (2004), Norment (1992, 2003), Norment & Fuller (1997), Orejuela & Morton (1975), Patterson & Petrinovich (1978), Peck & James (1987), Petrinovich (1985, 1988), Petrinovich & Patterson (1978), Petrinovich & Peeke (1973), Petrinovich, Patterson & Peeke (1976), Plamondon, Goller & Rose (2008), Plamondon, Rose & Goller (2010), Pleszczynska (1980), Pyle (1997), Ramenofsky *et al.* (2008), Rattenborg *et al.* (2004), Ridgway (1901), Rising & Beadle (1996), Sandercock & Jaramillo (2002), Simons & Alcock (1971), Slabbekoorn *et al.* (2003), Soha & Marler (2001), Trainer (1983), Urban (1959), Valone & Wheelbarger (1998), Webb & King (1983), Weckstein *et al.* (2001), Wheeler & Porter (2009), Zink, Dittmann & Rootes (1991).

61. White-throated Sparrow

Zonotrichia albicollis

French: Bruant à gorge blanche **German**: Weißkehlammer **Spanish**: Chingolo Gorjiblanco

Taxonomy. *Fringilla albicollis* J. F. Gmelin, 1789, Pensilvania = Philadelphia, Pennsylvania, USA.
Genus probably close to *Junco*. Hybrids between present species and *Z. atricapilla*, *Z. leucophrys* and nominate race of *Junco hyemalis* reported. Monotypic.
Distribution. Breeds in Canada (mainly E of Rocky Mts) from SE Yukon, WC & S Mackenzie, N & C Saskatchewan and N Manitoba E to Newfoundland, S to SC Alberta, S Saskatchewan, S Ontario, Vermont and Nova Scotia, and in NE USA S to NC North Dakota, N & E Minnesota, C Wisconsin, C Michigan, New York, New Hampshire, Massachusetts and N Pennsylvania. In non-breeding season found in SE Canada (S Maritimes, SE Quebec, rarely S Ontario), in USA from E South Dakota, S Wisconsin and S Michigan S to SC Florida and Gulf Coast, and from S Arizona E to S Texas, and in N Mexico (S to N Tamaulipas, Nuevo León, rarely to Sonora); also uncommonly along Pacific coast from extreme SW Canada (S British Columbia) S to extreme NW Mexico (N Baja California).



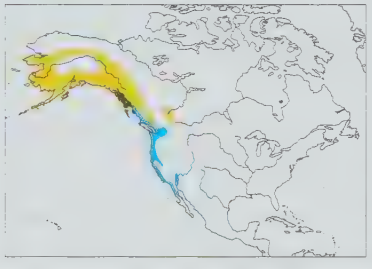
Descriptive notes. 15–17 cm; 19–35·4 g. A fairly large, long-tailed sparrow, polymorphic in head colour (a few birds intermediate). Has median crownstripe and broad supercilium either both white ("white-stripe morph") or both pale brownish-tan ("tan-stripe morph"), and always yellow from above eye to bill; lateral crownstripe and eyestripe dark chocolate-brown to black (generally darker in "white-morph" birds), ear-coverts and lores grey; mantle and scapulars brown or rusty brown, streaked dark brown or black, feathers edged beige, rump grey-brown with faint streaks; tail brown, slightly notched; upperwing brown, median and greater upperwing-coverts with brighter edges and tipped whitish (forming two narrow wingbars); throat white or dull white, sharply contrasting with greyish breast, which may be faintly streaked, flanks light brown and faintly streaked, belly dull white and unmarked; iris brown to deep reddish-brown; upper mandible dark horn-coloured, lower mandible lighter; legs flesh-coloured to pinkish-brown. Sexes similar in coloration, male slightly larger than female. Juvenile has median crownstripe indistinct, yellow in supercilium reduced or absent, forehead, crown and nape chestnut-brown, streaked black, chin and throat whitish, flaked with dusky, dark moustachial stripe, breast and flanks heavily streaked dark brown, belly and undertail-coverts white. Voice. Song a clear, loud whistle characteristically starting with lower note, this followed by 3 or 4 higher, wavering notes, or less frequently first note higher than others; song almost always has a change in pitch. Call a distinctive "tseet"; also quiet "tip" notes, and louder "pink" alarm call.
Habitat. Breeds in open coniferous and mixed forests, often in second growth following logging or fire, or along roadsides. On migration and in winter usually found in thick cover at woodland edge and in woodland clearings; visits gardens. To 3500 m.
Food and Feeding. In summer a variety of insects, including dragonflies and damselflies (Odonata), Hymenoptera, heteropteran bugs, and larval beetles (Coleoptera) flies (Diptera) and Lepidoptera, as well as spiders (Araneae), millipedes (Diplopoda), centipedes (Chilopoda) and snails (Gastropoda). Young fed with arthropods. In winter feeds principally on small seeds, e.g. ragweed (*Ambrosia*) and smartweed (*Polygonum*), and fruits (of *Viburnum*, *Sorbus*, *Rosa*), also arthropods when available. In early spring eats oak (*Quercus*) buds, and flowers of maple (*Acer*), beech (*Fagus*) and apple (*Malus*). Forages mainly on ground in small openings in dense thickets, often in leaf litter. Uses both feet together to scratch at soil and litter. In non-breeding season visits feeders. Singly and in pairs; outside breeding season often in large flocks, commonly with *Z. leucophrys* and *Junco hyemalis*.
Breeding. Breeds from late May to early Aug; sometimes double-brooded. Socially monogamous; rarely polygamous. Exceptionally unusual in having two colour morphs which correlate with slightly different behaviour: individuals mate in disassortative fashion, always choosing a partner of opposite morph, and in general white-stripe males more aggressive, territorial and more likely to mate outside pair-bond, and tan-stripe birds of either sex provide more parental care than do white-stripe ones; pair formation of tan-stripe males with white-stripe females begins earlier than that of white-stripe males with tan-stripe females, and nest-building by latter starts very soon after pairing, whereas pairs with tan-stripe male and white-stripe female start up to two weeks after pair formation. Nest built by female, a sturdy cup constructed from dry grasses, twigs, bark and moss, softer lining of finer grass, rootlets, pine (*Pinus*) needles and deer hair, usually placed on ground and concealed by vegetation, often under blueberry bush (*Vaccinium*), sometimes off ground in small tree or bush e.g. sweet gale (*Myrica gale*). Clutch 1–7 eggs, most commonly 4 or 5, clutch size on average larger farther N, eggs pale greenish or bluish with dark purplish or reddish-brown streaks, spots and scrawls; incubation by female, period 11–14 days, most frequently 12 days; chicks fed by both sexes, female doing on average more provisioning, but tan-stripe morph of either sex provisions more than does white-stripe morph of corresponding sex, thus white-stripe males feed young at lowest rates, while tan-stripe females feed at highest rates (as tan-stripe morph always pairs with white-stripe morph, overall provisioning rates of the two combinations are roughly equal); nestling period 7–12 days, most commonly 8–9 days. Brood parasitism by Brown-headed Cowbird (*Molothrus ater*) relatively uncommon, and in some populations unknown, owing to generally N breeding distribution.
Movements. Short-distance to medium-distance nocturnal migrant. Females winter farther S on average than males, and young females winter S of adult females. Migration generally on broad front, and mainly N–S; NW populations appear to have greater W–E component in migrations, moving towards SE wintering areas (rather than heading directly S). Breeding origin of sparse wintering population on Pacific coast not known, possibly W of Continental Divide. Wintering areas entirely vacated by late Apr to mid-May, although bulk of migrants leave well before that. Spring migration occurs from mid-Mar to late May; arrival in S breeding areas as early as late Mar, though more typically early to middle Apr, and reaches breeding areas farther N or W (N British Columbia, Newfoundland, Yukon) in first half May, sometimes early Jun; in Great Lakes region peak migration in last week Apr and first week May. During N-bound migration males travel 1–2 weeks earlier than females, and arrive earlier at breeding grounds; particularly with females, white-stripe morph moves N earlier than tan-stripe morph. Stable-isotope research indicates that time of arrival of spring migrants in Delta (Manitoba) is influenced by wintering latitude (not breeding latitude), body size and minimum temperatures during Apr. During S-bound migration adults and juveniles migrate at same time through Long Point (Ontario), but adults arrive on wintering grounds earlier, suggesting faster or more efficient migration by older birds; on average, S-bound migration slower and stopovers longer than during spring. In NW of breeding range (Yukon and C Alberta) S-bound passage begins late Aug into Sept, with peak in late Sept; peaks farther S and E, e.g. in S Ontario and Nova Scotia, during mid-Sept through late Oct; in main wintering range, arrivals span period from early Oct into Dec, with mid-Oct to mid-Nov as peak times of arrival. Casual or vagrant to Alaska, NC Canada (Kugluktuk, Baffin I and Coats I, in Nunavut), Iceland, British Is, Continental Europe (Fennoscandia, Netherlands, Germany, France, Gibraltar), and Puerto Rico.
Status and Conservation. Not globally threatened. Common to very common in appropriate habitat in many parts of range. Benefits from logging and fires. Has bred in N Germany (presumed to be escaped birds).
Bibliography. Able (1990), Able *et al.* (1982), Anon. (1998), Beadie & Rising (2002), Christiansson & Gerell (1966), Denny (2005), Falls (1988), Falls & Kopachena (1995), Glutz von Blotzheim & Bauer (1997), Good & Adkins (1927), Hellmayr (1938), Hock (1973), Houtman & Falls (1994), Howell & Webb (1995), Hurly, Ratcliffe, Weary & Weisman (1992), Hurly, Ratcliffe & Weisman (1990), Hurly, Weisman *et al.* (1991), Jenkins & Cristol (2002), Kanerva (1967), Knapton & Falls (1983), Kontogiannis (1967), Kopachena & Falls (1993a, 1993b, 1993c), Lewington *et al.* (1991), Lowther & Falls (1968), Mazerolle & Hobson (2007), McCarthy (2006), Michopoulos *et al.* (2007), Mikkola & Rautatiek (1969), Miller, A.H. *et al.* (1957), Miller, L.J. & Weise (1978), Muheim *et al.* (2009), Pauly & Ferrell (1984), Peck & James (1987), Piper (1990a, 1990b), Piper & Wiley (1990a, 1990b), Pleszczynska (1980), Pyle (1997), Ridgway (1901), Riede & Suthers (2009), Rising & Beadle (1996), Russell & Monson (1998), Ruthke (1973), Stoffels & van der Weijden (1978), Thomas *et al.* (2008), Thorneycroft (1966), Vardy (1971), Wasserman (1977, 1986), Weeden & Weeden (1973), Whillans & Falls (1990), Zink, Dittmann & Rootes (1991).

62. Golden-crowned Sparrow

Zonotrichia atricapilla

French: Bruant à couronne dorée **German**: Kronenammer **Spanish**: Chingolo Coronidorado

Taxonomy. *Emberiza atricapilla* J. F. Gmelin, 1789, "in Sinu Natka, et insulis Sandwich" = Prince William Sound, Alaska, USA.
Genus probably close to *Junco*. Present species perhaps most closely related to *Z. leucophrys*, with which it sometimes hybridizes; hybridizes less frequently with *Z. albicollis*. Monotypic.
Distribution. Breeds in Aleutian Is (E from Unimak I and Shumagin Is) and W & NC Alaska, W Canada (C Yukon and probably SW Northwest Territories S to S British Columbia and SW Alberta) and adjacent USA (extreme NW Washington). Non-breeding from S Alaska and S British Columbia S to SW USA (S to W California and E Nevada) and NW Mexico (N & C Baja California, rarely S to Sonora).



Descriptive notes. 15–18 cm; 21·2–36·5 g. A fairly large, long-tailed sparrow. In breeding plumage, crown is blackish-brown, becoming brownish toward nape, with broad yellow or yellowish median crownstripe; lores yellow or grey, ear-coverts grey, sometimes with faint streaking; upperparts greyish olive-brown, mantle, back and scapulars broadly streaked with brownish-black, suffused with rusty brown, rump and uppertail-coverts greyish-brown; tail brown, slightly notched; median and greater upperwing-coverts edged rufous and with white tips (forming two thin wingbars); throat and underparts grey, becoming paler on belly, and buffy on flanks; iris deep brown; upper mandible mostly dusky, lower mandible flesh-coloured; legs pale brownish. In non-breeding plumage loses strong head pattern, but amount of black and golden colour retained varies individually, some largely brown on crown with dull golden centrally, others strongly black on much of crown and with brown restricted to rear portion and strong golden stripe down mid-crown; once non-breeding head pattern develops in second winter, that pattern maintained in consecutive winters. Sexes similar in coloration, male slightly larger than female. Juvenile and first-winter are like adult, but lateral crownstripes brownish, and crown brownish (sometimes tinged with yellow) and faintly brown-streaked. Voice. Song characteristically consists of 3 plaintive, clearly whistled descending notes in minor key, typically transliterated as "three blind mice" or "oh dear me". Call a loud "chink" or "chip"; flight call a high "seeep".
Habitat. Breeds in forest–tundra ecotone and shrubby tundra with scattered birch (*Betula*) and dwarf conifers (*Picea*, *Abies*), alders (*Alnus*), cottongrass (*Eriophorum*), sedges (*Carex*), Labrador tea (*Rhododendron*), blueberry (*Vaccinium*) and crowberry (*Empetrum*). In winter in brush, field edges, chaparral and gardens. Sea-level to 2700 m.
Food and Feeding. Little information on diet. Outside breeding season principally vegetable matter (seeds and fruits), and takes small insects and spiders (Araneae) when available; summer diet not well known, but thought to feed small insects such as Hymenoptera, Lepidoptera, beetles (Coleoptera), flies (Diptera) and other animal items to young. Also eats young cabbages, beets and peas. Forages principally on or near ground or low in vegetation. Scratches soil and leaf litter in search of food items; gleans items from vegetation.
Breeding. Season Jun–Jul; single brooded, rarely second broods attempted. Monogamous. Pair formation occurs within two weeks of arrival on breeding grounds. Nest constructed by female, a thick cup of grasses, twigs, ferns and moss, lining of fine grasses and sometimes ptarmigan (*Lagopus*) feathers, usually placed on ground, sometimes less than 1 m from ground in small stunted conifer; nest-site often in or near shrub thicket, sometimes near stream. Clutch typically 4 eggs, pale blue to pale greenish with brown, reddish or purplish spotting; incubation by female alone, period 11–12 days; chicks fed by both parents, nestling period at least 10 days.
Movements. Migratory. Passage largely along coastal slope, interior breeding populations likely using river valleys (highland areas still covered in snow during N movement). During first winter, individuals fix on a wintering area and return to it in subsequent winters. Wintering areas in USA extend rarely E to Colorado, Kansas and W Texas, and S in Mexico to Sonora. Migration N from California wintering areas begins in early Mar, peak in late Mar and early Apr, some remaining into late Apr or rarely early May; in Oregon main migration period mid-Apr to mid-May; reaches Alaskan breeding grounds from middle to late Apr into late May, males and females arriving at similar times. Begins to move out of breeding grounds from mid-Aug, and first S-bound migrants detected in coastal British Columbia, Washington and Oregon in late Aug to early Sept; arrival in C California usually by mid-Sept, although bulk of migrants occur in late Sept to mid-Oct. Vagrants recorded in Canada E to Nova Scotia and in USA to Massachusetts and Florida; W of normal range, accidental in Russian Far East (Wrangel I, Chukotka, Koryak Highlands and Kamchatka).
Status and Conservation. Not globally threatened. Fairly common to locally common; often common in appropriate habitat. Some indications that populations increasing in size. Breeds in areas with low human populations, and probably little affected by human activities. On wintering grounds,

in brushy areas, was in the past sometimes persecuted as an agricultural pest, but apparently this is no longer the case.

Bibliography. Anon. (1998), Beadle & Rising (2002), Bull (1988), Chesser & Zink (1994), Colwell (1999, 2000), Davis (1973), Garrett & Dunn (1981), Gerasimov (1997), Harris (1983), Hellmayr (1938), Hendricks (1987), Hoffman *et al.* (1991), Holmes & Dirks (1978), Howell & Webb (1995), Kazama (1987), Mattsson (2009), McCarthy (2006), Mewaldt & Farner (1957), Miller *et al.* (1957), Norment *et al.* (1998), Pearson (1979), Pyle (1997), Ralph & Vroman (1990), Ridgway (1901), Rising & Beadle (1996), Weckstein *et al.* (2001), Zink, Dittmann & Rootes (1991).

Genus *MELOSPIZA* S. F. Baird, 1858

63. Song Sparrow

Melospiza melodia

French: Bruant chanteur **German**: Singammer **Spanish**: Chingolo Cantor

Taxonomy. *Fringilla melodia* A. Wilson, 1810, Philadelphia, Pennsylvania, USA.

Genus generally considered to be closely related to *Passerella* and *Zonotrichia*; unpublished molecular studies suggest close relationship with *Xenospiza* and some of the grassland sparrows (*Passerculus*, some *Ammodramus*, *Pooecetes* and *Oriturus*). In molecular-genetic studies of present species, little concordance found between mitochondrial DNA patterns and geographical variation in plumage and morphology, suggesting rapid post-glaciation radiation, combined with plumage evolution that has occurred more quickly than changes in mitochondrial DNA. One of the most variable of all avian species, as many as 52 races have been named, many of them weakly differentiated. Proposed races considered insufficiently distinct include: *amaka* (described from Amak I, in extreme E Aleutians), which is synonymized with *sanaka*, *inexspectata* (from c. 4·8 km E of L Moose, in British Columbia), synonymized with *morphna*, *juddi* (from L Rock, Tower County, in North Dakota), *melanchra* (Bay Point, Ohio) and *euphonia* (Cranberry Glades, Pocahontas County, in West Virginia), all included within nominate; in California, *saltonis* (from margin of Salton Sea 1·6 km SE of Mecca), subsumed into *fallax*, *fisherella* (from L Honey, near Milford), subsumed into *montana*, *mailliardi* (from Ranchos Dos Rios, near Modesto, in Stanislaus County) and *cooperi* (from San Diego), both synonymized with *heermanni*, and *micronyx* (from San Miguel I), *clementae* (from San Clemente I) and *coronatorum* (from North I, in Los Coronados Is, off NW Baja California), all synonymized with *graminea*; also, in Mexico, *yuriria* (from Yuriria, in SE Guanajuato), treated as synonym of *adusta*, and *niceae* (from Tulancingo, in Hidalgo) and *azteca* (from Lago de Zumpango, in México), both subsumed into *mexicana*. Thorough taxonomic review required. Twenty-five subspecies currently recognized.

Subspecies and Distribution.

M. m. maxima Gabrielson & Lincoln, 1951 – W Aleutian Is (Attu I E to Atka I).

M. m. sanaka McGregor, 1901 – E Aleutian Is (Seguam I E to Unimak I and Amak I), Alaska Peninsula E to Stepovak Bay and islands S of peninsula (Sanak I E to Semidi Is).

M. m. insignis S. F. Baird, 1869 – Kodiak I and Alaska Peninsula at Kukak and Katmai; non-breeding also S along Alaskan coast.

M. m. kenaiensis Ridgway, 1900 – Alaska on Pacific coast of Kenai Peninsula and islands in Prince William Sound; non-breeding also S to British Columbia.

M. m. caurina Ridgway, 1899 – coast of N Gulf of Alaska; non-breeding also in Pacific Northwest S to NW California.

M. m. rufina (Bonaparte, 1850) – outer islands of Alexander Archipelago, in SE Alaska, and in Queen Charlotte Is, in British Columbia (Canada).

M. m. morphna Oberholser, 1899 – C & SW British Columbia S (W of Cascades) in NW USA to NW Oregon.

M. m. merrilli Brewster, 1896 – E British Columbia S in USA to SE Washington and NW Montana; non-breeding farther S (S to SE California).

M. m. cleonensis McGregor, 1899 – W of Cascades in SW Oregon and NW California.

M. m. gouldii S. F. Baird, 1858 – C coast of California (except San Francisco Bay), also Santa Cruz I.

M. m. samuelis (S. F. Baird, 1858) – San Pablo Bay and N San Francisco Bay, in California.

M. m. maxillaris Grinnell, 1909 – Suisun Bay, E of San Pablo Bay.

M. m. pusillula Ridgway, 1899 – S San Francisco Bay.

M. m. heermanni S. F. Baird, 1858 – C & SW California and extreme NW Mexico (NW Baja California); non-breeding S to SE California.

M. m. graminea C. H. Townsend, 1890 – Channel Is (San Miguel, Santa Rosa and Anacapa), off SW California (USA), and Los Coronados Is, off NW Baja California (Mexico).

M. m. montana Henshaw, 1884 – breeds in W USA throughout Rocky Mts and Great Basin from SE Washington E to NC Montana, S to N & E California and N New Mexico; non-breeding S to SE California and N Mexico (E Sonora E to Coahuila).

M. m. melodia (A. Wilson, 1810) – breeds from WC Canada (Prairie Provinces and E Great Plains) E to Newfoundland, and S in USA (except middle Atlantic coast) to N Georgia; non-breeding S to Florida and S Texas.

M. m. atlantica Todd, 1924 – breeds US Atlantic coast from Long I (New York) S to C North Carolina; non-breeding from Maryland S to Georgia.

M. m. fallax (S. F. Baird, 1854) – SW USA from S Nevada and SW Utah S, including E Mojave Desert and Sonoran Desert, to Gulf of California and SE Arizona.

M. m. rivularis W. E. Bryant, 1888 – S Baja California (from San Ignacio S to Sierra Laguna), in W Mexico.

M. m. goldmani Nelson, 1899 – W Durango (El Salto), in WC Mexico.

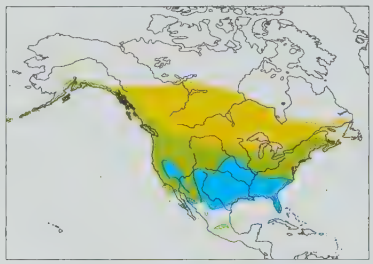
M. m. zacapu Dickerman, 1963 – Michoacán (Zacapu), perhaps also in Jalisco (at Laguna Chapala), in SW Mexico.

M. m. adusta Nelson, 1899 – R Lerma from L Yuriria (Guanajuato) S to Pátzcuero (Michoacán), in SC Mexico.

M. m. villai A. R. Phillips & Dickerman, 1957 – upper R Lerma drainage from Tarandacuao (Guanajuato) E to Toluca area (México), in SC Mexico.

M. m. mexicana Ridgway, 1874 – S Hidalgo, N México and Distrito Federal E to N Puebla and Tlaxcala, in SC Mexico.

Descriptive notes. 12–17 cm; 11·9–53 g. A medium-sized to large sparrow, largest in Aleutian Is and smallest in SW USA; rather long and rounded tail, often pumped up and down during flight. Nominate race has faintly dark-streaked dull brownish crown, narrow greyish-white median crownstripe, rather broad greyish-white supercilium extending posteriorly to side of nape, pale buffish eyering, narrow reddish-brown eyestripe behind eye, grey-buff lores and ear-coverts, latter bordered anteriorly by dark red-brown moustachial stripe, with contrasting whitish moustachial stripe and dark brown malar stripe; nape and side of neck greyish with faint dark streaking; upperparts greyish-brown with coarse black streaking (streaks with reddish-brown edges), rump olive-brown and faintly streaked, upper-tail-coverts greyer with stronger dark shaft streaks; tail feathers brown with slight rufous tinge, paler edges; lesser upperwing-coverts grey with rufous wash, rest of wing blackish-brown, edged warmer reddish-brown, median and greater coverts with narrow pale buff tips (forming two indistinct wingbars); throat and underparts whitish, breast and flanks boldly streaked dark rufous-brown, streaks often coalescing to form obvious small patch in centre of breast; iris dark reddish-brown; bill horn-coloured to grey, often dusky grey on culmen; legs yellowish-flesh to dusky brownish-grey. Sexes similar in appearance, male on average somewhat larger than female. Juvenile is generally more buffish in appearance than adult, has finely dark-streaked buff-brown crown with indistinct paler median stripe (sometimes lacking), underparts with somewhat thinner streaks, these not forming spot on breast. Races differ in size, bill size, and plumage coloration and markings, in broad terms NW races very large with large bill, plumage greyish with reddish streaking (juvenile has nearly uniform dark back), those from Pacific NW coast large, sooty or rusty, E races medium-sized and brownish, mainland California races relatively small and brownish-olive with blackish streaking below, races on Mexican plateau large and with dark brown/black ventral markings and white throat: *atlantica* is very like nominate, but tends to be slightly greyer and more distinctly streaked above; *montana* is slightly longer-tailed and longer-legged than nominate, but with slightly smaller bill, also a shade darker and greyer; *fallax* is clearly paler than previous and with paler rufous streaking; *maxima* is largest and biggest-billed of all races, plumage rather grey, streaks above and below dull rufous; *sanaka* is fairly large, olive-grey (in worn plumage looking ash-grey) with fairly heavy brown streaks above; *insignis* is slightly smaller than last, also upperparts darker and more uniformly brownish-grey; *kenaiensis* is smaller and browner than previous, with darker streaking; *morphna* is dark rufous-brown above, heavily streaked dark rufous below; *rufina* is larger, darker and more sooty-looking than previous; *caurina* is marginally larger and greyer than last; *merrilli* is somewhat darker and more uniform above than nominate, with less obvious streaking; *cleonensis* is more rufous in tone, with rufous-washed olive upperparts heavily streaked dark rufous-brown, rufous-brown streaks below becoming blackish at side of breast; *gouldii* is like previous, but less reddish above and with blacker (less rufous) streaks below; *heermanni* is relatively dark rufous above, with rather heavy blackish streaking both above and below; *samuelis* is very like last, but smaller and with slimmer bill; *maxillaris* tends to be darker brown above and more heavily streaked below than previous, also is larger and has bigger bill; *pusillula* is like *samuelis*, but smaller, more greyish-olive (less rufous) above and more heavily streaked (and often tinged yellowish) below; *graminea* is distinctly grey above and whitish below, with contrasting dark streaks; *rivularis* is pale, resembling *fallax*, but less rufous above, also larger and with longer, narrower bill; *goldmani* is like *montana*, but somewhat darker and less distinctly streaked above, also larger; *zacapu* is rather bright rufous above; *adusta* is similar to last, but slightly duller; *mexicana* is similar to *heermanni*, but darker, more olive-brown above, more heavily streaked and spotted below; *villai* is a large race, dark, more sooty and less rufous above than last. Voice. Song variable, but distinctive, characteristically starts with a series of 2–4 loud, clear whistles on same pitch, followed by a trill, often a buzzy trill, then several short notes, e.g. "chrup chrup chee chee tceeeee tzcu". Call a distinctive "tchenk", "tchip" or "chimp"; also a distinctive "tseep" call note.



Habitat. Open and semi-open areas with some cover. Generally on border of ponds or steams (invariably so in SW), or in old fields, thickets or woodland edge, or moist ravines. In Aleutian Is and coastal Alaska found in beach grass, commonly on boulder-strewn beaches, amid drift wood and boulders, and in winter feeding on tidal mudflats. In San Francisco Bay area (California) in saltmarsh and brackish marsh, and on both Pacific and Atlantic coasts in brackish marshes with cattails (*Typha*), cordgrass (*Spartina*), and pickleweed (*Salicornia*). In winter generally in brush, often near water. Sea-level to 2500 m.

Food and Feeding. Variety of foods. In British Columbia and NE, eats more plant food than animal food, but percentage of animal items increases during breeding season. Animal items include variety of insects, especially beetles (Coleoptera), Orthoptera, Lepidoptera, bugs (Hemiptera) and flies (Diptera), as well as earthworms (Annelida) and small gastropods. Plant foods consist of variety of seeds, e.g. millet (*Panicum*), wheat (*Triticum*), ricegrass (*Oryzopsis*), sunflowers (*Helianthus*), amaranth (*Amaranthus*), clover (*Trifolium*) and dock (*Rumex*), as well as fruits (e.g. *Vaccinium*, *Morus*, *Prunus*). Forages principally on or near ground or low in vegetation. Often in pairs or small groups, sometimes with other seed-eating species.

Breeding. Season varies geographically, generally Mar–Aug in W and Apr–Jul in E; two or three broods. Generally monogamous, but up to 13% of males and 21% of females at least occasionally mate in a polygamous group, depending on local density, sex ratio, and loss of mate. In migratory populations, males arrive at least a week before females, and begin to sing and defend a territory; pairs formed soon after females arrive, and nests built early, but egg-laying can be delayed by cold or wet weather. Nest built by female, a well-constructed cup of dry grass, plant stems, dry leaves and strips of bark, lining includes soft grasses, rootlets and sometimes hair, placed commonly on ground, under tuft of grass or shrub, sometimes as high as 4 m above ground in grass, shrub or tree. Clutch 1–6 eggs, usually 3–5, variably pale greyish, greenish or bluish with brown or rusty spots; incubation strictly by female, period 12–15 days, typically 13 days; chicks of first brood fed by both parents, later broods fed by female only; nestling period typically 10 days, although variable, and disturbance can cause young to leave early. Brood parasitism by Brown-headed Cowbird (*Molothrus ater*) very common (except in far N of range). Breeding success generally high; monogamous females have higher fledging success than those in polygamous groups; cowbird parasitism has negative and sizeable effect on reproductive success.

Movements. N populations generally migratory or partly migratory; S ones, including W coast populations as far N as Alaskan coast and islands, resident, but some populations partially migratory. Situation complex, but clearer and easier to understand in E, where N breeders all migratory; ring returns show that those breeding farthest N travel farthest S to winter quarters, a classic leapfrog pattern of migration. In E, migrates on NW–SE axis, concentrating in wintering areas in SE of USA; in W, much migration likely altitudinal, but in California presence of dark "Pacific Northwest" type individuals in winter suggests that some also perform significant N–S movements. In spring first departures from E wintering area from mid-Feb and last to mid-May, although peak migration mid-Mar to mid-Apr; reaches breeding areas in late Feb in S, Mar or Apr farther N, and May in Newfoundland. In W, spring passage noted between Apr and early May in Oregon; after breeding, begins to head S in Sept, with peak of movements at migration watchpoints from late Sept to early Nov, most in Oct. Arrives in wintering areas of far S, such as Sonora (Mexico), as early as mid-Sept; in SE wintering areas arrival begins in Sept, peak in mid-Oct, and some not

arriving until late Nov or early Dec. Accidental S to Bahamas and Dominican Republic. Vagrant to Russian Far East (Chukotka) and Japan; also to Europe, including British Is, Belgium, Netherlands and Norway.

Status and Conservation. Not globally threatened. Common to very common in much of range. In USA, populations on Santa Barbara I and San Clemente I, off W coast of California, have been extirpated by overgrazing of habitat, and populations in saltmarshes of San Francisco Bay, in California, have declined as a consequence of habitat loss. In desert areas of SW, overgrazing resulted in population declines. In California, races *samuelis*, *maxillaris*, *pusillula* and *graminea*, also "*mailliardi*" (subsumed in *heermanni*), are considered "of Special Concern". This species, however, responds well to conservation efforts that have reduced grazing in riparian habitats. In E North America, clearing of forests benefited this species by creating edge habitat for it. Although commonly parasitized by cowbirds, numbers of this emberizid remain high, suggesting that parasitism does not have a deleterious effect at population level (despite significant adverse effect on breeding success).

Bibliography. Akcay *et al.* (2009), Aldrich (1984), Anderson *et al.* (2005, 2008), Anon. (1998), Arcese *et al.* (2002), Beadle & Rising (2002), Beecher & Burt (2009), Chan & Arcese (2003), Chase *et al.* (2005), Cicero & Benowitz-Fredericks (2000), Collins & Resh (1985), Davis & Arcese (1999), DeGraaf (1989), Elekonich (2000), Evans *et al.* (2010), Foote & Barber (2007), Harris & Lemon (1972, 1976), Hauber (2009), Hellmayr (1938), Hernandez *et al.* (2009), Hill *et al.* (1999), Howell & Webb (1995), Hubbard & Crossin (1974), Hudson *et al.* (2008), Jennings *et al.* (2009), Johnston (1954, 1956a, 1956b), Keller (1998), Keller & Arcese (1998), Keller *et al.* (2008), Kramer & Lemon (1983), Lewington *et al.* (1991), MacDougall-Shackleton *et al.* (2009), Maeda *et al.* (2008), Marler & Peters (1987, 1988b), Marr *et al.* (2002), McCarthy (2006), Mulligan (1966), Neff & Pitcher (2009), Nelson (1987), Nice (1937, 1943), Nordlund & Barber (2005), Nulty *et al.* (2010), O'Connor *et al.* (2006), Okanoya & Dooling (1988), Patten & Pruett (2009), Potvin & MacDougall-Shackleton (2009, 2010), Pruett & Winker (2008), Pruett, Arcese *et al.* (2008), Pruett, Gibson & Winker (2004), Pyle (1997), Rastogi *et al.* (2006), Redkin & Koblik (2001a), Reid, Arcese, Cassidy, Hiebert *et al.* (2004, 2005), Reid, Arcese, Cassidy, Marr *et al.* (2005), Reid, Arcese & Keller (2003, 2006, 2008), Reid, Arcese, Keller, Elliott *et al.* (2007), Ridgway (1901), Rising & Beadle (1996), Rogers *et al.* (1991), Schluter & Smith (1986), Shuford & Gardali (2008), Smith, J.N.M. (1978), Smith, J.N.M. & Roff (1980), Smith, J.N.M., Keller *et al.* (2006), Smith, J.N.M., Taitt, Rogers *et al.* (1996), Smith, J.N.M., Taitt, Zanette & Myers-Smith (2003), Stewart & MacDougall-Shackleton (2008), Strote & Nowicki (1996), Suarez & Gallup (1987), Suthers (1994), Takekawa *et al.* (2006), Templeton *et al.* (2010), Tompa (1964), Turner & Barber (2004), Wilson & Arcese (2003, 2006), Wingfield (1985a, 1985b), Wood & Yezerinac (2006), Zink (2010), Zink & Blackwell (1996), Zink & Dittmann (1993a).

64. Lincoln's Sparrow

Melospiza lincolnii

French: Bruant de Lincoln **German**: Lincolnammer **Spanish**: Chingolo de Lincoln

Taxonomy. *Fringilla Lincolnii* Audubon, 1834, Labrador = near mouth of Natashquan River, Quebec, Canada.

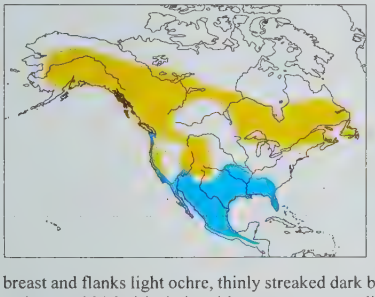
Genus generally considered to be closely related to *Passerella* and *Zonotrichia*; unpublished molecular studies suggest close relationship with *Xenospiza* and some of the grassland sparrows (*Passerculus*, some *Ammodramus*, *Pooecetes* and *Oriturus*). Geographical variation of present species weak and clinal, and differences among populations obscured by individual variation; *alticola* often considered to be a synonym of nominate. Three subspecies provisionally recognized.

Subspecies and Distribution.

M. l. lincolnii (Audubon, 1834) – breeds from NW Alaska E through Canadian boreal forest (S from NC Yukon and C Northwest Territories) to Labrador, Newfoundland and Nova Scotia, and S in USA to C Washington, N Idaho, NW Montana, N Minnesota, N Wisconsin, C Michigan, W New York and C Maine; winters in region from S USA (S from N California, S Nevada and Arizona E to N Oklahoma, E Kansas, C Missouri, S Kentucky and N Georgia, also Florida) S to S Mexico and Guatemala, rarely S to Honduras, Panama and Greater Antilles.

M. l. gracilis (Kittlitz, 1858) – breeds coastal S Alaska and W Canada (C British Columbia, rarely Vancouver I); winters in SW USA (C California and Arizona) and NW & NC Mexico (Baja California, Sonora and Coahuila).

M. l. alticola (A. H. Miller & McCabe, 1935) – breeds in mountains of W USA from NC Oregon E to SC Montana and NC Wyoming, S to California (inner coastal ranges to San Jacinto Mts), WC Nevada, SW Utah, EC Arizona and N New Mexico; non-breeding from C California, Arizona and S Texas S through Mexico (except Yucatán Peninsula) to Guatemala and El Salvador (rare).



Descriptive notes. 11·5–14·5 cm; 14·3–24 g. A medium-sized sparrow; often pumps tail up and down during flight. Nominate race has crown brown to dark rusty brown, grey median crownstripe, supercilium and side of neck; ear-coverts brownish, outlined with darker brown, moustachial and malar stripes brown, submoustachial stripe buffy ochre; upperparts buffy olive, sharply streaked with black, rump olive and streaked brown; tail feathers greyish-brown; upperwing dark brown, sometimes slightly rusty edges on median and greater upperwing-coverts and tertials; chin and throat buffy white, thinly streaked with dark brown; breast and flanks light ochre, thinly streaked dark brown, sometimes with median breast spot; belly and vent whitish; iris dark red-brown; upper mandible mostly dark grey to dark horn-brown, lower mandible paler horn-coloured; legs pinkish-flesh to brownish. Sexes similar. Juvenile is like adult, but crown brown or greyish-brown and streaked, supercilium buffish to brownish, edges of upperwing-coverts and tertials buffy (sometimes somewhat rusty), with marking less pronounced. Races differ minimally in size (differences slight, and some overlap between races) and plumage, probably inseparable in the field: *gracilis* is marginally smaller than nominate, with greyish-brown upperparts, heavier streaking above and below; *alticola* is on average slightly larger than nominate, with upperparts very slightly darker. Voice. Song a rich warble similar to that of Northern House Wren (*Troglodytes aedon*); occasionally performs flight song. Call a sharp "tep" or "chip".

Habitat. Often in boggy sites with dense low willows (*Salix*), sedge (*Carex*) and in moss-dominated habitats, usually where dense low cover. At lower elevations often in dense willows, but sometimes in willows mixed with poplars (*Populus*) and small spruce (*Picea*) and tamarack (*Larix laricina*), and usually near bogs. In non-breeding season generally found in brush, often near water. Sea-level to 3000 m.

Food and Feeding. Feeds on a variety of foods. During breeding season mostly arthropods, such as insect larvae, and adult beetles (Coleoptera), flies (Diptera), homopteran bugs, Lepidoptera and mayflies (Ephemeroptera), as well as spiders (Araneae); also takes small seeds when available. In winter, primarily small seeds, but takes invertebrates if available. Forages principally on or near ground and low in vegetation; generally shy. Often in pairs or small groups, sometimes mixed with other species.

Breeding. Egg-laying from late May (mostly Jun and Jul), fledglings mid-Jun to mid-Aug; often two or more broods. Apparently monogamous. Usually in loose colonies of a few nests. Nest built by female, work requiring 3 days, a cup-shaped structure of dry grass, often sedges, lined with fine grass and sometimes hair, placed on ground, slightly elevated, often inside small willow shrub or birch (*Betula*) containing dense sedge cover, rarely in elevated branches. Clutch 3–5 eggs, commonly 4, variably off-white to pale bluish with darker brown or rusty spots and scrawls; incubation by female, period 10–13 days, typically 11 days; chicks fed by both parents, nestling period 10–11 days; second clutch may be initiated before first brood fledged. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).

Movements. Migratory; in parts of W can be found in both summer and winter, although at different elevations, and possible that winter and breeding populations are of different individuals. Details of migration little known. In spring, passage in E begins middle to late Apr, peak in May, and ends in late May; in W migrates earlier, most having left wintering sites in California by mid-Apr. Departure from breeding grounds begins early Sept, and autumn migration peaks late Sept and early Oct, ending late Oct/early Nov through much of E; arrival in C California by early Sept, sometimes late Aug, suggesting earlier migration in W than in E. Arrival and departure in S Mexico (Oaxaca) late Nov and early May, respectively; in Costa Rica mid-Nov and late Feb. Generally three routes of travel: those breeding farthest W migrate mainly along lowlands W of Cascades–Sierra Nevada; mountain populations move through Great Basin; E populations migrate throughout, E of the mountains. Recorded as vagrant in Azores.

Status and Conservation. Not globally threatened. Common in W parts of range; uncommon to marginally rare in parts of E. In some areas of range habitat has been degraded by grazing of livestock. Reaches perhaps highest densities in subalpine meadows; nesting may be affected by recreational activities of humans.

Bibliography. Allen (1967), Ammon (1995), Anon. (1998), Armani (1985), Beadle & Rising (2002), Caro *et al.* (2010), Cicero (1997), Cicero & Benowitz-Fredericks (2000), Dickey & van Rossem (1938), Gregorie & Gregorie (1996), Hellmayr (1938), Hofslund (1969), Howell & Webb (1995), Hubbard & Crossin (1974), Keith *et al.* (2003), Miller *et al.* (1957), Peck & James (1987), Pyle (1997), Ridgway (1901), Rimmer (1986), Rising & Beadle (1996), Sockman (2009), Speirs & Speirs (1968), Wortman-Wunder (1997), Zink (1982).

65. Swamp Sparrow

Melospiza georgiana

French: Bruant des marais **German**: Sumpfammer **Spanish**: Chingolo Pantanero

Taxonomy. *Fringilla georgiana* Latham, 1790, interior of Georgia, USA.

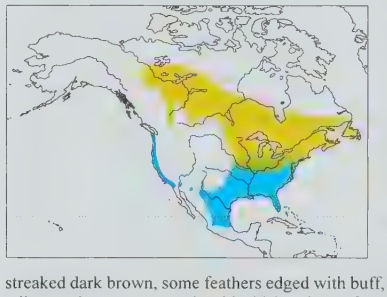
Genus generally considered to be closely related to *Passerella* and *Zonotrichia*; unpublished molecular studies suggest close relationship with *Xenospiza* and some of the grassland sparrows (*Passerculus*, some *Ammodramus*, *Pooecetes* and *Oriturus*). Race *nigrescens* rather distinctive, and apparently differs from others in ecology, migratory behaviour and nesting biology; further study required. Differences between *ericrypta* and nominate race slight. Three subspecies currently recognized.

Subspecies and Distribution.

M. g. ericrypta Oberholser, 1938 – breeds S Canada from SW Mackenzie E to C Quebec and Newfoundland and S to NE British Columbia, C Alberta, S Saskatchewan, W Ontario and SE Quebec, and S in USA to E North Dakota and N Minnesota; non-breeding from extreme SW Canada (coast of S Vancouver I) S in USA to CW California and C Nevada, also from E Texas E to S Georgia and NE Florida, and in Mexico in Sonora (rare) and Chihuahua, Coahuila and Tamaulipas S to Durango, Jalisco, San Luis Potosí and Veracruz.

M. g. georgiana (Latham, 1790) – breeds from E South Dakota E to SE Canada (Prince Edward I and Nova Scotia), S to E Nebraska, N Missouri, Illinois, Ohio and West Virginia; non-breeding S to S Texas, Gulf Coast and S Florida.

M. g. nigrescens G. M. Bond & Stewart, 1951 – breeds coastal E USA (from New Jersey S to SE Maryland).



Descriptive notes. 12–15 cm; 13·1–24 g. A medium-sized sparrow; often pumps tail up and down during flight. Nominate race breeding has black forehead with short, narrow white median stripe above bill; crown rusty or dark brown (possibly differs with age or sex), bold grey supercilium, dark brown postocular stripe, grey to brownish-grey ear-coverts sometimes faintly outlined with ochre, thin dark moustachial stripe, pale submoustachial stripe, sometimes a thin dark malar stripe; chin and throat white or whitish, sometimes flecked with brown; nape greyish or greyish-brown; upperparts rusty, mantle and scapulars boldly streaked dark brown, some feathers edged with buff, rump and uppertail-coverts more rusty brown; tail rusty brown; upperwing blackish, edges of upperwing-coverts rusty (variable), some edged dark brown, tertials broadly edged rusty; breast greyish or greyish-brown, sometimes with faint thin streaking, flanks beige and thinly streaked, belly white, undertail-coverts whitish with brown centres; iris brown; upper mandible dark brown, lower mandible yellowish with brown tip; legs fleshy-pink to brownish. Non-breeding plumage is similar to breeding, but generally duller, crown browner and dark-streaked, often with narrow median stripe, side of head more buffish or brownish, breast with diffuse streaks. Sexes similar in plumage, but female tends to be less extensively rufous and more heavily streaked. Juvenile resembles adult, but crown blackish or darkly streaked, facial markings brown (rather than grey), usually some rusty in wing-coverts, underparts streaked. Race *ericrypta* is paler on upperparts than nominate, more greyish on back and rump, with pale dorsal feather edgings whiter and broader; *nigrescens* is distinctive, has larger bill, greyish plumage, and black on head and nape. Voice. Song a clear, slow liquid trill on single pitch, "weet-weet-weet-weet-weet-weet". Call a metallic "chink".

Habitat. Variety of habitats, from open cedar (*Chamaecyparis*) forests to bogs and freshwater marshes, and brackish tidal marshes on Atlantic coast (race *nigrescens*). In much of range nests in freshwater marshes or brush near water on pond margins with emergent vegetation such as cat-tail (*Typha*), bulrushes (*Scirpus*) and reed grass (*Calamogrostris*), with scattered willows (*Salix*) or alders (*Alnus*). In N, utilizes bogs with sedges (*Carex*), leatherleaf (*Chamaedaphne*), blueberry (*Vaccinium*) and sweet gale (*Myrica gale*). On migration and in winter found in thickets, often near water. Sea-level to 1800 m.

Food and Feeding. In breeding season mostly insects, but some fruit if available; race *nigrescens* probably eats more non-insect animal food than do other races. At other times of year diet includes insects, as well as seeds and fruit. Probably consumes more animal food items than do congeners. Forages principally on or near ground or low in vegetation, especially in reedbeds, also in shallow water; shy. Generally singly and in pairs; sometimes in small groups outside breeding season.
Breeding. Season late Apr to early Jul, mostly mid-may to early Jul; two broods common in S parts of range. Generally monogamous, but 10–20% of males bigamous in at least some years. Male begins territorial defence and advertisement through song immediately on arrival on breeding grounds; after female arrival, 1–2 weeks elapse before pair formation. Nest built by female alone, taking 3–4 days, a bulky cup with coarse exterior of dry grass, stems, sedges and similar material, soft inner lining of fine grasses, rootlets and hair, generally slightly elevated or above water and tending to be supported by emergent vegetation ranging from grasses to cat-tails; some nests on ground. Clutch 1–6 eggs, average c. 4, pale greenish or bluish with reddish-brown spots and blotches; incubation by female, period 12–14 days, typically 12 days; chicks fed by both parents, nestling period 9–11 days. Nests sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*); appears to be poor host, as few cowbirds hatch.
Movements. Generally migratory; some perhaps resident in NE USA (N Iowa E to Massachusetts), where species present all year. Race *nigrescens* often cited as resident, but appears to be migratory, though wintering grounds not known. Recaptures of ringed individuals in different years at migratory sites suggest fidelity to traditional migratory routes, and some retrace routes in both directions; other data from coastal Atlantic sites and Florida suggest that more migrate along E route in autumn than in spring. In spring males migrate earlier than females; *nigrescens* arrives later in spring and leaves earlier in autumn than nominate migrants. Movement N from wintering areas begins early Mar, with peak early to mid-Apr, reaching breeding areas in S by mid-Apr, but late Apr in Minnesota and mid-May in C Alberta; *nigrescens* arrives in Maryland after 15th May. Autumn migration slower and lasts longer than spring migration: departure from breeding grounds from late Aug, most remaining to mid-Sept, peaks of passage over broad area spanning period from late Sept to mid-Oct; arrival on wintering grounds from mid-Oct to late Nov and even early Dec, males up to 2 weeks earlier than females.
Status and Conservation. Not globally threatened. Fairly common; often abundant in optimum habitat. Numbers greatly affected by loss of wetlands; a current decrease in populations is likely to continue.
Bibliography. Anderson (2009), Anon. (1998), Balaban (1988a, 1988b), Ballentine (2009), Ballentine *et al.* (2008), Beadell *et al.* (2003), Beadle & Rising (2002), Bond & Stewart (1951), Campbell *et al.* (2001), Cicero & Benowitz-Fredericks (2000), DuBois *et al.* (2009), Godfrey (1949), Greenberg (1988, 2003), Greenberg & Droege (1990), Greenberg, Cordero *et al.* (1998), Greenberg, Marra & Wooler (2007), Greenberg, Olsen & Etterson (2010), Hellmayr (1938), Howell & Webb (1995), Legare *et al.* (2000), Liu *et al.* (2008), Marler & Peters (1982, 1988a), Marler & Pickert (1984), Mowbray (1997), Nowicki *et al.* (2001), Okanoya & Dooling (1988), Olsen *et al.* (2008), Peck & James (1987), Peele *et al.* (2009), Podos, Nowicki & Peters (1999), Podos, Peters & Nowicki (2004), Poole *et al.* (2003), Pyle (1997), Reinert & Golet (1979), Ridgway (1901), Rimmer (1986), Rising & Beadle (1996), Russell & Monson (1998), Watts *et al.* (2008), Wetherbee (1968), Willson (1966b).

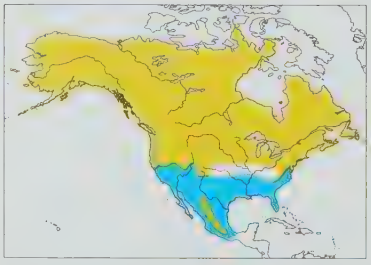
Genus *PASSERCULUS* Bonaparte, 1838

66. Savannah Sparrow

Passerculus sandwichensis

French: Bruant des prés **German**: Grasammer **Spanish**: Chingolo Sabanero
Other common names: Aleutian Savannah Sparrow (*sandwichensis*); Ipswich Sparrow (*princeps*); Dwarf Savannah Sparrow ("*brooksi*")

Taxonomy. *Emberiza sandwichensis* J. F. Gmelin, 1789, Unalaska, Alaska, USA.
Genus sometimes subsumed in *Ammodramus*. Traditionally treated as conspecific with *P. guttatus* and *P. rostratus*, and often also with *P. sanctorum*, but all differ in morphology and plumage and, to some extent, in ecology; separation at species level supported by recent molecular-genetic findings. Race *princeps* has been considered a separate species. Geographical variation of nominate race largely clinal: other proposed races are, from Canada, *anthinus* (described from Kodiak I, in Alaska), *crassus* (Sitka, in Alaska), *brooksi* (Chilliwack, in British Columbia), *oblitus* (Fort Churchill, in Manitoba) and *labradorius* (L'Anse-au-Loup, in Labrador), from USA *mediogriseus* (Ashtabula County, in extreme NE Ohio), *alaudinus* (from California, probably San Francisco), *nevadensis* (Soldier Meadows, Humboldt County, in NW Nevada) and *savanna* (Savannah, in E Georgia), from Mexico *rufofuscus* (Babicora, in Chihuahua) and *brunnescens* (Valley of Mexico), and from W Guatemala *wetmorei* (Hacienda Chancol); all are synonymized with nominate. Two subspecies recognized.
Subspecies and Distribution.
P. s. sandwichensis (J. F. Gmelin, 1789) – breeds in Alaska and Canada (except extreme N) S in USA to N California, W Colorado, Nebraska, Iowa, Indiana and N Georgia, in C Mexico S to Puebla, possibly also SW Guatemala, also in Russian Far East (Chukotka); non-breeding S Canada S to C Mexico.
P. s. princeps Maynard, 1872 – breeds Sable I, in E Canada (E Nova Scotia); winters on Atlantic coast of USA (E Massachusetts S to S Georgia).



Descriptive notes. 11·4–15·4 cm; 13–32·5 g. A rather small to medium-sized sparrow with relatively short, notched tail, geographically variable; tends to be larger on islands than on mainland, birds from Aleutian Is largest, size decreasing E along Alaska Peninsula. Nominate race has crown variably dark brown to grey-brown or buffish-brown, pale median crownstripe, generally yellowish supercilium (often paler posteriorly), dark eyestripe behind eye, dark moustachial stripe, whitish or light buffish submoustachial, dark brown malar stripe; chin and throat whitish, sometimes lightly spotted; nape and upperparts grey-buff to brown or grey-brown, mantle with heavy beige to blackish streaks, sometimes some thin rufous streaks, highly variable (generally paler in W than in E, darkest in NE, i.e. Labrador and Newfoundland, also darker in S); tail feathers dark brown with narrow paler edges; upperwing dark brown to blackish, feathers usually with pale rufous/buffish edges, median and greater coverts with whitish tips; underparts whitish to pale greyish-buff, breast and flanks heavily to lightly spotted/streaked, often an indistinct central breast spot; iris dark brown to dark red-brown; most of upper mandible dark greyish, lower mandible pinkish to horn-coloured; legs pink. Sexes alike. Juvenile is like adult, but tends to be more buffy. Race *princeps* is larger and paler than nominate, streaks below pinkish-brown and narrow. Voice. Song in breeding season a lisping "tzip-tzip-tzip streeeeeeeip", variable; race *princeps* slightly lower in pitch, with longer terminal trill. Calls include thin "seet", "chip", "tzip"; usually silent outside breeding season.
Habitat. Open areas, especially grasslands, generally with scattered shrubs, also tundra, meadows, farmland; in arid areas near water, often in grasses at edges of ponds. During migration also in urban parks.
Food and Feeding. In breeding season takes variety of larval, pupal and adult insects and other small invertebrates, e.g. spiders (Araneae), millipedes (Diplopoda), crustaceans, snails (Gastropoda); some seeds, but these a far less significant part of diet. On migration and in winter feeds principally on seeds and some fruits, as well as invertebrates when available. Small grass seeds and forbs make up more than 90% of diet in winter, *Digitaria*, *Ambrosia*, *Sorghum* and *Eleusine* predominating in some habitats; fruits include strawberries (*Fragaria*) and blueberries (*Vaccinium*). Forages on ground, sometimes (especially in autumn) in low bushes and trees. In non-breeding season occurs in small groups; often larger flocks during migration.
Breeding. Season mid-Feb to Aug, earlier in S and in coastal California than in N; usually two broods, sometimes three or more, but single-brooded at high latitudes. Female chooses nest-site, often at edge of or outside male's territory, she also constructs nest, a cup of woven grasses and other fine material, generally placed on ground, partly concealed with grasses and other vegetation, often at base of small bush. Clutch 2–6 eggs, usually 4–5, clutch size slightly larger at high latitudes than at low latitudes, eggs variable from off-white to pale greenish, with darker markings typically concentrated about wide end; incubation by female, period 9–15 days, usually c. 12 days; chicks fed by both parents, nestling period 8–13 days; fledglings stay with one parent for c. 15 days. Nests commonly parasitized by Brown-headed Cowbird (*Molothrus ater*).
Movements. Most populations migratory; some coastal California populations and those in Mexico and Guatemala resident. Commonly migrates at night, but some movements continue early in morning. In spring arrives from late Feb in S parts of breeding range, although most arrive early Mar; slightly farther N, in N USA and S Canada, arrival late Mar to early Apr, and does not reach N outposts until early May. Males and females may arrive together on breeding grounds, although on average males one week before females. From N breeding outposts in Alaska, moves S by middle to late Sept, and farther S & E, in Ontario and the Maritimes, departure by late Sept to mid-Oct. S of breeding areas passage early Sept to mid-Nov, and first arrivals by early Sept in Georgia and by late Sept in Florida; overall, S of Canadian border, migration peaks between early Oct and mid-Oct; in W moves through Oregon from late Sept to early Nov, so timing similar to that in E. Race *princeps* and populations of nominate race in Aleutian Is migrate earlier in spring and later in autumn than their smaller conspecifics: *princeps* leaves wintering grounds from mid-Mar to early Apr, arriving in Nova Scotia late Mar through early May, and in autumn starts to migrate in mid-Sept, most having departed from Nova Scotia by early Nov, though some apparently try to overwinter on Sable I; Aleutian birds reach Alaska by late Apr and breeding grounds by early May, and leave breeding grounds by late Sept. Rare migrant in El Salvador. Accidental on Cocos I, off Pacific coast of Costa Rica; also NE Russia (Wrangel I), Korea and Japan. Vagrant to British Is (nominate and race *princeps*) and Azores.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. Race *princeps* has tiny global range, a single small island c. 45 km long and 1 km wide, and small population; possibly at long-term risk from natural erosion of the island, which consists wholly of sand. This species moves into areas after clearance, logging or fires, and populations decline as woody vegetation replaces grassland. Thus in E North America, increased in abundance with the clearing of forests for farmland, but is decreasing as marginal farms abandoned, and as urban areas expand. In California, coastal breeding population ("*alaudinus*") is listed as being "of Special Concern" in the state owing to its low population size, restricted range, and decreasing habitat.
Bibliography. Alsop (1978), Beadle & Rising (2002), Bedard & LaPointe (1984a, 1984b, 1985), Bedard & Meunier (1983), Butler *et al.* (2009), Chew (1981), Cooper & Murphy (1985), Davis (2003), Dickey & van Rossem (1938), Dixon (1978), Dornak (2010), Fajardo *et al.* (2009), Freeman-Gallant (1996, 1997), Freeman-Gallant, O'Connor & Breuer (2001), Freeman-Gallant, Wheelwright, Meiklejohn & Sollecito (2006), Freeman-Gallant, Wheelwright, Meiklejohn, States & Sollecito (2005), Friedmann *et al.* (1977), Fujii *et al.* (2010), LaPointe & Bedard (1986), Lewington *et al.* (1991), Martin, M. *et al.* (2009), McCarthy (2006), Meunier & Bedard (1984), Nagata & Ishimoto (2000), Potter (1974), Pyle (1997), Rising (1987a, 1987b, 1988, 1989, 2001, 2007, 2010), Rising & Beadle (1996), Rising *et al.* (2009), Ross (1980), Shuford & Gardali (2008), Slack (2009), Sung Ha-Cheol & Handford (2006), Weatherhead (1980), Weatherhead & Robertson (1978), Welsh (1975), Wheelwright & Beagley (2005), Wheelwright & Rising (1993), Wheelwright & Seabury (2003), Wiens (1971), Yamamoto (2005), Zalik & Perlut (2008), Zalik & Strong (2008), Zink, Dittmann *et al.* (1991), Zink, Rising *et al.* (2005).

67. Belding's Sparrow

Passerculus guttatus

French: Bruant de Belding **German**: Beldingammer **Spanish**: Chingolo de Belding

Taxonomy. *Passerculus guttatus* Lawrence, 1867, San José del Cabo, Baja California Sur, Mexico.
Genus sometimes subsumed in *Ammodramus*. Traditionally treated as conspecific with *P. sandwichensis* and *P. rostratus*, and often also with *P. sanctorum*, but all differ in morphology and plumage and, to some extent, in ecology; separation at species level supported by recent molecular-genetic findings. Two additional proposed races from Baja California: *annulus*, described from Scammon's Lagoon (Guerrero Negro), is treated as a synonym of *beldingi*, and *magdalenae*, from North Estero (in Bahía Magdalenae), is synonymized with nominate. Two subspecies currently recognized.
Subspecies and Distribution.
P. g. beldingi Ridgway, 1885 – breeds extreme SW USA (coastal S California S from Santa Barbara, possibly from San Luis Obispo County) S in NW Mexico (Baja California), including Todos Santos I, to Laguna de Ojo Liebre.
P. g. guttatus Lawrence, 1867 – breeds in S Baja California from Laguna San Ignacio S to Bahía Magdalena; non-breeding S to Cabo San Lucas.
Descriptive notes. 11–14 cm; 15·5–22·5 g. Medium-sized sparrow, with relatively large bill. Nominate race is olive-grey above, with lemon-yellow supercilium fading behind eye, crown to back with dark brown streaks, tail dark brown and notched, upperwing feathers edged lighter brown; creamy-white submoustachial stripe, contrasting dark brown malar stripe; throat whitish, often flecked with brown, underparts white, breast and flanks streaked dark brown; iris dark; bill pinkish to horn-coloured, upper mandible often mostly dark horn-brown; legs pink. Differs from rather



similar *P. sandwichensis* mainly in darker general coloration, tendency to lack pale median crownstripe. Sexes similar. Juvenile is like adult, but perhaps buffier. Race *beldingi* is similar to nominate, but on average smaller in size and with smaller bill (but considerable overlap in dimensions), also darker general coloration and more intense yellow in supercilliary stripe. Voice. Primary song a highly variable, rather unmusical series of high-pitched chips and buzzes, often a "tzip tzip tzip zipppppppppp ip"; some versions have more emphatic ending, a "tick-a-see" note, than song of *P. sandwichensis*. Alarm "tsip"; also an intraspecific agonistic note, a loud buzz.

Habitat. Coastal saltmarshes with pickleweed (*Salicornia*), *Allenrolfea*, sea blight (*Suaeda*), alkali heath (*Frankenia grandifolia*), *Batis maritima*, *Monanthochloe*, *Atriplex*, *Triglochin*, and saltgrass (*Distichlis*); found in xeric scrub on Todos Santos I. After breeding, sometimes moves out of marsh and forages along beach strand and adjacent weedy areas.

Food and Feeding. Feeds on a variety of decapods, especially fiddler crabs (*Uca*), also isopods and amphipods, as well as on probable *Salicornia* seeds, also on adult and larval insects and small molluscs. Forages on ground and low in vegetation.

Breeding. Season mid-Feb to early Jun, mostly Apr and early May, and by mid-May most first broods have hatched; probably generally double-brooded. Possibly colonial nester, or at least nests quite densely packed in saltmarsh habitats. Nest made with dried *Salicornia* and *Distichlis*, also other vegetation, lined with finely woven grasses and fibres, including horsehair, placed on ground or close to it (to 15 cm up), often in saltgrass and in shelter of *Salicornia* or other taller vegetation; on Todos Santos I may be placed in low shrub. Clutch 3 eggs, rarely 4, pale blue with brown spots and blotches; no information on incubation and nestling periods. Nests susceptible to high water levels, such as those caused by storm tides.

Movements. Apparently sedentary. Some post-breeding movement to nearby beach strand; perhaps a certain amount of post-breeding wandering, and dispersal by juveniles at this time.

Status and Conservation. Not globally threatened. Locally common. Has suffered much loss of habitat to residential and recreational development, particularly in California, where now listed as a "State Endangered Species", as a consequence of the great reduction in saltmarshes.

Bibliography. Bradley (1977, 1994), Burnell (1998), Davis *et al.* (1984), Goldstein *et al.* (1990), McCarthy (2006), Omel'ko (1974), Powell (1993), Pyle (1997), Rising (1987a, 1987b, 1988, 2001, 2007, 2010), Rising & Beadle (1996), Rising *et al.* (2009), van Rossem (1947), Taber (1968b, 1968d), Wheelwright & Rising (1993), Williams & Hansell (1981), Zink *et al.* (2005).

68. Large-billed Sparrow

Passerculus rostratus

French: Bruant du Sonora **German**: Kalifornienammer **Spanish**: Chingolo Picudo

Taxonomy. *Emberiza rostrata* Cassin, 1852, seashore at San Diego, California, USA.

Genus sometimes subsumed in *Ammodramus*. Traditionally treated as conspecific with *P. sandwichensis* and *P. guttatus*, and often also with *P. sanctorum*, but all differ in morphology and plumage and, to some extent, in ecology; separation at species level supported by recent molecular-genetic findings. Geographical variation of present species apparently clinal, but difficult to determine as populations not distributed continuously along coast. Two subspecies recognized.

Subspecies and Distribution.

P. r. rostratus (Cassin, 1852) – breeds in NE Baja California (delta of R Colorado, San Felipe) and NW Sonora (mouth of R Colorado S to Patos I), in NW Mexico; non-breeding N to extreme SW USA (Salton Sea, Santa Cruz and Channel Is, all in S California) and on both shores of Baja California S to Cabo San Lucas.

P. r. atratus van Rossem, 1930 – breeds from coast of Sonora (Tepopa Bay and Kino Bay) S to C Sinaloa (El Molino); non-breeding individuals perhaps wander to extreme S Baja California.



Descriptive notes. 13–14·5 cm; 21–25·2 g. Medium-sized sparrow with large bill. Nominate race is light greyish-brown above, crown flecked blackish and with indistinct median crownstripe, mantle and back diffusely streaked darker brown; pale beige or pale yellowish supercilium and whitish submoustachial stripe; tail feathers brown, edged paler; upperwing blackish-brown, feathers edged light rufous, tips of median and greater coverts whitish (forming two wingbars); pale or rusty brown malar stripe, whitish throat, often flecked with brown, whitish underparts washed light buff, breast and flanks streaked rusty beige or brown; iris dark; bill flesh-coloured to yellowish-horn, dark culmen; legs pink. Distinguished from *P. sandwichensis* and *P. guttatus* mainly by larger and in particular longer bill, also diffuse nature of upperpart pattern and overall pale coloration. Sexes similar. Juvenile resembles adult. Race *atratus* is darker than nominate. Voice. Primary song a variable, rather unmusical series of high-pitched chips and buzzes, often as "tzip tzip tzip zipppppppppp ip". Alarm "tsip"; also has an intraspecific agonistic note, a loud buzz. Vocalizations differ from those of *P. guttatus*, but are similar.

Habitat. Coastal saltmarshes with pickleweed (*Salicornia*), *Allenrolfea*, sea blight (*Suaeda*), alkali heath (*Frankenia grandifolia*), *Batis maritima*, *Monanthochloe*, *Atriplex* and *Triglochin*.

Food and Feeding. Variety of decapods, especially fiddler crabs (*Uca*), also isopods and amphipods, as well as *Salicornia* seeds (probable), adult and larval insects, and small molluscs. Forages on ground and low in vegetation.

Breeding. Breeds mid-May through early Jun, mostly in May. Nest made from dried *Salicornia* and saltgrass (*Distichlis*) and other vegetation, lined with finely woven grasses and fibres (little difference between outer wall and lining), commonly placed in saltgrass, close to ground (up to 15 cm up), and often in shelter of *Salicornia* or other taller vegetation. Clutch 3 eggs, rarely 4, whitish to pale blue with dark spots and blotches; no information on incubation and nestling periods. Nests susceptible to high water levels, such as those caused by storm tides.

Movements. Some individuals breeding along coast of N Sonora wander in post-breeding season, many moving N to S California (especially Salton Sea and Pacific coast); winter vagrant as far N in California as Marin County (N San Francisco Bay area).

Status and Conservation. Not globally threatened. Common to abundant; local in occurrence. Habitat greatly reduced through residential and recreational development. In California listed as "Species of Conservation Concern", in second highest order of priority, because of steep declines in its numbers following major changes to environment of Colorado River Delta.

Bibliography. Anthony (1906), Garrett (1994), Grinnell (1905), Johnson & Ohmart (1973), McCarthy (2006), Pyle (1997), Ridgway (1901), Rising (1988, 2001, 2007, 2010), Rising & Beadle (1996), Rising *et al.* (2009), van Rossem (1947), Shuford & Gardali (2008), Taber (1968e), Wheelwright & Rising (1993), Zink *et al.* (2005).

69. San Benito Sparrow

Passerculus sanctorum

French: Bruant des San Benito **German**: Benediktammer **Spanish**: Chingolo de las San Benito

Taxonomy. *Passerculus sanctorum* Coues, 1884, Isla San Benito, Baja California, Mexico.

Genus sometimes subsumed in *Ammodramus*. Traditionally treated as conspecific with *P. sandwichensis*, *P. guttatus* and *P. rostratus*, and apparently most closely related to *P. guttatus*, but all differ in morphology and plumage and, to some extent, in ecology; present species almost certainly reproductively isolated from those, and separation at species level supported by recent molecular-genetic findings. Monotypic.

Distribution. San Benito Is, off CW Baja California, in extreme NW Mexico.



Descriptive notes. 12–13·7 cm; 19·4–24 g. Medium-sized sparrow, relatively large-bodied and with large, stout bill deep at base. Plumage is greyish-brown above, crown mottled brown and with no median crownstripe, mantle and back with darker feather centres; dirty whitish supercilium, whitish submoustachial stripe; tail feathers brown, edged paler; upperwing blackish-brown, feathers edged lighter, tips of median and greater coverts whitish (forming two indistinct wingbars); brown malar stripe, throat white, spotted dark brown, whitish below, breast and flanks streaked brown; iris dark; bill horn-coloured, lower mandible paler; legs pinkish to brownish. Sexes similar. Juvenile resembles adult. Voice. Song not described, apparently like that of *P. guttatus*. Calls include "tsip".

Habitat. Xeric scrub; coastal desert-thorn (*Lycium californicum*), known also as "frutilla", a prominent plant in this species' environment, and apparently exploited extensively. Forages also along beach.

Food and Feeding. Feeds extensively on fruit of *Lycium* when this available; probably also takes variety of small arthropods. Also eats rice when offered, and accepts table scraps from humans. Forages on ground and low in vegetation; searches among tidewrack along beach.

Breeding. Eggs late Mar or early Apr, recently fledged young seen late Apr (in 1906), and one young seen on nearby Cedros I on 21st Apr; no evidence of nesting in late Apr in 1999, suggesting that timing may vary from year to year. Nest composed of grasses, lined with finer grasses and few feathers, placed on or near ground under small bush and sunk level with ground or placed up to c. 0·3 m up in low bush. One clutch contained 3 eggs, pale with dark spots. No other information.

Movements. Resident; possibly some limited dispersal.

Status and Conservation. Not globally threatened. Abundant where found; local. Has very small global range, restricted to three small islands, rendering it potentially vulnerable. May be threatened also by accidental introduction of deer mice (*Peromyscus*). Can become rather tame; readily interacts with human inhabitants of a small fishing village on the islands, accepting food scraps from them.

Bibliography. Rising (1988, 2001, 2007, 2010), Rising & Beadle (1996), Rising *et al.* (2009), van Rossem (1947), Taber (1968c), Wheelwright & Rising (1993), Zink *et al.* (2005).



PLATE 47

inches 2

cm 5

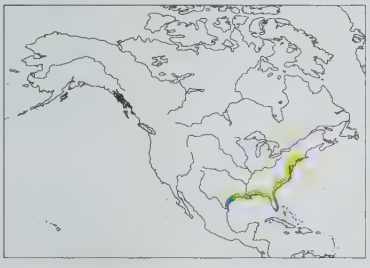
Genus *AMMODRAMUS* Swainson, 1827

70. Seaside Sparrow

Ammodramus maritimus

French: Bruant maritime **German**: Strandammer **Spanish**: Chingolo Costero
Other common names: Common Seaside Sparrow (*maritimus*); Dusky Seaside Sparrow (extinct race *nigrescens*); Cape Sable Seaside Sparrow (*mirabilis*)

Taxonomy. *Fringilla maritima* A. Wilson, 1811, Great Egg Harbor, New Jersey, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that this species is in a clade with *A. nelsoni*, *A. caudacutus* and *A. leconteii*; hybrid with *A. caudacutus* has been described. Distinctive races *mirabilis* and recently extinct *nigrescens* have been considered to represent two further species. Otherwise, races along Atlantic coast not well marked, nor are those on Gulf of Mexico, but the two groups are clearly different from each other; racial differences, however, confused by individual variation and plumage dichromatism (buffy and grey morphs). Seven extant subspecies recognized.
Subspecies and Distribution.
A. m. maritimus (A. Wilson, 1811) – breeds coastal E USA from New Hampshire and Massachusetts S to extreme N North Carolina; non-breeding S to NE Florida.
A. m. macgillivraii (Audubon, 1834) – North Carolina S to extreme SE Georgia.
A. m. sennetti J. A. Allen, 1888 – coastal S Texas (from Aransas County S to Nueces Bay); winters S to mouth of R Grande and to extreme NE Mexico (NE Tamaulipas).
A. m. fisheri Chapman, 1899 – San Antonio Bay (Refugio County), in SE Texas, E to SW Alabama; non-breeding SW to Nueces County, in Texas.
A. m. juncicola (Griscom & Nichols, 1920) – coastal NW Florida from Escambia County E to Taylor County.
A. m. peninsulae J. A. Allen, 1888 – W Florida from about Dixie County S to Old Tampa Bay.
A. m. mirabilis (A. H. Howell, 1919) – SW Florida from vicinity of Everglades SE (formerly) to Cape Sable.



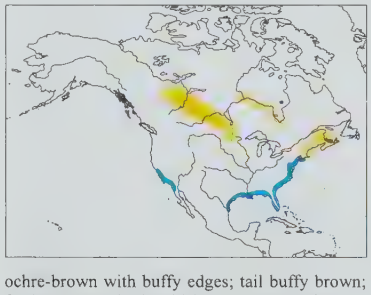
Descriptive notes. 12·5–15 cm; 18·9–28·7 g. A small sparrow with rather long and narrow conical bill, and relatively short tail with "sharp" rectrices. Nominate race has largely grey head with yellow supraloral patch (sometimes extended posteriorly into short supercilium), whitish submoustachial stripe, dark malar stripe and whitish throat; upperparts greyish with some brownish streaking (can look unstreaked); tail brownish; upperwing contrastingly brownish, greater upperwing-coverts mostly rufous; underparts greyish, breast and lower flanks washed buff, weak to moderately strong grey-brown streaking on breast and flanks; iris dark brown; bill leaden-grey with dusky grey culmen; legs dull brownish-grey. Sexes similar. Juvenile has olive-brown crown and upperparts streaked dark brown, mantle feathers with pale edges, face pattern like adult, with supraloral stripe pale buffish (rather than yellow), underparts light buff-white, breast and flanks more strongly buff and with thin brown streaks; first-winter like adult, but may be somewhat buffier. Race *macgillivraii* is similar to nominate, but smaller and more noticeably streaked; *mirabilis* is rather small, plumage tinged olive above, conspicuously streaked below; *peninsulae* has dark back, and breast somewhat more heavily streaked; *juncicola* is marginally larger than previous, also darker and browner; *fisheri* is whitish below with bright buff tinge around ear-coverts and on breast to flanks; *sennetti* is greenish-grey and unstreaked above, greyish-white below, with buff breastband and yellowish breast, juvenile unstreaked below; recently extinct race *nigrescens* was the darkest and most contrasted race, upperparts and side of head mostly black, contrasting with yellow supraloral patch, underparts white with bold, broad black streaks. Voice. Song a buzzy "spitsh-sheer, tup tup zee eeeee", or "oka-chee weeee", sounding like faint Red-winged Blackbird (*Agelaius phoeniceus*). Call "chak".
Habitat. Edge and interior of saltmarsh in most of range; occupies wettest, muddiest parts of marsh, nesting in vegetation consisting chiefly of cordgrass (*Spartina*), blackgrass (*Juncus gerardii*), cat-tail (*Typha*) and marsh-elder (*Iva annua*). In S Florida, race *mirabilis* breeds in freshwater habitats, especially in sparse sawgrass (*Cladium jamaicense*) or *Muhlenbergia* grass prairies, in which commonest three years after fire.
Food and Feeding. Largely animal matter, which accounts for more than 80% of diet in some places. Eats marine insects, small snails (Gastropoda) and crabs (Decapoda), beetles (Coleoptera); in winter more vegetable matter, mainly seeds of marsh grasses. Along New York coast, also takes adult and larval soldier flies (Stratiomyidae), shore flies/brine flies (Ephydridae), plant bugs (Miridae), and horseflies (Tabanidae). Nestling diet includes soft-bodied insects, e.g. moths (Lepidoptera). Forages mostly on ground, tending to keep close to cover. Catches some insects in air, and apparently also probes in mud for food. Usually in pairs; outside breeding season also in small groups.
Breeding. Season late Mar to Aug; some pairs double-brooded. Monogamous. Nest built by female alone, a cup of dry grasses, lined with finer grasses, suspended by grass stems in blackgrass tussock, cordgrass or marsh-elder, usually close to ground just above high-tide line, generally 14–71 cm above water, placement dependent on available marsh grass. Clutch 3–6 eggs, usually 4 or 5, whitish to pale blue with brown splotching, marks thickest at wide end; incubation by female, period 12 days; chicks fed by both parents, nestling period 9 days.
Movements. S populations sedentary. N populations (nominate race) move S to wintering grounds from Virginia to NE Florida, some occasionally remaining N as far as Massachusetts. S-bound movements begin by late Aug, peak later, continuing into late Oct; tower kills inland (up to 180 km from coast) suggest that some may move S away from immediate coast, or are displaced by winds during migration; N populations migrate back to breeding areas by late Apr, males arriving a week before females. Some movement N into Canadian Maritimes noted between late Aug and late Oct, possibly involving post-breeding wanderers.
Status and Conservation. Not globally threatened. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Race *mirabilis* protected under the Endangered Species Act in USA since 1973. This species can be common in suitable habitat. Estimated total population c. 110,000 individuals. Numbers declining, and many local populations have been extirpated by habitat loss, pesticide use, and development. Race *nigrescens* of CE Florida (a few sites from N Brevard County S to Titusville and Merritt I) extinct since 1987; heavily affected by measures aimed at mosquito control, first through DDT spraying and subsequently by flooding of marshland; ultimately, draining of marshes for road construction, combined with pesticides and pollution eliminated this race. Possible race *pelonotus* (perhaps no more than an isolated population of race *macgillivraii*) extinct since mid-1970s; formerly found in NE Florida (from Georgia–Florida boundary S to New Smyrna). In 2007 race *mirabilis* population c. 3184 individuals, largely within Everglades National Park and adjacent Big Cypress National Preserve; this is less than 50% of numbers in early 1990s, before hurricane "Andrew" struck, in 1992. Conservation initiatives for this race include efforts to restore water flows, and controlled burns at intervals of five to ten years. In general, the future viability of this species depends also on protection of large remaining tracts of undiked saltmarshes. Potential effects of climate change need also to be considered. It is not parasitized by Brown-headed Cowbird (*Molothrus ater*).
Bibliography. Almario *et al.* (2009), Anon. (1998), Avise & Nelson (1989), Baynard (1932), Beadle & Rising (2002), Bent & Austin (1968), Boulton & Lockwood (2010), Boulton, Baiser *et al.* (2011), Boulton, Lockwood *et al.* (2009), Curnutt *et al.* (1998), David & Gosselin (2002a), Elderd & Nott (2008), Gabrey & Afton (2000), Gjerdrum *et al.* (2005), Graves (1981), Greenlaw & Post (1985), Hill & Post (2005), Jenkins *et al.* (2003), Kale (1983), La Puma *et al.* (2007), Lebbin *et al.* (2010), Lockwood *et al.* (1997), Marshall & Reinert (1990), McCarthy (2006), McDonald (1989), McDonald & Post (1982), Nelson *et al.* (2000), Phillips & Einem (2003), Post & Greenlaw (1995, 2000, 2006), Poulson (1969), Quay *et al.* (1983), Rakestraw & Baker (1982), Rising & Beadle (1996), Tracey & Greenlaw (2009), Walters *et al.* (2000), Woolfenden (1956), Zink & Kale (1995).

71. Nelson's Sparrow

Ammodramus nelsoni

French: Bruant de Nelson **German**: Nelsonammer **Spanish**: Chingolo de Nelson
Other common names: Nelson's Sharp-tailed Sparrow; Sharp-tailed Sparrow (when treated as conspecific with *A. caudacutus*)

Taxonomy. *Ammodromus* [sic] *caudacutus nelsoni* J. A. Allen, 1875, Calumet Marshes, Cook County, Illinois, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is in a clade with *A. maritimus*, *A. caudacutus* and *A. leconteii*; has hybridized with *A. leconteii*. Until recently considered conspecific with *A. caudacutus*, but differs in its natural history; the two hybridize in NE USA (S Maine and N Massachusetts); precise ranges of the two on Atlantic coast not fully known, as references to "Sharp-tailed Sparrow" not always clear. Distinctive race *subvirgatus* perhaps represents a distinct species; further study needed. Race *alter* poorly differentiated from nominate. Three subspecies provisionally recognized.
Subspecies and Distribution.
A. n. nelsoni J. A. Allen, 1875 – breeds in Canada from NE British Columbia and S Mackenzie SE through Alberta to C & S Saskatchewan and C Manitoba, and in N USA in N, W & SE North Dakota, NE South Dakota and NW Minnesota; winters on Pacific coast of SW USA (California) and in extreme NW Mexico (N Baja California) and on Gulf Coast from Texas E to Florida Panhandle, also rarely S to Tamaulipas (NE Mexico).
A. n. alter (Todd, 1938) – breeds in EC Canada from N Manitoba E to N Ontario and W Quebec; probably winters on Gulf Coast of USA (W to Texas).
A. n. subvirgatus Dwight, 1887 – breeds in SE Canada (S side of St Lawrence R in S Quebec E to New Brunswick, Prince Edward I and Nova Scotia), and in NE USA S to S Maine and N Massachusetts; non-breeding on Atlantic coast S to South Carolina and N Florida, casually N to New York.



Descriptive notes. 11–13·5 cm; 12·8–20 g. A fairly small sparrow, short tail having spike-like rectrices. Nominate race has broad grey median crownstripe (not sharply defined) outlined by two dark brown lateral crownstripes, all extending back onto nape, hindneck grey with variable brown centre; broad yellow-ochre supercilium, wedge-shaped blackish eyestripe narrow at eye; ear-coverts greyish-ochre, thinly edged brown, ochre submoustachial stripe and postauricular area; mantle and upper back brown to greyish-brown with whitish stripes (in worn plumage stripes can be obscure), lower back and rump feathers dark ochre-brown with buffy edges; tail buffy brown; lesser upperwing-coverts dark olive-grey, wing feathers otherwise blackish-brown with rufous edges, these broadest on greater coverts and tertials; throat pale buffish; breast and flanks ochre, streaked brown, belly white, undertail-coverts buffy; iris dark brown; bill pinkish to leaden-grey, broadly dark horn-brown on culmen; legs flesh-coloured. Sexes similar in coloration. Juvenile has blackish crown, broad orange-buff median crownstripe and supercilium, brown mantle and scapular feathers edged buff (forming streaks), rump and uppertail-coverts unstreaked, throat and underparts mostly orange-buff, variously streaked, belly and vent paler. Race *alter* is very like nominate, but perhaps duller; *subvirgatus* is somewhat larger than others, and noticeably greyer in coloration, juvenile has median crownstripe olive-buff, rump slightly streaked. Voice. Song, often in aerial display and often at night, likened to sound made by water dropping on to a hot skillet, "psdhee-zipt" or "pshhh'tpt", c. 1 second in duration. Call a sharp "tsick" or "chip".
Habitat. Breeds in wet freshwater grasslands, sometimes mixed with cat-tail (*Typha*) and *Phragmites* reeds, and in sedge (*Carex*) marshes, often interspersed with small trees or bushes. In winter found in rank tall grasses, damp weedy fields and cat-tails, and in overgrown short-grass prairie; on migration often in cat-tail marshes, sometimes in salt or brackish marshes. Occurs from sea-level up to 1100 m.
Food and Feeding. In breeding season feeds almost exclusively on animal material, especially larval insects, spiders (Araneae) and amphipods, augmented with seeds of grasses such as wild rice

On following pages: 72. Saltmarsh Sparrow (*Ammodramus caudacutus*); 73. Le Conte's Sparrow (*Ammodramus leconteii*); 74. Baird's Sparrow (*Ammodramus bairdii*); 75. Henslow's Sparrow (*Ammodramus henslowii*); 76. Grasshopper Sparrow (*Ammodramus savannarum*); 77. Grassland Sparrow (*Ammodramus humeralis*); 78. Yellow-browed Sparrow (*Ammodramus aurifrons*); 79. Sierra Madre Sparrow (*Xenospiza baileyi*).

(*Zizania aquatica*); diet at other times also principally animal matter, augmented with seeds. Forages mostly on or near ground and low in vegetation. Generally secretive.
Breeding. Season late May to mid-Aug; race *subvirgatus* sometimes double-brooded. Promiscuous and non-territorial; does not form pair bonds. Possibly loosely colonial. Often performs elaborate aerial display while singing. Nest a loosely built cup (details not available) built in grass column, supported by vegetation on all sides, can be quite low above water (average 5 cm up), though sometimes to 25 cm above surface. Clutch 2–6 eggs, usually 3–5, pale greenish with reddish-brown speckling; incubation of eggs and feeding of chicks by female alone, no information on duration of incubation and nestling periods. Nests parasitized extremely rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Migratory. Very difficult to detect during migration, and much remains to be learnt regarding movements; spring and autumn migration routes expected to be similar. Individuals of nominate race wintering in S USA (Texas coast) depart from Apr, most having left wintering areas by late May, and move N along Mississippi R lowlands, and those wintering in SE move towards NW in spring; most do not reach Canadian Prairies until May, most arriving by late May, and earliest in middle to late Apr. In autumn most move S along Mississippi lowlands to Gulf Coast, but some appear to head SE to Atlantic coast and move S along coastal marshes. Migration of race *alter* little known: perhaps most that migrate through S Ontario and upstate New York are of this population; few specimens known from farther W, in Michigan and Ohio; probably winters on Gulf Coast; in Ontario spring migration nearly non-existent, while autumn movements reach peak in mid-Oct. Coastal *subvirgatus* simply moves N and S along Atlantic coast: arrival on breeding grounds late May to early Jun, and post-breeding movement spans period from early Oct to early Dec; in warm winters, some may remain on breeding grounds well into Dec, sometimes moving S when harsher weather sets in.
Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Often common locally in appropriate habitat. Global population estimated at c. 510,000 individuals. In Canada, may be declining in the Maritimes owing to habitat loss. Nominate race formerly bred in Illinois (N USA). Main threats are loss, degradation and fragmentation of marshland areas as a result of draining, conversion to agriculture, and coastal development, and also invasive *Phragmites*; predicted sea-level rise caused by climate change would further reduce and fragment coastal habitats. Environmental contaminants may pose a series of problems, e.g. high levels of mercury found in some blood samples taken from this species.
Bibliography. Anon. (1998), Beadle & Rising (2002), David & Gosselin (2002a), Greenlaw (1993), Greenlaw & Woolfenden (2007), Hellmayr (1938), Hodgman *et al.* (2002), Howell & Sibley (1998), Howell & Webb (1995), Lebbin *et al.* (2010), McCarthy (2006), Murray (1969), Nocera *et al.* (2007), Nordhagen *et al.* (2005), Peck & James (1987), Post (1998b), Powell & Nyari (2007), Pyle (1997), Ridgway (1901), Rising & Avise (1993), Rising & Beadle (1996), Shriver, Gibbs *et al.* (2005), Shriver, Hodgman, Gibbs & Vickery (2010), Shriver, Hodgman & Hanson (2011), Shriver, Vickery *et al.* (2007), Sibley, D.A. (1996), Tracey & Greenlaw (2009), Zink & Avise (1990).

72. Saltmarsh Sparrow
Ammodramus caudacutus

French: Bruant à queue aiguë **German**: Spitzschwanzammer **Spanish**: Chingolo Colifino
Other common names: Saltmarsh Sharp-tailed Sparrow; Sharp-tailed Sparrow (when treated as conspecific with *A. nelsoni*)

Taxonomy. *Oriolus caudacutus* J. F. Gmelin, 1788, New York, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is in a clade with *A. maritimus*, *A. nelsoni* and *A. leconteii*. Until recently considered conspecific with *A. nelsoni*, but differs in its natural history; the two hybridize in NE USA (S Maine and N Massachusetts); precise ranges of the two on Atlantic coast not fully known, as references to "Sharp-tailed Sparrow" not always clear. Races poorly differentiated, and probably indistinguishable in the field; original description of *diversus* was based on material from S of species' breeding range. Two subspecies tentatively recognized.
Subspecies and Distribution.
A. c. caudacutus (J. F. Gmelin, 1788) – breeds NE USA from S Maine S along coast to New Jersey; non-breeding mainly from New Jersey S to N & W Florida.
A. c. diversus Bishop, 1901 – breeds from coastal New Jersey S to Delmarva Peninsula; non-breeding probably from breeding range S to NE Florida, and casually to Louisiana.

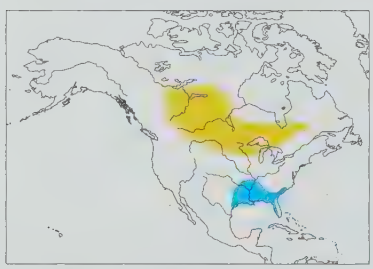


Descriptive notes. 11·5–13 cm; 15·3–23·1 g. A fairly small sparrow with short tail, rectrices spike-like. Nominate race has grey median crownstripe thin and often indistinct, bordered by two dark brown lateral crownstripes, with orange-buff to yellow-orange supercilium, submoustachial stripe and postauricular stripe; ear-coverts and nape grey; mantle and upper back greyish with white streaking (in worn plumage streaks obscure), lower back, rump and uppertail-covert feathers brown with buffy edges; tail buffy brown; lesser upperwing-coverts olive-grey, wing feathers otherwise mainly blackish, median upperwing-coverts brown with broad blackish centres and buffy tips, greater coverts and tertials blackish on centres, buff to whitish fringes on tips becoming rufescent brown and much broader towards feather bases, primaries and secondaries with narrow rufescent brown to pale buffy edges; throat white; breast and flanks pale buff with blackish-brown streaks, belly white, undertail-coverts pale buffish with some blackish streaks on shorter ones; iris dark brown; bill dark horn above, paler below; legs flesh-coloured. Sexes similar in coloration. Juvenile fairly similar to adult, but buffy in hue and with underparts more extensively, although finely, streaked. Race *diversus* is very similar to nominate, but bill on average slightly smaller, and upperparts perhaps darker. Voice. Male has a "whisper song" that has a whispery, wheezy quality, and may last for more than one minute, "ts-ts-sssss-tsik" or "si-lik tssss-s-s-s-s". Call is a sharp "chic", and also a repeated series of "tsick", "chuck" or "chip" notes.
Habitat. Occupies saltmarshes and wet meadows with dense cordgrass (*Spartina alterniflora*), blackgrass (*Juncus gerardii*), arrowgrass (*Triglochin*) or saltmeadow cordgrass (*Spartina patens*) present; also found along ditch margins or pool edges. Usually occurs in tidal areas; very rare away from coast.
Food and Feeding. No detailed information on diet; presumably small invertebrates and seeds. Forages principally on or near ground or low in vegetation.
Breeding. Season mid-May to Aug; two peaks of egg-laying, one in late May to early Jun, and other in middle to late Jul, suggest two broods. Promiscuous and non-territorial; does not form pair-bond; perhaps loosely colonial. Begins nesting one to two weeks after arrival on breeding grounds. Nest a loose, bulky cup of grasses and other marsh vegetation, lined with finer material, placed on or near ground, typically within 10 cm of ground or water's surface, suspended in emergent vegetation, usually in a site having a "roof" of dry grasses or sedges from previous season. Clutch 2–6 eggs, most commonly 3–5, modal clutch size 4 eggs, pale greenish or bluish with reddish-brown speckling throughout; replacement generally laid if initial clutch lost (often destroyed by high tides); incubation by female, period 12 days; chicks fed by female alone, nestling period 8–11 days.
Movements. Migratory. Spring migration from late Apr through early May, and autumn migration from Sept through Nov, most moving in Oct; difficult to observe and thus probably often overlooked. Presumably most, if not all, movements are carried out along Atlantic coast, but nominate race has been recorded in W Pennsylvania. Nominate race winters casually N as far as Massachusetts.
Status and Conservation. VULNERABLE. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Often common in appropriate habitat. Numbers decreasing; populations reduced by modification of marshland, and other coastal habitat. Estimated total population c. 250,000 individuals in first years of 21st century; recent crude estimate of density suggests that true figure more likely 50,000–100,000 individuals, and probably at lower end of this range. The species' geographical range extends in a narrow coastal band over c. 20,000 km², within which suitable habitat is greatly fragmented; effective area occupied is less than 2000 km². Main threat is the continuing loss, degradation and fragmentation of marshlands as a result of urban development; also chemical pollution of marshes, and invasive species, particularly *Phragmites* reeds (which render habitat completely unsuitable for this species). In addition, rise in sea levels caused by climatic warming potentially a serious threat. No records of brood parasitism of this species by Brown-headed Cowbird (*Molothrus ater*). Occurs within many protected areas, including Monomoy National Wildlife Refuge (Massachusetts), Blackwater National Wildlife Refuge and Fishing Bay Wildlife Management Areas (Maryland), and Cumberland Island National Seashore (Georgia).
Bibliography. Anon. (1998, 2010c), Bayard & Elphick (2011), Beadle & Rising (2002), Butchart & Stattersfield (2004), DiQuinzio *et al.* (2001, 2002), Gjerdrum *et al.* (2005, 2008), Greenlaw (1993), Greenlaw & Rising (1994), Hellmayr (1938), Hill *et al.* (2010), Hodgman *et al.* (2002), Howell & Sibley (1998), Howell & Webb (1995), Humphreys *et al.* (2007), Lebbin *et al.* (2010), Lowther (1996), McCarthy (2006), McLaren (2002), Murray (1969), Parkes (1992), Peck & James (1987), Post (1998b), Post & Greenlaw (2006), Poulson (1969), Pyle (1997), Ridgway (1901), Rising & Avise (1993), Rising & Beadle (1996), Shriver, Gibbs *et al.* (2005), Shriver, Hodgman *et al.* (2010), Shriver, Vickery *et al.* (2007), Sibley, D.A. (1996), Stattersfield & Capper (2000), Tracey & Greenlaw (2009), Woolfenden (1956), Zink & Avise (1990).

73. Le Conte's Sparrow
Ammodramus leconteii

French: Bruant de Le Conte **German**: Leconteammer **Spanish**: Chingolo de Le Conte

Taxonomy. *Emberiza leconteii* Audubon, 1844, prairies of upper Missouri River = Fort Union, North Dakota, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is in a clade with *A. maritimus*, *A. nelsoni* and *A. caudacutus*; has hybridized with *A. nelsoni*. Monotypic.
Distribution. Breeds in Canada from SC Mackenzie (in Northwest Territories), Peace R lowlands of NE British Columbia and throughout lowlands of Alberta E to C Manitoba, N & E Ontario and locally S Quebec, S in USA to NW Montana, N South Dakota, S Minnesota and N Michigan; non-breeding S USA from C Kansas, NW Arkansas, S Georgia and coastal South Carolina S to Gulf Coast (Texas E to W Florida).



Descriptive notes. 10·5–12·5 cm; 10–16·3 g. A small sparrow with short tail, rectrices spike-like, and bright ochre supercilium. Has whitish median crownstripe bordered by two dark brown lateral crownstripes, bright yellow-ochre supercilium, blackish eyestripe wedge-shaped, being narrow at eye; ear-coverts greyish-ochre, thinly edged with brown, submoustachial stripe ochre; nape greyish with chestnut stripes; mantle and upper back dark brown or blackish with buffy feather edges, rump and uppertail-coverts dark with buffy feathers edges; tail buffy brown; lesser upperwing-coverts brown, remaining wing mostly blackish-brown, feathers with pale buffy edges, broadest on median and greater coverts and tertials (by breeding season, buffy edges of fresh plumage have mostly worn off); throat white or whitish; breast and flanks buff, breast with long narrow streaks, flanks with broader blackish streaks, belly white, undertail-coverts buffy; iris dark brown; bill greyish-blue with broadly blackish culmen (non-breeding, bill brownish-horn to pinkish); legs flesh-coloured. Sexes similar in coloration. Juvenile resembles adult, but more extensively streaked on underparts, less ochre, and lacks chestnut marks on nape. Voice. Song a short insect-like "reese-reese", "z-z-z-buzz" or "tzeek-tzzz-tick". Call a sharp "chip".
Habitat. Breeds in moist to wet grasslands, sometimes mixed with cat-tail (*Typha*) and *Phragmites* reeds, or sedge (*Carex*) marshes, often interspersed with small trees or bushes. In winter found in rank tall grasses, damp weedy fields, cat-tails, and in overgrown prairies. Occurs from sea-level up to 1100 m.
Food and Feeding. Little detailed information. Diet during breeding mainly adult and larval insects, also seeds; probably feeds young principally on insects. Stomach analyses show that diet during migration principally grass seeds (e.g. *Andropogon*, *Panicum*, *Myosotis*, *Setaria*, *Sorghastrum*), as well as arthropods, including arachnid and beetles (Coleoptera). Forages principally on or near ground and low in vegetation. Occasionally in pairs or small groups outside breeding season.
Breeding. In general, has been little studied, and breeding behaviour is not well known. Season late May to mid-Aug. Monogamous. Perhaps loosely colonial. Nest a cup made from dried grasses, lined with finer grass and hair, placed on or up to 20 cm above ground, when on ground well hidden and with overhanging canopy of dead grass concealing nest from above. Clutch 4–5 eggs, whitish to pale greenish with brown to cinnamon spotting; incubation by female only, period up to 13 days; chicks fed by both parents, no information on nestling period. Nests relatively frequently

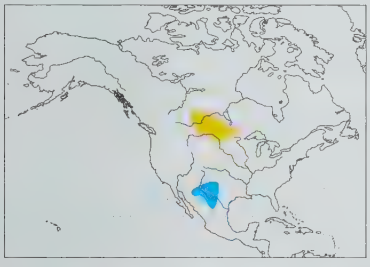
parasitized by Brown-headed Cowbird (*Molothrus ater*); success rates of host and parasite as yet unstudied.
Movements. Migratory. Difficult to observe and probably often overlooked; migration routes appear to be through E Great Plains E to Mississippi Valley. Leaves wintering areas from late Mar to early Apr, and first arrivals in S portion of breeding range by late Apr/early May, into late May in N part of breeding range. A relatively late autumn migrant, first movements S in mid-Sept and peak passage in middle to late Oct, arrival on wintering grounds in early Nov; some young migrate S still in juvenile plumage. Casual on E US coast and in N Mexico (Coahuila); vagrant in W USA as far as California.
Status and Conservation. Not globally threatened. Classed as "Declining" in the USA (Yellow WatchList priority species for conservation). Often common in appropriate habitat; most numerous in W of range. Declining. Global population recently estimated at 2,900,000 individuals, but this requires corroboration. Has suffered loss and degradation of native grasslands through extensive conversion to cropfields, overgrazing, and fire suppression; also, early mowing or haymaking reduces breeding success in hay fields. Has benefited from carefully planned burning, breeding densities in some areas reaching a peak two years after fire; in US part of range, some habitat restoration has been achieved through the Conservation Reserve Program. Occurs as a breeder or winterer in many protected areas.
Bibliography. Anon. (1998), Beadle & Rising (2002), Boulva & Browne (1965), Cooper (1984), Dove *et al.* (2001), Easterla (1962), Gilligan *et al.* (1985), Guarente (2009), Hellmayr (1938), Howell & Webb (1995), Igl & Johnson (1995, 1999), Johnson & Usyk (2009), Kaplan & Moore (1988), Lebbin *et al.* (2010), Lowther (1996), Maxwell *et al.* (1988), McCarthy (2006), McNair & Post (2000), Murray (1969), Patrikeev (2006a), Peck & James (1987), Powell & Nyari (2007), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Villard & Bracken (1989), Winter *et al.* (2005).

74. Baird's Sparrow

Ammodramus bairdii

French: Bruant de Baird **German**: Bairdammer **Spanish**: Chingolo de Baird

Taxonomy. *Emberiza bairdii* Audubon, 1844, prairies of upper Missouri = near Old Fort Union, North Dakota, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is closely related to *A. henslowii* in a clade that includes also *Melospiza*, *Passerculus* and *Xenospiza baileyi*. Monotypic.
Distribution. Breeds in SW Canada from SE Alberta, C Saskatchewan and SW Manitoba, S in N USA to NE & NC Montana (possibly to E Wyoming) and NW South Dakota, perhaps also still NW Minnesota; winters in S USA (SE Arizona, New Mexico and NC Texas) and N Mexico (NE Sonora E to W Coahuila, S to Durango and N Zacatecas).



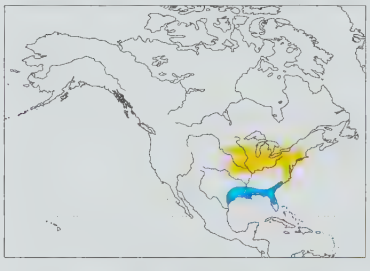
Descriptive notes. 12–14 cm; 15–21·5 g. A medium-sized, rather short-tailed sparrow. Head is mostly ochraceous, crown heavily streaked with dark brown, a more or less distinct buffy-ochre median crownstripe tending to become wider towards nape, buff or ochre supercilium bordered below by indistinct dark spots; ear-coverts buffy or ochre, edged posteriorly with dark brown spots, thin dark brown moustachial stripe, thin dark brown malar stripe; nape ochre, boldly marked with short, thin dark streaks; mantle and back dark brown, feathers distinctly edged buff, rump and uppertail-coverts brownish with darker centres; tail dark brown, outermost feather pair with whitish on outer webs; upperwing brown, wing-coverts and scapulars edged with ochre, often slightly rusty in colour; throat pale buff; breast and flanks pale buffy ochre, thinly streaked with blackish (necklace of small dark spots), rest of underparts whitish; iris brown; bill pale flesh-coloured, darker brownish on culmen; legs pale flesh-coloured. Sexes similar. Juvenile has crown and nape buffy ochre, heavily speckled with brown, broadly edged with buffy-ochre; breast and flanks more heavily spotted than on adult. VOICE. Song a clear, loud series of ringing notes ending in melodious trill, "zhe zhe she zurrrrrrrrl". Call a whining "meeerr", sometimes repeated if agitated, also a sharp "chup", "chip" or "kee-keep".
Habitat. Breeds in ungrazed or lightly grazed grassland interspersed with scattered clumps of grass and low shrubs, such as sage (*Artemisia*) and western snowberry (*Symphoricarpos occidentalis*), with tangled matted grass on ground; in some places shows strong preference for native grasses such as wheatgrass (*Agropyron*), junegrass (*Koeleria*) and needlegrass (*Stipa*), but in other places breeds in exotic grasses a few years after their introduction. May move into an area 3–5 years after a burn; in dry years often found in dried-out ponds or depressions. In non-breeding season found mainly in bunchgrasses (*Bouteloua*, *Eragrostis*). Occurs at elevational range of 1200–2000 m.
Food and Feeding. Feeds on seeds, but also takes insects such as beetles (Coleoptera), Orthoptera, Lepidoptera larvae and flies (Diptera), and spiders (Araneae); in winter probably principally on seeds and waste grain. Forages mostly on or near ground and low in vegetation. Generally rather shy.
Breeding. Season late May to mid-Aug; usually single-brooded, sometimes two broods. Monogamous, occasionally polygynous. Nest had coarse exterior made from thicker dry grass and stems, lining includes fine grasses, rootlets, fur or moss, placed on ground in depression. Clutch 2–6 eggs, usually 4 or 5, greyish-white with rusty or chestnut spots; incubation by female, period 11–12 days; chicks fed by both parents, nestling period 8–11 days. Nests parasitized with moderate frequency by Brown-headed Cowbird (*Molothrus ater*); cowbirds known to have fledged successfully.
Movements. Migratory; movements occur through Great Plains (passage recorded through E Colorado, W & C Kansas, W Oklahoma, W Texas, perhaps E to W Missouri). Leaves wintering areas in N Mexico (Sonora) by early Mar, but some remain later in S USA (Texas); because of this species' very skulking nature, particularly during migration, timing of migration difficult to assess, but present through much of Great Plains between early Apr and mid-May; arrival on breeding grounds early May to late May depending on latitude, males from a few days to a week before females. Leaves breeding area by late Sept; migration S spans period from late Aug to late Oct, reaching Texas from early Sept and Sonora by early Oct. Casual in SW British Columbia (SW Canada) and (in USA) California, S Texas, Oklahoma, and E to Wisconsin, New York and Maryland.
Status and Conservation. Not globally threatened. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Locally common in appropriate habitat. Declining. Global population estimated at 1,200,000 individuals, but this requires corroboration. Apparently was formerly quite common, but has been greatly affected by habitat destruction caused mainly by agricultural expansion and overgrazing. On wintering grounds in Arizona has decreased in historic times, but difficult to assess degree of this decrease; currently found in Arizona mostly in Cochise County, in extreme SE. Main threats are the continuing loss and degradation of native grasslands through conversion to cropfields, overgrazing, and fire suppression (which leads to growth of shrubs). This species is vulnerable also to elevated levels of cowbird parasitism in habitat fragments, and reduced breeding success caused by early mowing of fields. Population in Saskatchewan (Canada) increased locally following habitat management; habitat-restoration work in progress at several National Wildlife Refuges in USA, and breeding densities in North Dakota found to reach a peak 2–4 years after controlled burns. This species occurs in several protected areas.
Bibliography. Ahlering *et al.* (2006, 2009), Anon. (1998), Beadle & Rising (2002), Cartwright *et al.* (1937), Davis (2003), Davis & Sealy (1998), Green *et al.* (2002), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Jones *et al.* (1998), Lebbin *et al.* (2010), Marks & Nordhagen (2005), Miller *et al.* (1957), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Sutter *et al.* (1995), Voelker (2004), Winter (1999a), Zink & Avise (1990).

75. Henslow's Sparrow

Ammodramus henslowii

French: Bruant de Henslow **German**: Henslowammer **Spanish**: Chingolo de Henslow

Taxonomy. *Emberiza henslowii* Audubon, 1829, opposite Cincinnati, Kentucky, USA.
Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is closely related to *A. bairdii* in a clade that includes also *Melospiza*, *Passerculus* and *Xenospiza baileyi*. Races weakly differentiated; proposed race *houstonensis* (based on a population that lived in Houston, in SE Texas), probably inseparable from nominate, is now extinct. Species sometimes treated as monotypic. Two subspecies provisionally recognized.
Subspecies and Distribution.
A. h. henslowii (Audubon, 1829) – breeds from E South Dakota E through C Wisconsin and S Canada (S Ontario) to C New York, S to C Kansas, Missouri, Arkansas, N Kentucky and C West Virginia; winters in S USA from C Texas E to South Carolina, S to Gulf Coast and N Florida.
A. h. susurrans (Brewster, 1918) – breeds from C New York E to S New Hampshire, S to E West Virginia and E North Carolina; winters along US coastal plain from South Carolina S to C Florida.



Descriptive notes. 12·1–13·3 cm; 10·6–15 g. A small sparrow, with a short tail, large bill and flat head. Nominate race has head with median crownstripe buffy olive, lateral crownstripes dark brown and streaked with buffy olive; supercilium broad and buffy olive, sometimes with greenish hue; eyestripe, moustachial stripe and malar stripe dark brown and fairly thin; nape buffy olive, streaked dark brown; mantle and upper back feathers dark brown, edged buff, lower back and rump buffy olive with brown feather centres; tail feathers blackish with rufous edges, central pair dark brown with broad rusty-brown edges; lesser upperwing-coverts rufous with olive fringes, remaining wing feathers dark brown, median and greater coverts edged rufous, tertials and sometimes secondaries edged rusty, tertials with whitish fringes; yellow at bend of wing; throat pale buff; breast and flanks darker and with thin brown streaks, belly whitish, undertail-coverts buffy; iris dark brown; culmen and most of upper mandible dark horn-grey to dusky brown, cutting edges and lower mandible flesh-coloured; legs flesh-coloured. Sexes similar in coloration. Juvenile is similar to adult, but somewhat buffier, lacks moustachial and malar stripes, has little or no streaking on breast and flanks. Race *susurrans* is darker, more saturated in colour, than nominate and has larger and deeper bill. VOICE. Song, often delivered at night, is a short, insect-like "tsi-lick" or "flee-sic"; rarely, a longer song given. Call "tsip".
Habitat. Breeds in native prairie with tall, dense grass and with matted ground cover. Often colonizes an area a few years after a burn, or occupies infrequently mowed pastures, but avoids fields with encroachment of woody plants. Breeds also in extensive grasslands covering reclaimed strip mines. In non-breeding season found in open prairies or open pine (*Pinus*) forest; most common in meadows in pine woods where broomsedge (*Andropogon virginicus*) and wiregrass (*Aristida stricta*) predominate. Sea-level to 1100 m.
Food and Feeding. In summer feeds primarily on insects, especially grasshoppers (Orthoptera) and beetles (Coleoptera); in winter mainly seeds, especially those of wiregrass. Forages principally on or near ground and low in vegetation; unobtrusive. Occasionally in small groups outside breeding season.
Breeding. Laying May–Aug; perhaps single-brooded in N of range, and in some S areas, such as Missouri, two peaks of egg-laying, suggesting species may be double-brooded. Monogamous. Cooperative breeding recorded: three adults feeding nestlings at one nest. Nest built in 4–6 days, a cup constructed from dry grass, lined with finer grasses, placed 6–8 cm above ground and sitting snugly within adjacent vegetation (not woven into it), in area with much litter such as dry grass and weedy stalks. Clutch 2–5 eggs, most commonly 4, creamy-coloured to pale greenish with reddish spotting; incubation by female, period 11–12 days; chicks fed by both parents, nestling period 9 days. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Short-distance migrant; movements strictly nocturnal. Migration routes and timing very poorly known, as species is extremely difficult to observe. Movements N from wintering areas begin in Mar, but more move in Apr; in Tennessee recorded early Mar to late May, in Kansas mid-Apr to early May, and at Point Pelee (Ontario) largely in first two weeks of May; arrival on breeding grounds in Illinois by mid-Apr, some as early as late Mar. Often does not return to same breeding areas as those used in previous years. Many birds begin to leave breeding grounds in Sept, but true picture unclear as species becomes extremely difficult to detect once breeding over; arrival in wintering areas early to middle Oct. Accidental W to North Dakota, Colorado and New Mexico.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Often common in appropriate habitat. Decreasing. Global population estimated at c. 79,000 mature individuals. Data from Breeding Bird Survey and Christmas Bird Count reveal that this species has suffered a large and significant decrease of c. 96% since 1970s; recent analysis indicated that population now stable (and may have started to increase in some regions). Greatest declines in N & E of range; now extinct or locally rare breeder in NE USA from Vermont S to Delaware. Main threats are

wetland drainage and destruction of grassland through fire suppression, conversion to agriculture or exotic plantations, combined with earlier (and more frequent) cutting of hay fields. S populations may have increased, apparently assisted by creation of undisturbed grassland habitat by the Conservation Reserve Program. Periodic burning of tall-grass prairie, on a three-year or four-year cycle benefits this species, as does occasional mowing of pastures.

Bibliography. Anon. (1998, 2010c), Aquila *et al.* (2007), Arbour & Wood (2006), Bajema & Lima (2001), Bajema *et al.* (2001), Beadle & Rising (2002), Bechtoldt & Stouffer (2005), Burhans (2002), Butchart & Stattersfield (2004), Carrie *et al.* (2002), Cully & Michaels (2000), Dimiceli *et al.* (2007), Dornak (2010), Graber (1968), Guzy *et al.* (2002), Heller & Hughes (1997), Hellmayr (1938), Herkert (2007), Herkert & Glass (1999), Herkert *et al.* (2002), Holimon *et al.* (2004), Hyde (1939), Ingold *et al.* (2009), Johnson, DiMiceli & Stouffer (2009), Johnson, DiMiceli, Stouffer & Brooks (2011), Kim (2005), Lebbin *et al.* (2010), Leftwich & Ritchison (2008), McNair (1998a), McNair & Post (2000), Monroe & Ritchison (2005), Plentovich, Holler & Hill (1998, 1999), Pranty & Scheuerell (1997), Pyle (1997), Reinking (2002), Reinking & Hendricks (1993), Reinking *et al.* (2000), Ridgway (1901), Rising & Beadle (1996), Shaffer *et al.* (2003), Silcock & Jorgensen (2007), Skipper (1998), Thatcher *et al.* (2006), Thompson & Ely (1992), Tucker & Robinson (2003), Winter (1999b), Zimmerman (1988).

76. Grasshopper Sparrow

Ammodramus savannarum

French: Bruant sauterelle **German**: Heuschreckenammer **Spanish**: Chingolo Saltamontes

Taxonomy. *Fringilla savannarum* J. F. Gmelin, 1789, Jamaica.

Genus, as currently delimited, is probably polyphyletic. Molecular studies suggest that present species is closest to two Neotropical species, *A. humeralis* and *A. aurifrons*, all in a clade that includes some of the *Aimophila* sparrows and *Arremonops*, most of which are primarily Neotropical in distribution. Geographical variation often minimal, and many races poorly differentiated. Twelve subspecies generally recognized.

Subspecies and Distribution.

A. s. perpallidus (Coues, 1872) - breeds in SW Canada (SE British Columbia E to W Ontario) and in USA discontinuously S to W California and E to Minnesota, W Oklahoma and C Texas, also extreme NW Mexico (N Baja California); non-breeding S USA (C California, S Arizona, C Oklahoma and Gulf Coast) S through Mexico and Guatemala to El Salvador.

A. s. pratensis (Vieillot, 1818) – breeds E of Great Plains from Wisconsin E through Michigan to SE Canada (SE Ontario, S Quebec and S New Brunswick), S to E Oklahoma, NE Texas, Arkansas, North Carolina and SE Virginia; non-breeding from S limits of breeding range S to Bahamas, Cuba, E & S Mexico, Belize and Guatemala.

A. s. ammolegus Oberholser, 1942 – breeds in S Arizona and adjacent NW Mexico (N Sonora); non-breeding also in W Mexico (S to Oaxaca) and Guatemala.

A. s. floridanus (Mearns, 1902) – C Florida (Kissimee Prairie).

A. s. bimaculatus Swainson, 1827 – C & S Mexico (at least Zacatecas, México, S Veracruz, possibly also Oaxaca), Guatemala, Nicaragua and Costa Rica.

A. s. cracens (Bangs & Peck, 1908) – N & E Guatemala (Petén and Izabál), Belize, E Honduras and NE Nicaragua.

A. s. beatriceae Olson, 1980 – C Panama (Coclé Province).

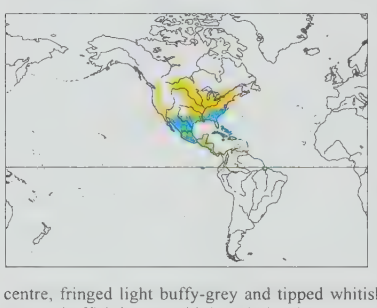
A. s. savannarum (J. F. Gmelin, 1789) – Jamaica.

A. s. intricatus E. J. O. Hartert, 1907 – Hispaniola.

A. s. borinquensis J. L. Peters, 1917 – Puerto Rico.

A. s. caribaeus (E. J. O. Hartert, 1902) – Netherlands Antilles (Curaçao and Bonaire).

A. s. caucae Chapman, 1912 – S Colombia (upper Cauca Valley) and NW Ecuador.



Descriptive notes. 12–12·5 cm; 13·4–28·4 g. A small to medium-sized, chunky sparrow with short tail and large bill. Nominate race has head with dark brown lateral crownstripes, pale buffy median crownstripe, supercilium buffish with golden patch anteriorly, lores and ear-coverts pale buffy yellow, thin dark postocular stripe; nape buffish-grey with blackish streaks, side of neck buffy; upperparts greyish, streaked blackish, with centres of feathers light rufous, rump and uppertail-coverts mottled rufous; tail feathers brown, edged pale buff; upperwing brown, feathers edged pale brown, median coverts broadly blackish-brown on centre, fringed light buffy-grey and tipped whitish-buff, with short brown apical streak, greater coverts buffish-brown with broad blackish centres, each divided by fulvous brown apical triangle and with narrow greyish-buff margin, becoming whitish-buff near tip, tertials largely blackish on inner web and proximally on outer web, becoming brownish near tip, especially on inner web, rest of outer web brown becoming blackish near shaft and pale buff on edge towards feather tip; throat whitish, underparts whitish with pale buffy wash; iris dark brown; bill fleshy-horn to grey, culmen broadly darker greyish; legs pinkish. Sexes alike in coloration. Juvenile has crown, nape and upperparts dark brown, feathers edged pale buff or rusty brown, median crownstripe indistinct, underparts finely streaked with brown spots, streaks strongest on breast, upper mandible dark. Races differ mainly in size, bill size and general coloration: *borinquensis* is smaller than nominate, and has brighter median crownstripe; *intricatus* is like previous, but browner on head; *caribaeus* is paler than previous two and nominate; *pratensis* is rather small, with heavy bill and dark mantle colour, darker than nominate, streaks on nape rufous (not blackish); *perpallidus* is like last, but somewhat paler; *ammolegus* has distal portion of feathers of back and wing with rufous centres, breast to flanks also more richly coloured; *floridanus* has dark back; *cracens* is very dark above, with buffy underparts; *bimaculatus* is rather richly coloured, but paler than previous; *beatriceae* has paler grey back, is paler than preceding two races; *caucae* is similar to last, but brownish-black on nape, perhaps even paler below. Voice. Song, often at night, variable, characteristically 2–3 high notes followed by high trill, "chip chip scheeeeeeeee" or "c chit zhuzeeeeee"; also gives more complex excited song at times. Call a weak "tillic".

Habitat. Tall dense grassland, also rice fields. In arid W Great Plains, tends to be found in areas with relatively lush grass with weeds. In E North America often in drier habitats than those preferred by *Passerculus sandwichensis*, and often at lower elevations than *Passerculus sandwichensis* (although overlap in ranges and ecology); in Florida, generally in wiregrass (*Aristida stricta*) and palmetto (*Serenoa repens*). In winter, in E, occurs in grass-dominated areas with smooth crabgrass (*Digitaria ischaemum*) and broomsedge (*Andropogon virginicus*); in C Florida in native prairie; in Mexico and Belize occasionally in grazed pastures. Lowlands to 2500 m.

Food and Feeding. Diet small arthropods and seeds. In summer mainly insects, especially grasshoppers (Orthoptera), but also beetles (Coleoptera) and larval butterflies and moths (Lepidoptera), also some spiders (Araneae); also variety of seeds, such as those of panicgrass (*Panicum*) and sedges (Cyperaceae). Forages principally on or near ground and low in vegetation.

Breeding. Season varies depending on region, in Great Plains mid-May to Jul/mid-Aug and often two or more broods raised, farther S up to four broods per season; in Florida and Jamaica may be bi-modal, breeding often following fires, and up to four broods; little information on more tropical populations. Monogamous; cases of polygyny recently documented. Sometimes breeds co-operatively, with helpers, the latter juveniles from earlier brood(s). Nest constructed from dry grasses and stalks, lined with finer grasses, sedges or hair, placed on ground, often with a concealing dome of overhanging grasses. Clutch 3–6 eggs, usually 4–5, creamy white with greyish or reddish spots, which concentrated towards wider end; incubation by female, period 11–13 days; chicks fed by both parents and by any helpers present, nestling period 8–9 days. Brood parasitism by Brown-headed Cowbird (*Molothrus ater*) generally infrequent.

Movements. N populations (especially races *pratensis* and *perpallidus*) migratory, *ammolegus* a partial migrant; other populations resident, but may move locally depending on rainfall and grass heights. In spring, a relatively late migrant; in California arrives in C part of state by late Feb to early Mar, although in some years not until late May or Jun, and in E arrives in S of breeding range by middle to late Apr; farther N reaches N US states and S Canada in early or middle May, Massachusetts to Maine in late May; males arrive on breeding grounds 3–5 days before females. Autumn migration difficult to detect owing to the species' secretive nature; leaves N breeding grounds from Aug, mainly in Sept; migrants observed in Florida late Sept to Dec, and tower kills in C Florida show peak numbers between late Oct and late Nov. In Canadian Maritimes autumn vagrants tend to occur in Oct; off-course individuals in Bermuda from late Sept.

Status and Conservation. Not globally threatened. Race *floridanus* federally listed as Endangered; listed as a California Bird Species of Special Concern. Often common in appropriate habitat. In many parts of range local in distribution. Many populations have decreased in size in recent years as a consequence of habitat loss, the result largely of agricultural conversion and urbanization. For example, in California this species is placed in the second highest order of priority for conservation, this due to conversion of grasslands throughout the state.

Bibliography. Ahlering *et al.* (2009), Anon. (1998), Arguedas-Negrini (2001), Ayerbe-Quiñones & Ramírez-Chaves (2008), Balent & Norment (2003), Beadle & Rising (2002), Binford (1989), Bradshaw (1934), Bulgin *et al.* (2003), Cannings *et al.* (1987), Comins (2001), Delany & Cox (1986), Delany & Linda (1994, 1998), Delany, Giesel & Brazeau (2000), Delany, Shumar *et al.* (2007), Delany, Stevenson & McCracken (1985), Dornak (2010), Griscom (1932), Heller & Hughes (1997), Hellmayr (1938), Herkert (1998), Howell & Webb (1995), Hubbard (1972a), Joern (1988, 2002), Kaspari (1991), Kaspari & O'Leary (1988), Keith *et al.* (2003), McCarthy (2006), McNair (1986), McNair & Post (2000), Miller, A.H. *et al.* (1957), Miller, P. (2005), Mylecraine *et al.* (2008), Nicholson (1936), Olson (1980), Peck & James (1987), Perkins, D.W. & Vickery (2001, 2005), Perkins, D.W., Shriver & Vickery (2009), Perkins, D.W., Vickery, Dean & Scheuerell (1998), Perkins, D.W., Vickery & Shriver (2008), Pranty (2000), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Ruth (2008), Shriver & Vickery (1999), Shuford & Gardali (2008), Small, Gimpel *et al.* (2009), Small, Parks *et al.* (2008), Smith (1959, 1963), Soha *et al.* (2009), Stevenson & Anderson (1994), Veit & Petersen (1993), Vickery (1996), Wetmore *et al.* (1984), Whitmore (1981), Wiens (1971).

77. Grassland Sparrow

Ammodramus humeralis

French: Bruant des savanes **German**: Wachtelammer **Spanish**: Chingolo Pajonalero

Taxonomy. *Tanagra humeralis* Bosc, 1792, Cayenne, French Guiana.

Formerly placed with *A. aurifrons* in a separate genus, *Myospiza*. The two sometimes considered to form a superspecies, but ranges overlap sufficiently to make such treatment implausible. Genetic studies indicate that the two are closely related to *A. savannarum*, which is, in turn, distant from other six species currently included in genus; these last should perhaps be reassigned to a different genus. Four subspecies recognized.

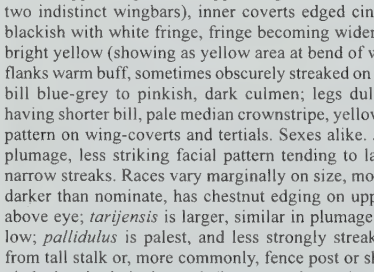
Subspecies and Distribution.

A. h. pallidulus (Wetmore, 1949) – Guajira Peninsula of N Colombia and NW Venezuela.

A. h. humeralis (Bosc, 1792) – Colombia and Venezuela (except Guajira Peninsula), and the Guianas E to E Brazil (S to Paraná).

A. h. xanthornus Gould, 1839 – extreme SE Peru (Pampas del Heath) and NE Bolivia E through SC Brazil to Paraguay and Uruguay and S to C Argentina.

A. h. tarijensis (J. Bond & Meyer de Schauensee, 1939) – SE Bolivia (Santa Cruz, Tarija and Chuquisaca).



Descriptive notes. 13 cm; 13–19 g. A short-tailed and large-headed sparrow with medium-sized bill, relatively long legs and large feet, and short wing, primaries entirely hidden by tertials. Nominate race has distinctive head pattern, having brown crown with neat and well-defined white central crownstripe, greyish-brown face with pale lores, noticeable yellow patch in supraloral area continuing as pale grey supercilium; dark brown postocular stripe broadens as it reaches side of neck; nape and hindneck grey with narrow rusty streaking, back grey and warm brown with darker streaking, rump unstreaked warm brown; tail brown; upperwing brown, upperwing-coverts with broad blackish centres and pale tips (creating two indistinct wingbars), inner coverts edged cinnamon, outer ones grey or grey-brown, tertials blackish with white fringe, fringe becoming wider and cinnamon towards bases; marginal coverts bright yellow (showing as yellow area at bend of wing on perched bird); throat whitish; breast and flanks warm buff, sometimes obscurely streaked on rear flanks, rest of underparts off-white; iris dark; bill blue-grey to pinkish, dark culmen; legs dull pinkish. Distinguished from *A. aurifrons* by having shorter bill, pale median crownstripe, yellow on face restricted to supraloral area, and bolder pattern on wing-coverts and tertials. Sexes alike. Juvenile is similar to adult, but paler and duller plumage, less striking facial pattern tending to lack yellow in loral area, and has breastband of narrow streaks. Races vary marginally on size, more distinctly in plumage darkness: *xanthornus* is darker than nominate, has chestnut edging on upperparts, and deeper and more extensive yellow above eye; *tarijensis* is larger, similar in plumage to previous, but browner above and buffier below; *pallidulus* is palest, and less strongly streaked on upperparts than nominate. Voice. Song, from tall stalk or, more commonly, fence post or shrub, plaintive, musical and sweet, though high-pitched and relatively weak (but on cool mornings with little air movement, carries for surprising distance), begins with sweeter longer note (sometimes 2), then short and buzzy notes, and ends in light and longer trill usually falling slightly in pitch, "sweep–siip tzzt tk treeeeeeeee"; individual

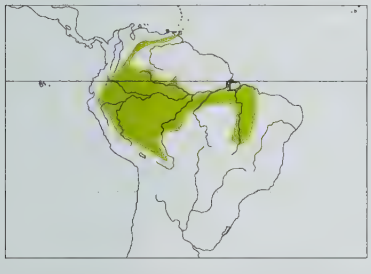
variation, and middle elements quite buzzy in some variants, but pattern similar through range. Call a high-pitched yet rather liquid "tiip".
Habitat. Variety of grassland, from tall grassland to savanna, *campos* and *cerrado* of Brazil, as well as drier *pampas* in S Brazil, Uruguay and Argentina; moist grassland, in *pampas* also those moist enough to have sedges (*Cyperus articulatus*). Found also in pastures and other agricultural areas with grassy field edge. Absent where overgrazed and grass is too short. To 1300 m.
Food and Feeding. Diet seeds and insects, latter particularly during breeding season. Forages exclusively on ground. Adults specialize on grass seeds, and will use feet to pull down taller grasses, enabling them to feed on them while on ground.
Breeding. Season Apr–Aug in N and Sept–Feb in S. Cup-shaped nest placed on ground, with runway leading to it through grass; sometimes grass grows over runway, creating loosely covered tunnel. Clutch 3–4 eggs, pale whitish. No other information.
Movements. Resident in much of range; possibly short-distance migrant in C Argentina.
Status and Conservation. Not globally threatened. Fairly common throughout most of extensive range. Preference for a variety of grassy and open habitats makes this a low-sensitivity species, and forest clearance likely increasing available habitat for it. Occurs in several protected areas.
Bibliography. Armani (1985), Byers, Curson & Olsson (1995), Carson & Spicer (2003), Costa & Costa (2003), Cruz & Andrews (1989), Graham *et al.* (1980), Klicka & Spellman (2007), Lill (1974), Marcondes-Machado (1988d), de la Peña (1975, 1987), Restall *et al.* (2006), Ridgely & Tudor (1989), Storer (1989b).

78. **Yellow-browed Sparrow**

Ammodramus aurifrons

French: Bruant à front d'or **German**: Gelbwangenammer **Spanish**: Chingolo Cejigualdo

Taxonomy. *Tanagra aurifrons* Spix, 1825, "in provincia Bahia"; error = Fonte Bõa, Rio Solimões, Brazil. Formerly placed with *A. humeralis* in a separate genus, *Myospiza*. The two sometimes considered to form a superspecies, but ranges overlap sufficiently to make such treatment implausible. Genetic studies indicate that the two are closely related to *A. savannarum*, which is, in turn, distant from other six species currently included in genus; these last should perhaps be reassigned to a different genus. Four subspecies recognized.
Subspecies and Distribution.
A. a. apurensis (Phelps, Sr & Gilliard, 1941) – NE Colombia E through *llanos* of W Venezuela to Orinoco Delta.
A. a. cherriei (Chapman, 1914) – EC Colombia (in *llanos* of Meta).
A. a. tenebrosus (J. T. Zimmer & Phelps, Sr, 1949) – SW Venezuela (SW Amazonas), SE Colombia (Guainía and E Vaupés) and adjacent W Brazil.
A. a. aurifrons (Spix, 1825) – SE Colombia (SE of Andes) S through E Ecuador and E Peru to NE Bolivia, and E through Amazonian Brazil.



Descriptive notes. 13 cm; 14·5–19 g. A short-tailed and long-legged sparrow with relatively long and stout bill and short wing, primaries entirely hidden by tertials. Nominate race has grey head with fine darker streaking on crown, prominent bright yellow supercilium extending half-way back on head and continuing pale grey on rear head, largely greyish face with yellow wash on lores, yellow often extending below eye and to base of malar region; upperparts grey with darker streaking, rump unstreaked grey-brown; tail brown; lesser upperwing-coverts dark brown with broad olive-yellow fringes, median coverts similar but fringed buffish, often paler at tip, forming rather weak wingbar, rest of upperwing feathers dark brown with brown to grey fringes, marginal coverts bright yellow (showing as yellow area at bend of wing on perched bird); throat whitish, narrow brownish moustachial line; breast and flanks grey, rest of underparts off-white; iris dark; bill dark above, blue-grey below; legs greyish-flesh to dull pink. Distinguished from *A. humeralis* by longer bill, extensive yellow on face, lack of median crownstripe, and less distinct pattern on coverts and tertials. Sexes alike. Juvenile is similar to adult, but paler and duller plumage, lacking much yellow on face, and has breastband of narrow streaks. Races differ in darkness of plumage, also in extent of yellow on face: *cherrieri* has less yellow on face than nominate; *apurensis* is like previous, but has blacker and wider streaking on upperparts, and brighter white throat contrasting with buff of breast; *tenebrosus* is darkest, has orange wash on area above lores, dark grey flanks. Voice. Song, often given in heat of midday, a high-pitched, insect-like, nasal double trill, "tzeeee-tzneeeeee", often preceded by very soft "tk" note (audible only at very close quarters). Call a high-pitched "tip".
Habitat. Lowland tropical grassland and open sites, although found commonly to 1000 m in E Ecuador, and exceptionally to 2500 m. Essentially will accept any open habitat, including short grass, taller grass, pastures, open areas adjacent to villages, roadside grassy spots, and all kinds of open and degraded habitats, including empty lots in cities. Very adaptable.
Food and Feeding. Seeds and insects; nestling diet arthropods. Forages exclusively on ground, specializing on grass seeds. Often forages in the open, and, unlike *A. humeralis*, not hidden in grass.
Breeding. Season May–Oct in Venezuela and Feb–Sept in Colombia. Cup-shaped nest of dried grass, lined with finer material, placed on ground; clutch 2–3 eggs, whitish. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common throughout most of extensive range. Very adaptable, this species' preference for variety of grassy and open habitats makes it one of low sensitivity, and forest clearance is increasing available habitat for it; is quickly gaining habitat as Amazonian forest being cleared, and more settlements and agricultural areas established. Occurs in several protected areas.
Bibliography. Armani (1985), Byers, Curson & Olsson (1995), Carson & Spicer (2003), Cruz & Andrews (1989), Hilty (2003), Klicka & Spellman (2007), Restall *et al.* (2006), Ridgely & Tudor (1989).

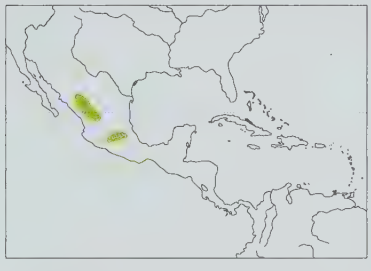
Genus *XENOSPIZA* Bangs, 1931

79. **Sierra Madre Sparrow**

Xenospiza baileyi

French: Bruant des sierras **German**: Sierraammer **Spanish**: Chingolo Serrano
Other common names: Bailey's Sparrow

Taxonomy. *Xenospiza baileyi* Bangs, 1931, Bolaños, Jalisco, Mexico.
Sometimes suggested as being close to *Ammodramus*, and genus sometimes subsumed in latter; song and limited molecular work, however, suggest close affinity with *Melospiza*, and may be better placed within that genus. Monotypic.
Distribution. C Mexico, where now restricted to two isolated localities: Distrito Federal (centred around La Cima and Milpa Alta, near Mexico City); and S Durango (Ejido Ojo de Agua–El Cazador).



Descriptive notes. 14–15·2 cm; 15·8–19 g. Medium-sized sparrow with very short wings. Plumage is brownish above, washed with rufous and streaked with dark brown, crown with indistinct pale median crownstripe, nape indistinctly streaked brown; supercilium grey, contrasting dark ear-coverts, with dark eyestripe, whitish submoustachial stripe often tinged buffy near side of neck, blackish malar stripe; tail dark brown, feathers edges pale greyish-rufous; upperwing dark brown, lesser coverts rufous, median and greater coverts with broad rufous edges and buffish tips, flight-feathers thinly edged buff, tertials broadly edged rufous and with narrow white fringes; bend of wing distinctly yellowish; throat and underparts whitish, breast and flanks washed buffy and with dark brown streaks, streaks sometimes coalescing into spot on central breast; iris dark; bill grey; legs yellowish-flesh to pink, often darker and greyer on feet. Sexes similar. Juvenile is duller than adult, with supercilium, throat and underparts washed yellowish-buff, lacks yellow at bend of wing. Voice. Song often begins with 2, 3 or as many as 4 or 5 rapid notes, these followed (as in song of *Passerculus sandwichensis*) by variable series of notes, 7–12 in number, expressed as "tzee", "zhip" or a scratchy "jeep", or "chi-chi-chi-chi-chi zzzzzzzr si-ch hu"; may be on a variable or ascending scale. Call a nasal "nyeu".
Habitat. Pine (*Pinus*) savanna at 2285–3050 m, mostly above 2800 m. Found in medium and tall bunchgrass meadows (*zacatón*) with the grasses *Muhlenbergia affinis*, *Muhlenbergia macroura*, *Festuca amplissima* and *Stipa ichu* interspersed with stands of pines, mainly Montezuma pine (*Pinus montezumae*), Hartweg's pine (*Pinus hartwegii*) and teocote (*Pinus teocote*); also in open pine–oak (*Pinus–Quercus rugosa*) woodland. In Durango occurs in dry marshes in tall grass, but not necessarily found near marshy areas. Bushes absent in habitat.
Food and Feeding. Observed to feed on moths and caterpillars (Lepidoptera), flying ants (Formicidae), earthworms (Lumbricidae), and grass seed. Stomach of one bird contained remains of a small beetle (Coleoptera) and a spider (Araneae). Forages mostly on and near ground within clumps of grass. Generally very secretive.
Breeding. Eggs and young found in Jun and Jul, nest with young in Aug, and juveniles recorded Aug and Sept. Nest built by female, taking 2–4 days, consists of outer shell of coarse grasses, lined with fine grasses and rootlets, and small amounts of horsehair, built c. 0·3 m above ground in middle of clump of bunchgrass or near ground between clumps of grasses. Clutch 3 eggs, blue-green with fine spots of burnt umber or blackish; incubation by female, period 15–16 days; chicks brooded by female, fed by both sexes, nestling period 9–12 days. Of eleven nests in one study, 36% succeeded in fledging young.
Movements. Apparently sedentary; possible short-distance post-breeding dispersal.
Status and Conservation. ENDANGERED. Restricted-range species: present in Sierra Madre Occidental and trans-Mexican range EBA. Locally common; has very small range, within which populations appear to be in rapid decline. Global population put at 2500–9999 mature individuals, great majority at a single site. According to recent survey, species now survives at only two locations: one in Distrito Federal (centred around La Cima and Milpa Alta, near Mexico City), where population in 1997 estimated at 5380–6150 adults; the other in S Durango (Ejido Ojo de Agua–El Cazador), where at least three breeding pairs concentrated in area of 0·5 ha within an 80-ha marsh and total population probably no more than 50 individuals. Density of 2·9 territories/ha recorded at La Cima. A report of this species at Los Dinamos (Distrito Federal) in 1993 referred to a misidentified juvenile of *Melospiza melodia*. Formerly occurred at four sites in S Durango and N Jalisco and at several localities around Distrito Federal–Morelos border. Had not been recorded in Durango since 1951 until rediscovered there in 2004. Overgrazing and fires remain a major threat; uncontrolled burning of bunchgrass meadows to create new pasture for sheep and cattle has destroyed much of the species' preferred habitat. Much of the tillable habitat in La Cima area has already been ploughed, and most of the habitat in Durango has been lost to logging and cultivation. At the main site, area of suitable habitat has decreased by c. 50% in ten years since end of 20th century. In addition, mycotoxins (from contaminated grain) found to have caused some mortality, and nesting failure very common owing to heavy predation, which may be exacerbated by habitat fragmentation. Conservation measures require urgent monitoring of remaining populations, and survey of suitable habitat in Durango, as well as effective protection of surviving habitat fragments; also encouragement for local inhabitants to develop appropriate grassland-management strategies and to ensure prevention of potential poisoning by micotoxins.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Cabrera-Garcia *et al.* (2006), Collar *et al.* (1992), Dickerman *et al.* (1967), Howell & Webb (1995), Klicka & Spellman (2007), Miller *et al.* (1957), Oliveras de Ita & Gómez de Silva Garza (2002, 2007), Oliveras de Ita & Rojas-Soto (2006), Oliveras de Ita *et al.* (2001), Pitelka (1947), Rojas-Soto *et al.* (2008), Stattersfield & Capper (2000).



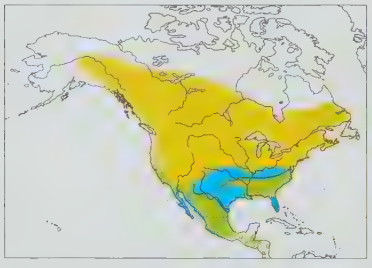
Genus *SPIZELLA* Bonaparte, 1832

80. Chipping Sparrow

Spizella passerina

French: Bruant familier **German**: Schwirrammer **Spanish**: Chingolo Cejiblanco

Taxonomy. *Fringilla passerina* Bechstein, 1798, Quebec City, Canada.
Probably closely related to *S. pallida* and *S. breweri*, and individuals of the three in first-winter plumage difficult to differentiate. Geographical variation rather minimal, and in North America clinal, with slight increase in darkness from W to E; also substantial individual variation within populations. Proposed races *stridula* (described from Pasadena, California) and *boreophila* (from Fort Simpson, Mackenzie, in Canada) are considered synonyms of *arizonae*, *comparanda* (from SE Nayarit, in W Mexico) is included within *atremaea*, *repetens* (from R Molino in S Oaxaca, in Mexico) is subsumed in *mexicana*, and *cicada* (from near Chalatenango, in NW El Salvador) is synonymized with *pinetorum*. Five subspecies recognized.
Subspecies and Distribution.
S. p. arizonae Coues, 1872 – breeds in E Alaska, W & C Canada (from W Yukon and C Mackenzie E to N Saskatchewan, N Manitoba and W Ontario) and W USA (E to W & C Texas), S to Mexico (N Baja California, NW Sonora, SW Chihuahua, Durango and Coahuila); non-breeding from SW USA (C California, S Nevada, C & SE Arizona, C New Mexico and C Texas) S to S Baja California and highlands of Mexico (S to Oaxaca).
S. p. passerina (Bechstein, 1798) – breeds in N Minnesota, N Michigan and SE Canada (C Ontario and S Quebec E to SW Newfoundland) S in USA to S Oklahoma, SE Texas, C Louisiana, S Mississippi, NW Florida, C Georgia and SE South Carolina; non-breeding from Oklahoma and Arkansas E to Virginia and Maryland S to S Florida, Gulf Coast and NE Mexico (Nuevo León and Tamaulipas).
S. p. atremaea R. T. Moore, 1937 – W Mexico in Sierra Madre Occidental from S Chihuahua and S Durango E to C Nuevo León and S to Aguascalientes and NE Jalisco.
S. p. mexicana Nelson, 1899 – highlands of C & S Mexico from Nayarit, NC Jalisco, Guanajuato, San Luis Potosí, Hidalgo and E Veracruz S to Chiapas, and NW Guatemala.
S. p. pinetorum Salvin, 1863 – NE Guatemala (E Petén), Belize, Honduras, N El Salvador and NE Nicaragua.



Descriptive notes. 12–14 cm; 10·3–15·5 g. A small, slim sparrow with long, notched tail. Nominate race breeding has forehead black, usually small whitish medial spot above bill, bright rusty cap, greyish-white supercilium and black eyestripe; nape and side of head grey, very thin dark moustachial line, broad white submoustachial stripe, thin dark malar line; upperparts rusty brown with dark brown streaking, rump grey; tail brown; upperwing dark brown, feathers edged rusty, median and greater upperwing-coverts rusty, tipped white or light beige (forming one or two wingbars); throat whitish; breast and flanks grey to greyish-brown, belly dull white; iris black; bill black; legs fleshyy-pink to light brown, often duller on feet. Non-breeding plumage is like breeding but duller, with cap dull chestnut and (especially late in season) finely streaked dark brown or black, supercilium tinged brownish-yellow, rump pale brown with fine dark streaks, becoming grey, wing edgings browner; bill brownish, lower mandible flesh-coloured. Sexes similar in coloration. Juvenile resembles non-breeding adult, but a little duller, and with face, breast and flanks heavily streaked blackish. Race *arizonae* is larger and paler than nominate; *atremaea* is darker and brighter than previous, and has wider streaking above; *mexicana* is larger and darker than nominate, with rustier crown; *pinetorum* is darkest and brightest race. Voice. Song a thin, dry rattle on one pitch. Call a thin, clear "tseep" or dry "chip".
Habitat. Breeds in dry open woodland with grassy understorey, orchards, parks and golf courses; also in mixed woodland. In SW USA (California) occupies wide variety of habitats, including coniferous forest at high elevations, and orchards in humid coastal belt, and at least occasionally in Channel Is. In S Mexico (Oaxaca) breeds in arid pine–oak (*Pinus–Quercus*) woodland, and in Central America in open pine woodland. In winter in various kinds of open woodland, shrubland, brush, and arid subtropical scrub. Sea-level to at least 3500 m.
Food and Feeding. Consumes seeds throughout year; insects form bulk of diet during breeding season. Seeds of dandelion (*Taraxacum officinale*) an important spring food, but also eat seeds of black bindweed (*Fallopia convolvulus*), sweet clovers (*Melilotus*), chickweed (*Stellaria media*), lamb's quarter (*Chenopodium album*), oats (*Avena*), and of many other species. Invertebrate food principally insects, e.g. Lepidoptera, beetles (Coleoptera), Orthoptera and others; sometimes takes spiders (Araneae). Forages principally on or near ground and low in vegetation, often near edges of fields and meadows. Outside breeding season usually in small flocks.
Breeding. Season Mar–Aug, from Mar (Jun in Morelos, in Mexico) in S, but from mid-May and Jun in Oaxaca (S Mexico); commonly double-brooded, sometimes three broods in S of range. Monogamous; occasional polygyny recorded. Sometimes breeds co-operatively, with helpers. Males of migratory populations begin to sing and defend territory very soon after arrival in spring. Nest constructed by female alone, within two weeks of her arrival, a cup of dried grasses and rootlets, lined with finer grass and usually hair, particularly horsehair, placed usually above ground and normally below 6 m in bush or tree, commonly a conifer, often in open grassy area; often young, short and thick conifer chosen (up to 90% of nests are in young conifers). Clutch 2–8 eggs, usually 4, generally pale blue with sparse dark brown to purplish markings; incubation by female, period 10–12 days; chicks fed by both parents, largely by male in early days, nestling period 9–12. Nests commonly parasitized by Brown-headed Cowbird (*Molothrus ater*), often resulting in abandonment of nest. Brood parasitism causes severe reduction in productivity, but effects vary depending on locality, and populations farther N only very rarely parasitized.
Movements. N races migratory; resident in S. Begins to leave wintering grounds in S USA (Florida and Texas) in late Feb; moves through Oklahoma from late Mar to early Apr, late Apr in Minnesota and Wisconsin, and arrival in Canada (S Alberta and N Ontario) by mid-May. Arrival in more S breeding areas, such as Texas, as early as Mar. Coastal migrants along Atlantic earlier than in areas farther inland; passage along W coast in Oregon during early Apr to mid-Apr W of Cascades, and late Apr to early May E of Cascades. Males arrive at breeding areas 1–2 weeks before females. Leaves breeding grounds as early as Jul in some areas, particularly interior W; Rocky Mts populations begin S-bound movement mid-Jul (as they head to moulting grounds in Great Plains), and movements out of breeding areas farther E peak by early Aug to mid-Sept; early arrivals in wintering areas in Texas and Florida by mid-Sept, and peak in arrival during early Nov.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. Widespread within its large range. Relatively tame, and easy to observe.
Bibliography. Albrecht & Oring (1995), Anon. (1998), Beadle & Rising (2002), Binford (1989), Bojfror (1959), Button (1937), Dickey & van Rossem (1938), Dunning (2008), Gilligan *et al.* (1994), Grinnell (1915), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Hubbard & Crossin (1974), Liu Wanchun & Kroodsma (2007), Marshall (1957), Middleton (1998), Middleton & Prescott (1989), Miller *et al.* (1957), Moldenhauer & Taylor (1973), Monroe (1968), Phillips *et al.* (1964), Pyle (1997), Reynolds & Knapton (1984), Rising & Beadle (1996), Rowley (1962), Russell & Monson (1998), Salvadori (1999), Scott (1988), Simmons & Sloan (1974), Sloan &

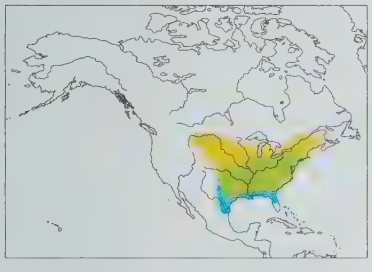
Simmons (1973), Swanson *et al.* (2004), Tasker (1955), Walkinshaw (1944, 1959), Willoughby (1991), Zink & Dittmann (1993b).

81. Field Sparrow

Spizella pusilla

French: Bruant des champs **German**: Klapperammer **Spanish**: Chingolo Campestre

Taxonomy. *Fringilla pusilla* A. Wilson, 1810, Philadelphia, Pennsylvania, USA.
Sometimes considered sister to *S. wortheni*; has been considered conspecific, but more closely resembles *S. atrogularis* in song and ecology, as well as bill colour. Races intergrade broadly in Great Plains; intermediate populations have been described as separate races, *perissura* (described from Valentine, Nebraska) and *vernonia* (Japonica, Texas), but great variability of these intergrading populations makes taxonomic separation both inappropriate and unhelpful; both herein included within *arenacea*. Two subspecies recognized.
Subspecies and Distribution.
S. p. arenacea Chadbourne, 1886 – breeds in C USA from SE Montana and North Dakota S through Great Plains to NE Colorado, W Oklahoma and C Texas; non-breeding from Kansas, C Oklahoma, N Arkansas and NW Mississippi S to NE Mexico (to N Coahuila, C Nuevo León and Tamaulipas).
S. p. pusilla (A. Wilson, 1810) – breeds in SE Canada (S Manitoba, S Ontario and S Quebec) and E USA from C Minnesota and C Michigan E to S Maine, S to E Texas, SE Louisiana, S Mississippi, SE Alabama and SW Georgia, rarely to NC Florida; non-breeding from E Kansas, C Missouri, C Ohio, N West Virginia, Maryland and S Massachusetts S to S Texas, Gulf Coast and C Florida.



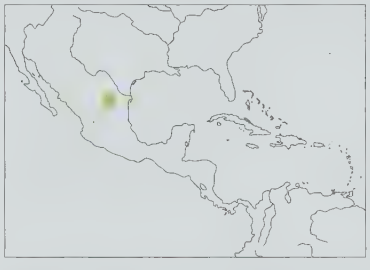
Descriptive notes. 13·5–14·5 cm; 11–15·7 g. A small, slim sparrow with long, notched tail. Nominate race has rusty-pink crown with faint grey median crownstripe; side of head grey, thin white eyering, rusty postocular stripe; nape rusty; upperparts rusty with darker brown streaks, lower back to uppertail-coverts plain grey-brown or slightly streaked light brown; tail dark brown, feathers with narrow grey edges; upperwing mainly dark brown, lesser coverts mostly grey, median coverts blackish-brown with broad light buff to whitish tips, greater coverts and tertials blackish-brown with rusty to buffy edges (usually rustier on tertials) and paler tips (most notable on outer webs of greater coverts, forming a second wingbar); throat and underparts grey, tawny wash on breast and flanks; iris dark brown; bill pink; legs pale brown to pinkish-yellow. Sexes similar. Juvenile is similar to adult, but without rusty colours, crown dull grey to brown, and breast and flanks with light dusky streaks. Race *arenacea* is paler than nominate, also slightly larger, with postocular stripe less prominent. VOICE. Song, sometimes at night, a series of 2 or more clear, plaintive, run-on whistles that accelerate and ascend into a trill, "swee-swee-swee-swee-wee-wee-wiwiwi". Call "tsip", "zweep" or sharp "chip".
Habitat. Breeds in oldfields, and occasionally new plantations (Christmas-tree farms), in E parts of range often with broomsedge (*Andropogon virginicus*), crabgrass (*Digitaria*) and horseweed (*Leptilion*) and other grasses; also in shrubby woodland edges, fencerows, and brush borders of streams. Occurs up to 3500 m.
Food and Feeding. Diet includes seeds of broomsedge, horseweed, and crabgrass and other grasses; in summer insects comprise more than 50% of diet. Arthropods commonly eaten include cicadas (Cicadidae), spiders (Araneae), Orthoptera (commonly katydids), Lepidoptera larvae and adults, and flies (Diptera). Forages principally on or near ground and low in vegetation. Often in pairs or small groups outside breeding season.
Breeding. Season late Apr/early May to early Aug, in South Dakota late May through Aug; may rear several broods in a season. Usually monogamous; 2% of males in Pennsylvania polygynous. Female chooses nest-site and builds nest, often accompanied by male during building stage, nest a cup made from dry grasses and twigs, lined with finer grasses, rootlets and hair, placed on or near ground in grass clump or near base of shrub; later nests may be placed low in crotch of tree or shrub, in black raspberry (*Rubus allegheniensis*), prairie crab apple (*Malus ioensis*), red cedar (*Juniperus virginiana*), sprouting elm (*Ulmus*) or similar; nest sometimes reused for later broods. Clutch 3–5 eggs, most commonly 4, cream-coloured to pale bluish and spotted brownish or reddish throughout, but spots concentrated at wide end; incubation by female, period 10–12 days; chicks fed by both parents, nestling period 7–9 days. Nests commonly parasitized by Brown-headed Cowbird (*Molothrus ater*); often deserts parasitized nests and is a poor host, seldom raising cowbird young successfully.
Movements. Partially migratory; individuals breeding N of Massachusetts, N Kansas, and many in Ohio migrate into S USA. Routes not well known, movement likely on a generally broad front with some concentration along major river valleys. Migration has been characterized as slow and leisurely, with long stopovers. Movement out of Tennessee as early as late Feb, peak in early Mar, arriving in South Dakota, S Michigan and Wisconsin as early as mid-Mar, Nebraska mostly late Apr; overall, most of spring migration takes place during mid-Apr to early May. Males arrive in breeding areas 10–20 days before females. Begins to leave breeding grounds in Sept; mostly gone from Wisconsin by end Oct, from South Dakota and Nebraska mid-Nov; a few winter records for Nebraska, and one winter record from Manitoba. Casual in E Canada in Newfoundland, Nova Scotia, New Brunswick and SE Quebec (including Magdalen Is), and in Bermuda. Vagrant W in USA to Wyoming, California, Arizona and C New Mexico.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. Rare as a breeder in S Manitoba (Canada). Has benefited from clearance of forest. In Midwest numbers certainly increased after virgin forests cut; in Ohio became a common summer resident by late 19th century.
Bibliography. Allaire (1972), Anon. (1998), Beadle & Rising (2002), Best (1974, 1977a, 1977b, 1977c, 1978, 1979), Burhans *et al.* (2001), Carey (1990), Carey *et al.* (1994), Dooling *et al.* (1979), Dunning (2008), Evans (1978), Fretwell (1968), Heckenlively (1976), Hellmayr (1938), Henise (1997), Laskey (1934), McCarthy (2006), McPeek (1994), McWilliams & Brauning (2000), Monahan & Hijmans (2008), Nelson, D.A. (1988, 1989, 1992), Nelson & Croner (1991), Nicholson (1981), Olson & Kendeigh (1980), Peterjohn (1989), Pyle (1997), Rising & Beadle (1996), Robbins (1991), Robert (1971), Roberts (1936), Saunders (1922), Schneider (1981), Sharpe *et al.* (2001), Short (1966), Small, D.M. *et al.* (2007), Stanford (1995), Suthers (1994), Tallman *et al.* (2002), Taylor (2003), Walkinshaw (1939b, 1968), Willoughby (1991).

82. Worthen's Sparrow

Spizella wortheni

French: Bruant de Worthen **German**: Mexikoammer **Spanish**: Chingolo de Worthen

Taxonomy. *Spizella wortheni* Ridgway, 1884, Silver City, New Mexico, USA.
Sometimes considered sister to *S. pusilla*; has been considered conspecific, but *S. pusilla* appears closer to *S. atrogularis*. Recently published molecular data indicate that present species is sister to *S. breweri*, suggesting that plumage similarities to *S. pusilla* reflect convergence; song reminiscent of that of *S. passerina*, but molecular work suggests that the two are not sister-taxa. Race *browni* known only from three specimens from type locality (near Sombrerete, in W Zacatecas). Two subspecies recognized.
Subspecies and Distribution.
S. w. wortheni Ridgway, 1884 – SE Coahuila and SW Nuevo León, in NE Mexico.
S. w. browni Webster & Orr, 1954 – W Zacatecas, in NC Mexico.



Descriptive notes. 11–14 cm; 9·5–15 g. A small, slim, long-tailed sparrow. Male nominate race has crown rusty, becoming grey towards bill, grey nape; side of face greyish, with greyish-brown ear-coverts, buffy eyering, faint thin dark moustachial line and malar line (fainter in worn plumage); upperparts sandy brownish, mantle with dark brown streaks, rump plain grey; tail feathers dark brown with narrow greyish edges; upperwing dark brown, most feathers with pale greyish-buff edges, median and greater coverts with pale buff tips (forming two weak wingbars, which can largely disappear in worn plumage); throat white, underparts plain pale grey; iris dark; bill pink; legs black, or pink to pale orange (may vary seasonally). Female is very like male, but crown buffy brown, obscurely streaked blackish-slate, sometimes buffy brown on back, with ground colour a little more cinnamon, scapulars, secondaries and wing-coverts edged with buffy brown. Juvenile is similar to adult, but without rusty crown, and with prominent pale buffy eyering, and buffy postocular stripe, has dark streaks on head, breast and flanks. Race *browni* is said to be darker than nominate. VOICE. Song a high "peee churrrr", first note slurred, and usually on lower pitch, also described as a dry chipping trill suggesting song of *S. passerina*. Call a high, thin dry "tssip" or "tsip", sometimes repeated rapidly.
Habitat. Arid upland mesquite–juniper (*Prosopis–Juniperus*) and yucca–juniper (*Yucca–Juniperus*) grasslands with sparse shrubs. Appears to show preference for ecotones between gypsophilous grasslands (*Muhlenbergia*, *Hilaria* and *Bouteloua*) and desert scrub dominated by tarbush (*Flourensia cernua*), Berlandier's wolfberry (*Lycium berlandieri*), four-winged saltbush (*Atriplex canescens*), crown-of-thorns (*Koeberlinia spinosa*) and creosote bush (*Larrea tridentata*), with a few tree cholla (*Cylindropuntia imbricata*) and *Opuntia*, and perhaps with Russian thistle (*Salsola iberica*), and variety of other plants (*Machaeranthera*, *Croton*, *Zinnia* and *Ambrosia*). Found also in overgrown maize (*Zea mays*) fields. May forage in overgrazed pastures, but prefers pastures that are not overgrazed, with waist-high junipers. At 1200–2450 m.
Food and Feeding. Little information. Probably mostly seeds in winter, augmented with other plant food; insects e.g. moths (Lepidoptera), also spiders (Araneae). Forages on ground. Outside breeding season commonly in small flocks, formerly often of up to 50 individuals and exceptionally to 120; forms mixed flocks with *Pooecetes gramineus* and/or *S. pallida*.
Breeding. Peak of breeding activity in Zacatacas, Coahuila and Nuevo León in Jun and Jul, with juveniles observed in Aug; timing of nesting probably related to rains. Nest a cup woven from dry grasses, with finer lining, placed 0·1–1·5 m up in tarbush or thorn shrub, or close to (usually below 30 cm) or even on ground in weeds, usually of the mint family (Lamiaceae). Clutch 2–5 eggs, most commonly 3 (of six nests in Zacatecas, four had 4-egg clutches and two held 3-egg clutches; nests in Nuevo León and Coahuila contained 2 or 3 eggs), pale blue with brown to chestnut mottling at large end, resembling eggs of *S. pallida*. No information on incubation and nestling periods. Breeding success evidently very low, only 14% in one area and 0% in another; disturbance by livestock and predation seem to be main causes; snakes and coyotes (*Canis latrans*) thought to prey on nest contents.
Movements. Apparently sedentary; probably some short local movements in non-breeding season.
Status and Conservation. ENDANGERED. Rare and very local. Has extremely small range and population, both though to be decreasing. Global population probably no more than 100–120 mature individuals. Until very recently was known still to breed at only three locations (Las Esperanzas, in Nuevo León; and La India and Tanque de Emergencia, in Coahuila), at one of which population exceeds 50 individuals. In Jun–Jul 2006, three new breeding localities discovered, at La Carbonera and San Rafael, in Nuevo León, and at San José del Alamito, in Coahuila, with probable breeding also at El Erial–La Casita (in Nuevo León). Appears to be significantly affected by conversion of desert scrub to agriculture or livestock grazing; conservation measures should be geared to protect appropriate habitat. Formerly was found from SW New Mexico (and no doubt more widely in what is now SW USA) S through Mexican Plateau at least to Puebla. In New Mexico known only from type specimen, collected Jun 1884; in Mexico not recorded in C Chihuahua since 1959, no records from SW Tamaulipas since 1924, and last recorded in San Luis Potosí in 1951, in WC Veracruz in 1948 and in N Puebla in 1893. No records of race *browni* from Zacatecas (NW Sombrerete) since 1961; this poorly known race possibly extinct. Open shrub-grasslands have been severely reduced in extent by expansion of agriculture and grazing, and rate of habitat loss is increasing, mainly for potato-growing; unlikely that large tracts of suitable habitat survive near currently known sites. Very low reproductive success recorded, but effects on this on total population not known. Urgent conservation efforts required include implementation of full protection of all known breeding areas of this species and of other suitable areas of habitat.
Bibliography. Anon. (2010c), Behrstock *et al.* (1997), Butchart & Stattersfield (2004), Canales-del Castillo, González-Rojas *et al.* (2010), Canales-del Castillo, Klicka *et al.* (2010), Canales-Delgadillo *et al.* (2008), Collar *et al.* (1992), Garza de Leon *et al.* (2007), Howell & Webb (1995), Miller *et al.* (1957), Rising (1996a), Scott-Morales *et al.* (2008), Stattersfield & Capper (2000), Thayer (1925), Webster (1968), Wege *et al.* (1993).

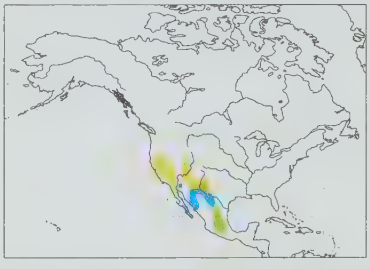
83. Black-chinned Sparrow

Spizella atrogularis

French: Bruant à menton noir **German**: Schwarzkinammer **Spanish**: Chingolo Barbinegro

On following pages: 84. Clay-colored Sparrow (*Spizella pallida*); 85. Brewer's Sparrow (*Spizella breweri*).

Taxonomy. *Spinites atrogularis* Cabanis, 1851, Mexico.
Probably closely related to *S. pusilla*, with which it shares many similarities in song and habitat, and *S. wortheni*, to which very similar in general appearance; mitochondrial DNA work on genus indicates that present species and *S. pusilla* are sister-taxa (*S. wortheni* may be closer to *S. breweri*). Present species is the only member of genus that exhibits sexual plumage dimorphism. Race *caurina* often synonymized with *cana*. Four subspecies generally recognized.
Subspecies and Distribution.
S. a. caurina A. H. Miller, 1929 – breeds in coast ranges of WC California from Contra Costa County S to San Benito County, occasionally N to S Oregon, in W USA; non-breeding range poorly known (one record from Santa Cruz I, in California).
S. a. cana Coues, 1866 – breeds in inner coastal mountains of C & SW California (from Monterey County S on W slopes of S Sierra Nevada) and extreme NW Mexico (N Baja California); non-breeding SW California S to S Baja California.
S. a. evura Coues, 1866 – breeds in SE California, S Nevada, SW Utah, C & SE Arizona, S New Mexico, W Texas and extreme N Mexico (NE Sonora); non-breeding range poorly known.
S. a. atrogularis (Cabanis, 1851) – C plateau of Mexico from Durango, S Coahuila and W Nuevo León S to C Oaxaca.



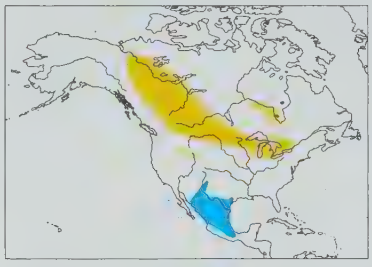
Descriptive notes. 14–15 cm; 9–14·8 g. A small, slim sparrow with long, notched tail. Male nominate race has grey head, with lores, area around base of bill and throat black (greyer in non-breeding plumage); upperparts cinnamon-brown to rufous-brown, streaked black, rump and uppertail-coverts grey or olive-grey; tail dark greyish-brown; upperwing mainly dark brown, feathers edged light buff, lesser coverts largely grey, median coverts with blackish-brown central area and broad buffy tips (during breeding, tips paler, forming wingbar), greater coverts and tertials broadly blackish on centre, tawny fringes broadest basally, narrower and paler buffy on tips, forming indistinct second wingbar (duller in worn plumage); chest and rest of underparts grey, palest on central belly and undertail-coverts; iris deep brown; bill bright pink; legs pinkish. Female is somewhat duller than male, has grey of head slightly washed brownish, black area of face smaller and greyer, thus less contrasting. Juvenile is like female, but without black on face, streaks above narrower, tertials edged pale rusty, chest grey, becoming nearly white on belly, and indistinctly streaked (variable) light grey. Race *evura* is paler than nominate, back sandy brown, black on throat restricted in extent; *cana* is shorter-tailed and smaller than nominate and previous, has underparts washed brownish; *caurina* is darker grey and less brown than other races, back richer cinnamon than in last. Voice. Song a clear ascending or descending trill, "sweet sweet sweet te te te te"; territorial males may countersing. Call a single thin "seep", "tsweet" or "cheep".
Habitat. Large tracts of undisturbed dry chaparral in foothills, and similar brushy habitats, commonly in tall and fairly dense sagebrush (*Artemisia*), manzanita (*Arctostaphylos*), ceanothus (*Ceanothus*) chaparral (dependent on frequent fires), often with scattered yucca (*Yucca*), also open juniper (*Juniperus*) woodlands, in rugged, rocky country. At 1200–2500 m; lower in winter.
Food and Feeding. Diet not well known. In winter principally seeds; in summer larval insects. Forages in variety of forbs, including pinyon (*Pinus*), juniper, coffeeberry (*Rhamnus californica*), mormon tea (*Ephedra nevadensis*) and chamise (*Adenostoma fasciculatum*). Gleans food from inner foliage and ground. Secretive and difficult to observe.
Breeding. Season middle to late Apr to early Jul, most activity mid-May to mid-Jun; probably single-brooded, perhaps occasionally two or three broods. Monogamous. May be loosely colonial. Nest a simple cup constructed from grasses, yucca fibres, stems, shredded bark, and perhaps a few small twigs or leaves, lined with finer material, in S California placed in big sagebrush (*Artemisia tridentata*) or California buckwheat (*Eriogonum fasciculatum*), less commonly in manzinita, oak (*Quercus*), desert ceanothus (*Ceanothus greggii*), holly-leaf cherry (*Prunus ilicifolia*) or redberry (*Rhamnus ilicifolia*), usually towards middle of shrub, mostly well concealed, at average height of c. 45 cm. Clutch 2–5 eggs, usually 3–4, pale greenish with scattered brown or blackish spots; replacement may be laid if first clutch lost; incubation by female, period 10–12 days; chicks fed by both parents, no information on duration of nestling period. Nests parasitized only very exceptionally by Brown-headed Cowbird (*Molothrus ater*).
Movements. Populations N of C Mexico migratory. Those breeding W of the Sierra and into N Baja California move S to C or S Baja California; migrant populations E of the Sierra move S to N & C Mexico (Sonora, Chihuahua, Coahuila). Arrivals of migrants in S part of breeding grounds from late Mar to early Apr, and correspondingly later farther N; in C & N California usually late Apr to early May, many not arriving until late May (presence in C California varies from year to year, depending on rainfall, sometimes entirely absent); reaches Great Basin early Apr to mid-Apr. S-bound movements not well known; breeding areas appear to be deserted by middle to late Aug. In 1955, an "extraordinary" autumn movement into SW Arizona took place following unseasonally heavy rains; many remained into winter and were identified as of race *cana*, which winters normally in S Baja California. Thus, migrations may vary in extent and geography depending on rainfall patterns.
Status and Conservation. Not globally threatened. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Generally uncommon and local; may be common in some places in optimum habitat. Global population estimated at 390,000 mature individuals. Declining in USA; Breeding Bird Survey data show average decrease in abundance of c. 5·4% per year during period 1966–2007. No information on population trends in Mexico. Characteristically found in large tracts of undisturbed habitat. Moves into areas in California a few years after fire, and may breed for several years in that area, before departing. Has suffered extensive habitat loss in recent decades. Main threats are continued degradation of habitat caused by mining activities, off-road vehicles, also fire suppression, as well as (especially in wintering range) overgrazing. Occurs within several protected areas, including Guadalupe Mountains National Park and Davis Mountains (Texas), Gray Ranch (New Mexico), Coronado National Forest (Arizona) and Vandenberg Air Force Base (California).
Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), Binford (1989), Grinnell & Swarth (1926), Hargrove (2010), Hellmayr (1938), Howell & Webb (1995), Lebbin *et al.* (2010), Miller *et al.* (1957), Phillips *et al.* (1964), Rising & Beadle (1996), van Rossem (1935), Russell & Monson (1998), Shackford (2003), Tenney (1997), Willoughby (1991).

84. Clay-colored Sparrow

Spizella pallida

French: Bruant des plaines **German**: Fahlammer **Spanish**: Chingolo Pálido

Taxonomy. *Emberiza pallida* Swainson, 1832, Carlton House, Saskatchewan, Canada.
Apparently closely related to *S. passerina* and *S. breweri*. Monotypic.
Distribution. Breeds in W & S Canada from WC Mackenzie, E British Columbia, Alberta, NW & C Saskatchewan and Manitoba (local and irregular in N) E to S Ontario and extreme S Quebec (rarely E to Gaspé Peninsula), S in USA to S Wisconsin, Michigan and New York (perhaps rarely S to SE South Dakota, NW Iowa, Illinois and N Indiana); non-breeding in S USA (S New Mexico and S Texas) and Mexico (S to Veracruz, Oaxaca and Chiapas), rarely Guatemala.



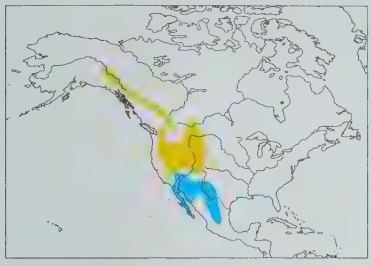
Descriptive notes. 12–13·5 cm; 9–15 g. A small, slim sparrow with long, notched tail. Has streaked crown with distinct cream-coloured median crownstripe and dark brown lateral crownstripe, broad whitish-buff supercilium, ochre ear-coverts, blackish eyestripe behind eye; blackish moustachial stripe, white submoustachial stripe and thin dark malar stripe; nape and side of neck grey; upperparts sandy brown to ochraceous buff, with bold blackish streaks, rump and uppertail-coverts plain and duller buffy-brown; tail brown; upperwing dark brown, feathers edged pale buff, median and greater coverts also with pale tips (forming two inconspicuous wingbars); throat whitish, underparts pale and unstreaked, with ochre breast; iris dark brown; bill reddish-flesh, dusky on culmen and near tip; legs pinkish or pale horn-coloured. Sexes similar. Juvenile is similar to adult, but crown clearly streaked with black, median stripe buffy, supercilium pale dull buff and indistinct, throat and flanks with distinct, thin brown streaks and spots. Voice. Song, occasionally at night, a series of 2–8 (usually 2–3) short, low-pitched, loud insect-like buzzes, "zee-zee-zee" or "buzz-buzz-buzz". Call a sharp "tsip", "chip" or "seep".
Habitat. Breeds in open, uncultivated brushy areas where shrubs interspersed in grasslands. In prairies characteristically found in rose (*Rosa*) or snowberry (*Symphoricarpos albus*) thickets, often along streams or around ponds; occurs also in alder (*Alnus*), willow (*Salix*) or poplar (*Populus*) parkland. In E, often in abandoned field with shrubs and small trees, and young conifer plantations. On migration may occur in mesquite (*Prosopis*) and other desert shrubs, thickets, open woodland and parks. In winter found in semi-arid grassland with small shrubs. Recorded from sea-level up to 2700 m.
Food and Feeding. Arthropods and seeds. Young fed mostly with Lepidoptera larvae, leafhoppers (Homoptera), adults and nymphs of grasshoppers (Orthoptera), spiders (Araneae), and damselflies (of family Coenagrionidae). In winter consumes variety of seeds, e.g. of alyssum (*Alyssum*), cockscomb (*Celosia*), lamb's quarters (*Chenopodium*), pigweed (*Axyris amaranthoides* and *Amaranthus retroflexus*), and various grasses. Forages low down and on ground. Gleans insects from low vegetation; takes seeds from ground or low seedheads. Outside breeding season usually in small flocks, often mixed with other sparrows, including *S. passerina* and *S. breweri*.
Breeding. Season late May to early Aug; sometimes double-brooded. Monogamous. Pair formation relatively quick after arrival of females on breeding grounds. Nest constructed by female, often accompanied by male, work takes 2–4 days to complete, a cup made from grasses, twigs and stalks, softer lining of fine grasses, hair and rootlets, placed near ground, usually below 30 cm, in bush, in Canadian Prairies mostly in snowberry. Clutch 3–5 eggs, usually 4, pale blue with brown markings; incubation by female, period 10–14 days, usually 11 days; chicks fed by both parents, nestling period 7–9 days; young not able to fly until 14 days old. Nests parasitized by Brown-headed Cowbird (*Molothrus ater*); in one study more than a third of all nests were parasitized, and usually only cowbird young survives.
Movements. Migratory. Migration routes largely through Great Plains, E of Rocky Mts and W of Mississippi; apparently, autumn migration may be slightly farther to W than that in spring. First obvious signs of movement N from Mexican border in late Mar/early Apr, movements along border zone continuing to mid-May. Arrival on breeding grounds from as early as late Apr, but usually in first week of May, and in Saskatchewan peak movements in mid-May; males arrive on breeding grounds 3–7 days before females. Post-breeding departure dates unclear (species becomes difficult to follow and track); remains on breeding grounds into Aug, some into early Sept, rarely Oct, although some moving S by early Aug, and some reach Texas by this time. Rare but regular on passage on both coasts; in California mainly a coastal migrant, peak late Sept to mid-Oct, and much rarer along W coast in spring. Casual visitor to Bermuda, Bahamas and Cuba.
Status and Conservation. Not globally threatened. Locally common to very common in appropriate habitat. In USA, rare but increasing in New York, rare in S Michigan, and apparently irregular at S limits of breeding range (South Dakota, NW Iowa, Illinois and N Indiana). In Mexican non-breeding range, common in Coahuila, incommon in S Baja California and Oaxaca.
Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), Binford (1989), Brooks (1974), Davis (2003), Dunning (2008), Fedak (1999), Fox (1961), Grant *et al.* (2006), Griffith (1992), Griscom (1932), Hellmayr (1938), Howell & Webb (1995), Knapton (1978, 1979a, 1979b, 1982, 1994), McCarthy (2006), Miller *et al.* (1957), Newman (1985), Rising & Beadle (1996), Root (1968), Russell & Monson (1998), Salt (1966), Seyffert (1988), Thurber (1986), Urban (1959), Walkinshaw (1939a), Warburton (1952), Willoughby (1991).

85. Brewer's Sparrow

Spizella breweri

French: Bruant de Brewer **German**: Nevadaammer **Spanish**: Chingolo de Brewer
Other common names: Timberline Sparrow (*taverneri*)

Taxonomy. *Spizella breweri* Cassin, 1856, western North America, California, and New Mexico = Black Hills, South Dakota, USA.
Apparently closely related to *S. passerina* and *S. pallida*. It has been suggested that race *taverneri* represents a distinct species, differing in habitat preferences; further study required. Two subspecies currently recognized.
Subspecies and Distribution.
S. b. taverneri Swarth & A. C. Brooks, 1925 – breeds in SE Alaska and W Canada (SW Yukon and NW & SE British Columbia and W Alberta) and N USA (W Montana); non-breeding range SW USA (Arizona E to W Texas) and probably N Mexico.
S. b. breweri Cassin, 1856 – breeds in S Canada (extreme S British Columbia, S Alberta and SW Saskatchewan) and W USA from E Montana, SW North Dakota and NE Colorado S to E & S California, S Nevada, C Arizona and NW New Mexico; non-breeding from S edge of breeding range S to NW & W Mexico (Baja California E to Coahuila, Nuevo León, San Luis Potosí, Guanajuato and Jalisco).
Breeds also in mountains from W Montana S to Colorado; race uncertain.
Descriptive notes. 12·5–15 cm; 8·9–14 g, *taverneri* larger (average 12·3 g), nominate 8·9–11·8 g.



A small, slim sparrow with long, notched tail. Nominate race has crown finely streaked with brown, without distinct median crownstripe (some individuals have a faint one), supercilium pale dull grey to dull whitish, lores pale, thin white eyering, dark eyestripe behind eye; ear-coverts brown, moustachial and malar stripes thin and brown; side of neck greyish-brown, faintly streaked; upperparts light brown with dark brown streaks or rows of spots, rump and uppertail-coverts plain brown; tail brown; upperwing dark brown, feathers edged narrowly pale buff, median and greater upperwing-coverts also with paler buff tips (forming two poorly defined wingbars); throat and underparts whitish, breast and flanks washed pale greyish-buff; iris dark brown; bill dull horn-brown to pale horn-pink, with dusky culmen and tip; legs pinkish or pale horn. Sexes similar. Juvenile is similar to adult, but less streaked above, with breast and flanks narrowly streaked with black triangular marks. Race *taverneri* is slightly larger than nominate, greyer (less brown) in coloration, with more contrast between grey breast and white belly, dorsal streaking coarser, head pattern bolder (approaching that of *S. pallida*), nape more heavily streaked, and bill darker and usually smaller. VOICE. Difficult to describe. Short song a "bzzzzzzz chip-chip-chip-chip-chip", second part slightly lower in pitch, and first part like a song of *S. pallida*; long song a sustained series of buzzing, bubbling, wheezing and canary-like trilling on different pitches. Call a weak "tsip", "chip" or "seep", like that of *S. pallida*.

Habitat. Throughout most of range found in shrubland dominated by big sagebrush (*Artemisia tridentata*); in winter in arid or semi-arid scrub with saltbush (*Atriplex*) and creosote bush (*Larrea tridentata*). Sometimes found in mountain mahogany (*Cercocarpus montanus*), rabbitbrush (*Chrysothamnus*) and pinyon–juniper (*Pinus* cf. *edulis–Juniperus*) grassland, or in bunchgrass prairie. Race *taverneri* in dwarf balsam fir–dwarf birch (*Abies–Betula*) habitat at or above timber-line. On migration and in winter occurs in variety of habitats, including weedy fields, edges of agricultural fields, and urban areas, and in creosote bush and other low xeric vegetation; in Arizona found in winter in open desert. Sea-level to 2500 m.

Food and Feeding. Few data on diet. Arthropods and seeds. Young fed mostly with Lepidoptera larvae, spiders (Araneae), bugs (Hemiptera) and leafhoppers (Homoptera). Forages low down and on ground. Gleans insects from low vegetation; takes seeds from ground and from low seedheads. In non-breeding season usually in small flocks, often mixed with other sparrows.

Breeding. Season mid-May through Jul; sometimes double-brooded. Monogamous. Occasional cooperative nesting recorded. Pairing within a few days of arrival of females on breeding grounds. Nest a cup of dry grass and sometimes sagebrush stems, lined with finer grasses, rootlets and commonly horsehair, placed low down near ground (rarely on ground), most (over 80%) of those of nominate race in thicker stand of big sagebrush, nests of *taverneri* in dwarf shrub or bush. Clutch 2–5 eggs, usually 3, blue-green with brown or rusty spots; incubation by female, rarely assisted by male, period 10–12 days, usually 11 days; chicks fed by both parents, nestling period c. 9 days. Proportion of nests parasitized by Brown-headed Cowbird (*Molothrus ater*) varies geographically, up to 50% in some places; usually abandons nest if parasitized.

Movements. Migratory; good evidence that populations farthest N leap-frog over S ones, and winter farthest S. Nominate race winters in Sonoran and Chihuahuan desert habitats from SW USA S into C Mexico; essentially, moves N and S, using lowland valleys as corridors for migratory passage. Migrants in Great Basin noted from mid-Mar, peak in Apr, and into early May; in S Canada (Alberta), more S and lowland nominate race arrives by early May, while more N and highland race *taverneri* arrives late May. Males reach breeding grounds approximately a week before females. In autumn, some depart by late Jul, many passing through SE Arizona in early Aug to mid-Aug, and migration can continue into early Oct; in lower Colorado Valley many present in early to middle Sept. N race *taverneri* begins to leave breeding areas from Aug, and gone by late Sept. Rare in autumn W to Pacific Coast and E to W Kansas and Oklahoma. Vagrant in E North America, recorded in autumn and winter in Minnesota, Nova Scotia, Massachusetts and Louisiana, and in spring in Ontario and Illinois.

Status and Conservation. Not globally threatened. Classified as "Declining" in the USA (Yellow WatchList priority species for conservation). Often common or very common in appropriate habitat. Numbers apparently declining significantly in much of W part of range owing to habitat destruction. Main threats are fragmentation and destruction of sagebrush habitat through agricultural expansion and overgrazing, as well as altered fire regimes; frequent fires enables invasive grasses to become dominant, and suppression of fire allows growth of pinyon–juniper woodland. This species occurs in several protected areas.

Bibliography. Anon. (1998), Banks & Gibson (2007), Beadle & Rising (2002), Best & Petersen (1985), Biermann *et al.* (1987), Butchart & Stattersfield (2004), Doyle (1997), Dunning (2008), Gill & Krannitz (1997), Harrison *et al.* (2009), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Igl (2007), Klicka *et al.* (1999), Lebbin *et al.* (2010), Mahony, Krannitz & Martin (2006), Mahony, Vander Haegen *et al.* (2001), Mayr & Johnson (2001), McCarthy (2006), Miller *et al.* (1957), Nordin *et al.* (1988), Paine (1968), Petersen & Best (1985a, 1986), Petersen *et al.* (1986), Phillips *et al.* (1964), Pyle (1997), Reynolds (1981), Rich (1978, 1980a, 2002), Rising & Beadle (1996), Rotenberry *et al.* (1999), Russell & Monson (1998), Semenchuk (1992), Urban (1959), Welstead *et al.* (2005), Wiens *et al.* (1990), Willoughby (1991).



PLATE 49

inches 3

cm 8

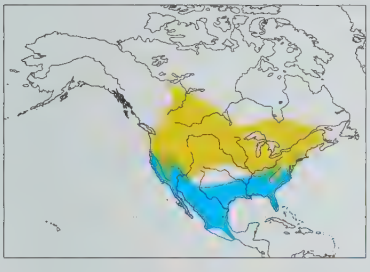
Genus *POOECETES* S. F. Baird, 1858

86. **Vesper Sparrow**

Pooecetes gramineus

French: Bruant vespéral **German**: Abendammer **Spanish**: Chingolo Coliblanco
Other common names: Oregon Vesper Sparrow (*affinis*)

Taxonomy. *Fringilla graminea* J. F. Gmelin, 1789, New York, USA.
Perhaps close to *Melospiza* and some *Ammodramus* species. Geographical variation largely clinal. Proposed race *altus* (described from Kendrick Park, in NC Arizona), treated as a synonym of *confinis*. Three subspecies recognized.
Subspecies and Distribution.
P. g. confinis S. F. Baird, 1858 – breeds in SW Canada (C British Columbia and SW Mackenzie E through C Saskatchewan and S Manitoba to W Ontario) and S in USA to CE California, C Nevada, C Arizona, C New Mexico, E Colorado and W Nebraska; non-breeding from S edge of breeding range (California E to New Mexico) and from S Texas S in Mexican highlands (to Oaxaca), occasionally to Guatemala.
P. g. affinis G. S. Miller, 1888 – breeds in W Washington and W Oregon (W USA); non-breeding from C California (W of Sierra Nevada) S to NW Mexico (NW Baja California, possibly also Chihuahua).
P. g. gramineus (J. F. Gmelin, 1789) – breeds in SE Canada (NE Ontario and S Quebec E to Prince Edward I and N Nova Scotia) and E USA from N Minnesota E to Maine and S to C Missouri, C Kentucky, NE Tennessee, C North Carolina and S Virginia; non-breeding from S part of breeding range S to C Texas and Gulf Coast.



Descriptive notes. 14–18 cm; 19·5–28·3 g. A medium-sized sparrow with fairly large, conical bill, much white in outer tail feathers. Nominate race breeding has crown and nape greyish-brown, conspicuously streaked dark brown, supercilium and submoustachial stripe often largely unstreaked whitish, greyish or buffy (paler than other facial markings, but not distinct), whitish line on central forehead, white eyering; ear-coverts pale in centre, dark towards rear; moustachial and malar stripes brown; nape and upperparts greyish-brown, dark centres of feathers giving conspicuously streaked appearance, rump less boldly streaked than back; tail brown, outer web and tip of outermost feather pair white, adjacent one variable but usually some white in outer web (in flight, outer tail flashes conspicuously white); upperwing dark brown, lesser upperwing-coverts rusty, tips of median and greater coverts light buff or buffy white (forming one or two indistinct wingbars), tertials narrowly edged buffy or buffy white; throat buffy white with indistinct dark spotting; underparts dull whitish, breast and flanks narrowly streaked brown, belly white, undertail-coverts whitish; iris light brown or brown; bill flesh-coloured, broadly dusky on culmen; legs pinkish. In fresh non-breeding plumage, generally more buffish (less grey) in appearance, and underparts faintly tinged buff. Sexes similar in coloration. Juvenile is like adult, but buffier. Races differ minimally: *affinis* is relatively small, upperparts somewhat more buffish; *confinis* is on average somewhat larger, with relatively longer, more slender bill. Voice. Song, from tree or exposed perch, sweet and musical, generally 2–4 long clear notes, often with downward slurs, followed by shorter flute-like trills, often rising and then falling in pitch; reminiscent of song of *Melospiza melodia*, but sweeter and more plaintive; occasional flight song given. Call a sharp "chirp".
Habitat. Dry open grasslands with sparse and patchy herbaceous vegetation, fields, and brushy second growth; sometimes in openings in pine–oak (*Pinus–Quercus*) woodlands, oldfields, and reclaimed strip mines. In winter found in arid tropical scrub. Sea-level to 2500 m.
Food and Feeding. Diet mainly small invertebrates and seeds. Invertebrates taken include beetles (Coleoptera), grasshoppers (Orthoptera), caterpillars (Lepidoptera), spiders (Araneae). Consumes grass and weed seeds, also waste grain. Forages principally on or near ground and low in vegetation; runs or hops on ground. Sometimes uses a double-scratch when searching for arthropods in litter; also gleans insects from low vegetation. Will perch on fences or trees. Generally singly; on migration also often in small loose flocks.
Breeding. Season Apr–Aug; generally one or two broods, occasionally triple-brooded. Monogamous; occasionally polygynous. Males arriving late on breeding grounds often have trouble in pairing. Nest shallow cup of dry grasses, lined with finer vegetation, rootlets, hair and sometimes feathers, placed on ground, sometimes in depression and often well hidden by grass, at other times in much more open situation. Clutch 3–5 eggs, usually 4 (occasionally 6), whitish with lavender to brownish-red speckling; incubation by female, period 12–13 days; chicks fed by both parents, nestling period at least 9 days. A relatively frequent host of Brown-headed Cowbird (*Molothrus ater*), but little information on effects on breeding success.
Movements. Mostly migratory. Spring migration from mid-Feb to early May; in Colorado Valley passage through to Apr, arrival in Oregon as early as late Feb/early Mar W of Cascades and late Mar/early Apr E of Cascades; moves through Great Plains late Mar to early May, peak in Great Lakes region early to late Apr. Males arrive on breeding grounds a week before females. Autumn migration from mid-Aug through mid-Nov, with peak movements Sept to early Oct; all have left Alberta by mid-Sept, and Great Lakes region most gone by late Oct, some lingering into Nov. In N Mexico (Sonora) most migration in Nov and Mar. Nominate race casual in winter in E & SE Mexico (Tamaulipas and Yucatán) and Bermuda. Migrates in small groups or loose flocks, sometimes with Horned Larks (*Eremophila alpestris*) or *Passerculus sandwichensis*.
Status and Conservation. Not globally threatened. Race *affinis* listed as a "California Bird Species of Special Concern" (wintering population). Locally common in appropriate habitat. Changes in farming practices appear to be correlated with changes in the species' range and abundance in E, where it probably was not common in pre-Columbian times. In W, will benefit from management to preserve dry grassland. Overgrazing of desert grassland has destroyed much of wintering habitat; greatest remaining threat is development of the largely flat and open grassland used during non-breeding period.

Bibliography. Adams *et al.* (1994), Beadle & Rising (2002), Best & Rodenhouse (1984), Binford (1989), Cardiff (1965), David *et al.* (2009), Dawson & Allen (1960), Dawson & Evans (1960), Grant *et al.* (2006), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Hubbard & Crossin (1974), Jones & Cornely (2002), Klicka & Spellman (2007), Kroodsma (1972), McCarthy (2006), Miller *et al.* (1957), Nelson & Martin (1999), Ohmart & Smith (1971), Perritt & Best (1989), Phillips *et al.* (1964), Pyle (1997), Reed (1985, 1986), Ridgway (1901), Rising & Beadle (1996), Ritchison (1980, 1981a), Rodenhouse & Best (1983, 1994), Russell & Monson (1998), Schroeder (1972), Shuford & Gardali (2008), Sutton (1941), Swain (1987), Wells & Vickery (1994), Wray & Whitmore (1979).

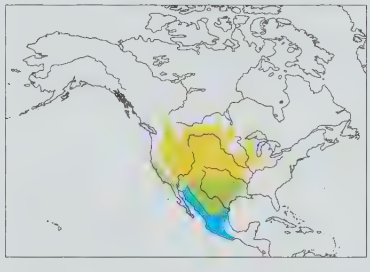
Genus *CHONDESTES* Swainson, 1827

87. **Lark Sparrow**

Chondestes grammacus

French: Bruant à joues marron **German**: Rainammer **Spanish**: Chingolo Arlequín

Taxonomy. *Fringilla grammaca* Say, 1822, Bellefontaine, 4 miles [6·4 km] from mouth of Missouri River, Missouri, USA.
Probably close to *Calamospiza* and *Amphispiza*. Geographical variation largely clinal; races poorly differentiated. Proposed race *quillini* (described from Cotulla, Texas) included within *strigatus*. Two subspecies generally recognized.
Subspecies and Distribution.
C. g. strigatus Swainson, 1827 – breeds in S Canada from S interior British Columbia and SE Alberta E to S Saskatchewan and S Manitoba, and W USA from Oregon E to the Dakotas and S to S California, C Nevada and S Arizona (Chiricahua Mts), S to N Mexico (N Sonora E to Coahuila, S to Zacatecas, Nuevo León and W Tamaulipas); non-breeding from S edge of breeding range S to S Louisiana and Mexico (S, except Yucatán Peninsula and adjacent lowlands, to S Baja California, Veracruz and Chiapas).
C. g. grammacus (Say, 1822) – breeds from Minnesota and C Wisconsin S to Texas, E to Ohio, Mississippi Valley and Louisiana; non-breeding from C Texas and S Louisiana S through C Mexico to Guerrero and Oaxaca.



Descriptive notes. 14·1–18·3 cm; 24·7–33·3 g. Fairly large, long-tailed sparrow with strongly patterned face and much white in tail. Nominate race has white or light beige median crownstripe, rusty or chestnut lateral crownstripe (becoming blacker towards bill), long, broad white supercilium becoming buffier towards rear, thin black eyestripe, white crescent under eye, chestnut ear-coverts with white spot at posterior, white submoustachial stripe, prominent black malar stripe becoming broader towards neck, and white throat; nape warm brown, slightly streaked darker brown; upperparts sandy-brown with conspicuous dark brown stripes, lower back and rump brown and unstreaked; tail brown, 3–5 outer pairs of rectrices boldly tipped white, outermost two also edged with white; upperwing dark brown, feathers edged pale buff, bases of primaries conspicuously pale (producing rather distinct band), median and greater coverts with pale buff or whitish tips (forming two indistinct wingbars); breast pale beige with bold brown central patch, flanks pale beige, belly dull white, undertail-coverts dull white; iris dark brown; bill pale horn to greyish, upper mandible often much duskier grey; legs dull flesh-coloured. Sexes similar in coloration. Juvenile is similar to adult, but with heavily streaked underparts, head markings brown, not rusty, and has supercilium and submoustachial stripe duller. Race *strigatus* is overall paler than nominate, and has duller chestnut colour on head and narrower streaking above. Voice. Song musical and variable, a broken series of clear notes, "twee twee trerere trerere twee twee twee", introduced with 1 or 2 clear notes. Call a sharp, distinctive, parulid-like "tslip" or a metallic "cheep", often given in flight.
Habitat. Open habitats with heavily grazed grassland, bare ground and scattered trees. In Great Plains often in floodplains of rivers, with scattered eastern cottonwoods (*Populus deltoides*) and other trees; in W part of range in grasslands with sagebrush (*Artemisia*), greasewood (*Sarcobatus vermiculatus*) and mesquite (*Prosopis*); in Utah, juniper (*Juniperus osteosperma*) or mixed brush juniper–big sagebrush (*Artemisia tridentata*), and rocky canyons with springs. In winter, often in agricultural lands with scattered trees and hedgerows, open weedy fields, suburbs; in Colima and Jalisco (W Mexico) in grassy coastal plains, semi-open thorn-scrub and arid pine–oak (*Pinus–Quercus candicans*) forest with pines to 15 m tall and sparse grass (*Andropogon*), at 300–2400 m. Generally from sea-level up to 2500 m.
Food and Feeding. Diet c. 75% granivorous and 25% insectivorous. Insects taken include 14% orthopterans, also adult beetles (Coleoptera), larval lepidopterans, and adult flies (Diptera). Dominant seeds eaten vary seasonally, include bristlegrass (*Setaria leucophila*), panicgrass (*Panicum*), ragweed (*Ambrosia*), wheat (*Triticum*) and, on W coast, redmaids (*Calandrinia caulescens*), oats (*Avena*), knotweed (*Polygonum*). Forages principally on or near ground and low in vegetation. Comparatively tame. In non-breeding season often in small flocks.
Breeding. Season mid-Apr through Jul; usually single-brooded. Monogamous. Pairs formed soon after arrival on breeding grounds. Nest-site selected by both sexes, final choice apparently by female, nest a cup of dry grass and twigs, lining of finer grasses, rootlets, hair and sometimes leaves, placed on ground, often at base of bunchgrass or small cactus, less commonly to 3 m up in tree or shrub, often near area of sandy soil; old nest of other species occasionally used. Clutch 3–6 eggs, usually 4 or 5, creamy or greyish-white with blackish, brown or purplish spots and scrawls; incubation by female, period 11–12 days; chicks fed by both parents, nestling period 11–12 days. Commonly parasitized by Brown-headed Cowbird (*Molothrus ater*).
Movements. Most populations migratory; present all year S USA (California, S Arizona, New Mexico, Texas) and Mexico. Some tendency for nomadic movements, perhaps a result of anomalies in rainfall. Spring migration late Mar through May; arrival in S latitudes mid-Mar, peak migra-

On following pages: 88. Five-striped Sparrow (*Amphispiza quinquestriata*); 89. Black-throated Sparrow (*Amphispiza bilineata*); 90. Bell's Sparrow (*Artemisiospiza belli*); 91. Sage Sparrow (*Artemisiospiza nevadensis*); 92. Tumbes Sparrow (*Rhynchospiza stolzmanni*); 93. Stripe-capped Sparrow (*Rhynchospiza strigiceps*); 94. Stripe-headed Sparrow (*Peucaea ruficauda*); 95. Black-chested Sparrow (*Peucaea humeralis*); 96. Bridled Sparrow (*Peucaea mystacalis*); 97. Cinnamon-tailed Sparrow (*Peucaea sumichrasti*); 98. Rufous-winged Sparrow (*Peucaea carpalis*); 99. Cassin's Sparrow (*Peucaea cassinii*); 100. Bachman's Sparrow (*Peucaea aestivalis*); 101. Botteri's Sparrow (*Peucaea botterii*).

tion for US middle latitudes mid-Apr through May; in Sonora (N Mexico) moves N from mid-Mar through Apr, with latest recorded in mid-May; in California and Oregon migrants seen late Apr to mid-May. After breeding some adults depart very early, from mid-Jul/Aug, and movements S may continue until Nov; in middle latitudes of USA migrants present late Aug to mid-Oct, and in California most migration over by late Sept; in lower Colorado Valley migrants observed by mid-Aug, but in Sonora first arrivals may begin late Jul, although peak movements in Sept. Rare visitor to E coast during autumn, and vagrant during spring; recorded as far N as Newfoundland. Vagrant to various parts of S, including Yucatán, Guatemala, El Salvador, Honduras, Cuba, Jamaica, N Bahamas and Bermuda, with sight reports from Panama; also vagrant to W Palearctic, where recorded twice in British Is.

Status and Conservation. Not globally threatened. Fairly common to locally very common; rare in S Ontario (Canada). Has declined in E parts of range, where nominate race, until fairly recently, bred E to SE Canada (S Ontario) and, in USA, to C Pennsylvania, W North Carolina and C Alabama. In pre-colonial times found only in W North America; moved E with clearing of forests. As marginal farms have reverted to woodland, this species, which is often found in grazed habitats, has suffered habitat loss and has decreased in numbers.

Bibliography. Anon. (1998), Beadle & Rising (2002), Charlton (1991, 1995), Crowell *et al.* (1982), Griscom (1932), Hellmayr (1938), Houston & Houston (2001), Howell & Webb (1995), Hubbard (1972a), Lusk *et al.* (2003), Markle (1946), Martin & Parrish (2000), McNair (1984, 1985), Miller *et al.* (1957), Newman (1970), Peck & James (1987), Pyle (1997), Raffaele *et al.* (1998), Renwald (1977), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Urban (1959), Veit (2000), Walley (1985), Whitaker (1957), Zimmerman (1993).

Genus *AMPHISPIZA* Coues, 1874

88. Five-striped Sparrow

Amphispiza quinquestriata

French: Bruant pentaligne **German**: Fünfstreifenammer **Spanish**: Chingolo Cincorrayas

Taxonomy. *Zonotrichia quinquestriata* P. L. Sclater and Salvin, 1868, Mexico, probably Bolaños, in Jalisco.

Genus has sometimes been subsumed into *Aimophila*, but this treatment not supported by molecular-genetic findings, which indicate that the two are not closely allied; juvenile plumages also different. Recent molecular work suggests that present genus is in a clade that contains also *Calamospiza*, *Chondestes* and *Spizella*; also that present species is close to *A. bilineata*. Two subspecies recognized.

Subspecies and Distribution.

A. q. septentrionalis (van Rossem, 1934) – extreme S USA (SC Arizona) and NW Mexico (E Sonora and W Chihuahua S to C Sinaloa and W Durango).

A. q. quinquestriata (P. L. Sclater & Salvin, 1868) – N Jalisco, in W Mexico.



Descriptive notes. 13–16 cm; 17·1–21·7 g. A medium-sized, long-tailed, rather dark sparrow. Nominate race has crown, nape and side of face brownish-grey, white narrow supercilium, submoustachial stripe and broken eyering, broad black malar stripe; chin and throat white; upperparts reddish-brown mixed with grey, without conspicuous markings, rump and uppertail-coverts brownish; tail feathers dark brown with lighter edges; upperwing dark brown, upperwing-coverts with warmer and paler brown edges; breast and flanks dark grey, contrasting with white throat, black central breast spot; belly whitish, undertail-coverts grey with pale edges; iris dark; upper mandible blackish, lower mandible paler bluish-grey; legs dull pinkish-flesh. Sexes similar. Juvenile has crown and back brown, spotted darker brown, lower back and rump without streaking, tail dark with tips of outer rectrices white, primaries edged whitish and secondaries and wing-coverts edged rusty, underparts mottled yellowish and brownish, undertail-coverts brown with yellowish tips, lacks blackish malar stripe and breast spot. Race *septentrionalis* is larger and paler than nominate, and has smaller chest spot. Voice. Song staccato and brief, lasting just over a second, usually composed of introductory note followed by several note complexes, each usually repeated two or three times, e.g. "tsi-gp tsi-gp twsee tweep" or "chip chip chip pt pt pt"; after pause of a few seconds, a series may be repeated, up to 18 phrases per minute. Call "chuck", "pip" and "seet".

Habitat. Dense desert scrub and tropical thorn-scrub, also tropical deciduous woodland, in canyons and often on rocky well-vegetated hillsides. At 50–1850 m.

Food and Feeding. Diet seeds, fruit (*Celtis*, *Anisicanthus*), also insects, primarily caterpillars and moths (Lepidoptera), grasshoppers (Orthoptera) and ants (Formicidae); young fed primarily with grasshoppers and caterpillars. Forages principally on ground and low in shrubs; shy. Outside breeding season usually in pairs and small flocks.

Breeding. Probably coincides with first major summer rainstorm; early Jun, usually not until mid-Jul (Arizona and Sonora), to Sept; probably single-brooded. Monogamous. Nest built by female alone, a deep cup constructed from dry grasses and stems, lined with finer vegetation and hair, including that of Collared Peccary (*Pecari angulatus*), placed in grass clump or in shrub, sometimes at base of an ocotillo (*Fouquieria*), generally 19–150 cm above ground. Clutch 3–4 eggs, most commonly 4, whitish to pale blue and unmarked; incubation by female, period 12–13 days; chicks fed by both parents, nestling period 9–10 days. Commonly parasitized by Brown-headed Cowbird (*Molothrus ater*).

Movements. Probably non-migratory. Some individuals breeding in N of range (Arizona and N Sonora) may move S in winter.

Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Status not well known. Often common in appropriate habitat. Only relatively few individuals found N into extreme S USA. Has small range, with estimated global population c. 200,000 mature individuals; US population probably no more than 60–70. Numbers thought to be decreasing.

Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), Groschupf (1985, 1992, 1994), Groschupf & Mills (1978, 1982), Hellmayr (1938), Howell & Webb (1995), Lebbin *et al.* (2010), Mills (1977), Mills *et al.* (1980), Phillips & Farfan (1993), Rising & Beadle (1996), Russell & Monson (1998), Storer (1955), Wolf (1977).

89. Black-throated Sparrow

Amphispiza bilineata

French: Bruant à gorge noire **German**: Schwarzkehlammer **Spanish**: Chingolo Gorjinegro

Taxonomy. *Emberiza bilineata* Cassin, 1850, Texas, on Rio Grande, USA.

Genus has sometimes been subsumed into *Aimophila*, but this treatment not supported by molecular-genetic findings, which indicate that the two are not closely allied; juvenile plumages also different. Recent molecular work suggests that present genus is in a clade that contains also *Calamospiza*, *Chondestes* and *Spizella*; also that present species is close to *A. quinquistriata*. Several other races proposed: *dapolia* (described from Chisos Mts, Texas) included within *opuntia*; in SW Gulf of California, *carmenae* (Carmen I) and *sanctissima* (Espiritu Santo I) both synonymized with *bangsi*; *confinis* (Chihuahua Municipality, C Chihuahua) treated as a synonym of *grisea*. Nine subspecies recognized.

Subspecies and Distribution.

A. b. deserticola Ridgway, 1898 – breeds in W USA from C Washington, Oregon, NE California, N Nevada, S Idaho, N Utah, SW Wyoming and W Colorado S through Great Basin to NW Mexico (NE & C Baja California S, including Cedros I, Natividad I and Ángel de la Guarda I, to c. 27° N, E to NW Chihuahua); non-breeding in S third of breeding range and S into N Sonora (Mexico).

A. b. opuntia Burleigh & Lowery, 1939 – breeds in SE Colorado and NW Oklahoma S through E New Mexico and W Texas (USA) S to N Mexico (NW Coahuila); non-breeding in S parts of breeding range.

A. b. bilineata (Cassin, 1850) – S USA (NC Texas) S to NE Mexico (E Coahuila, Nuevo León and lower elevations of Tamaulipas).

A. b. bangsi Grinnell, 1927 – S Baja California (S from c. 26° N), including nearby islands (except Tortuga I and Cerralvo I), in NW Mexico.

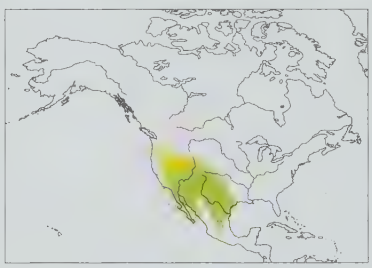
A. b. tortugae van Rossem, 1930 – Tortuga I, in WC Gulf of California (S Baja California).

A. b. belvederei Banks, 1963 – Cerralvo I, in SW Gulf of California (S Baja California).

A. b. pacifica Nelson, 1900 – C & S Sonora (including Tiburón I and San Pedro Nolasco I, in E Gulf of California) and N Sinaloa, in NW Mexico.

A. b. cana van Rossem, 1930 – San Esteban I, in E Gulf of California.

A. b. grisea Nelson, 1898 – NC Mexico from C Chihuahua, S Coahuila, San Luis Potosí and SW Tamaulipas S to N Jalisco, Guanajuato, Querétaro and Hidalgo.



Descriptive notes. 12–14·5 cm; 10·2–16·4 g. A small to medium-sized sparrow with distinctive plumage. Nominate race has crown and upperparts grey, mantle and scapulars washed brown; white supercilium thinly outlined with black; side of face grey, becoming black on cheek and lores, white lower half of eyering, broad white submoustachial stripe not reaching bill base; tail dark greyish-brown to blackish, outer rectrices with white outer webs, outermost two also tipped white (tail feathers often worn); upperwing dark brown, feathers edged grey-brown; chin and throat black, black extending to centre of breast; rest of underparts pale greyish-white, flanks washed buffish, undertail-coverts more irregularly so; iris dark greyish-brown; upper mandible blackish, lower mandible bluish; legs dark grey or black. Sexes similar in coloration, male slightly larger than female. Juvenile has crown dark grey-brown, lores and ear-coverts grey, partial white eyering, supercilium white, nape to back brown-grey, rump greyish or brownish-grey, tail as on adult; wing blackish (not so dark as tail), wing-coverts and tertials edged light rusty brown, median and greater coverts also with pale buff tips (forming two indistinct wingbars); throat mottled with grey, breast to upper belly and flanks finely streaked grey, lower belly and undertail-coverts light buffy. Races differ mainly in colour of upperparts and size: *deserticola* is large, with reddish-brown back; *opuntia* also is large, with medium to pale grey back with brown tinge; *bangsi* is smaller than *deserticola* and is darker and more greyish; *belvederei* is like previous, but slightly darker and greyer above, upper mandible slightly more decurved; *pacifica* resembles nominate, but smaller tail spots; *tortugae* is darkest race, colour more saturated; *cana* is smallest and greyest race, more white in tail than *deserticola*; *grisea* is like *deserticola*, but very much darker, and darker and less brown above than nominate. Voice. Song, heard through spring and summer (and occasionally at other times) variable and complex, difficult to describe, a sweet tinkling warble. Call a high "sii".

Habitat. Open arid areas with scattered bushes and cacti, from sea-level to 2500 m. Common in alluvial fans, washes and canyons. Most common where mesquite (*Prosopis*), palo verde (*Cercidium microphyllum*) and creosote bush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), catclaw acacia (*Acacia greggii*), blackbrush (*Coleogyne ramosissima*), sagebrush (*Artemisia*), antelope brush (*Purshia tridentata*), rabbitbrush (*Chrysothamnus*) and various cacti are common and (depending on locality) interspersed with Joshua trees (*Yucca brevifolia*), pinyon–juniper (*Pinus* cf. *edulis–Juniperus*) or other vegetation. In SE Colorado, E New Mexico, W Texas and Oklahoma prefers short pastureland with scattered mesquite, yucca, prickly-pear and cholla (*Opuntia*); in Oregon and Idaho breeds on barren grassy hillsides with scattered sagebrush and rabbitbrush and saltbush (*Atriplex*).

Food and Feeding. Diet during breeding season mainly arthropods, including grasshoppers (Orthoptera), mantids (Mantodea), walking sticks (Phasmida), caterpillars (Lepidoptera), robber flies (Asilidae) and dragonflies (Odonata), as well as a variety of grass seeds; in non-breeding season, almost exclusively dried grass seeds, e.g. of *Aristida*, *Paspalum*, *Amaranthus*, *Panicum*. Forages principally on or near ground, usually near or under shrubs or low in vegetation. Picks food items from ground, also gleans from low vegetation. Capture of some arthropods (e.g. grasshoppers) involves flushing and short aerial chases. In pairs and in small groups outside breeding season.

Breeding. Mainly Apr–May, sometimes from as early as Feb, and recently fledged young seen in Aug in N Mexico (Coahuila); sometimes two broods, when nesting in mid-Jun stimulated by monsoon rains. Monogamous. Nest built by female, a cup made from grasses, twigs and rootlets, lined with finer grasses and hair, placed close to ground, average c. 35 cm up, in shrub. Clutch 2–5 eggs, usually 3–4, white to bluish-white and unmarked; incubation by female, period 12 days; chicks fed by both parents, nestling period on average 9·5 days. Regularly parasitized by Brown-headed Cowbird (*Molothrus ater*), which significantly reduces clutch size of host by damage of eggs and egg removal.

Movements. N populations migratory, and individuals in many populations move downslope in winter; S populations resident. In USA, arrival in S California from mid-Mar, farther N (in Nevada, Oregon and Idaho) in Apr and early May; arrivals similarly timed towards E (Texas Colorado, Oklahoma). In autumn, leaves breeding grounds late Aug and Sept, reaching wintering grounds from early Sept. Casual visitor (probably race *deserticola*) in non-breeding season N to SW Canada (SW British Columbia, S Alberta, S Manitoba) and W Montana E to Atlantic coast and Florida Panhandle.

Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat; local in Oregon. Populations in USA seem to be declining, probably primarily because of urban development and clearing of mesquite for agricultural purposes.
Bibliography. Anon. (1998), Austin & Smith (1974), Banks (1968), Beadle & Rising (2002), Bowers & Dunning (1985), Brunton & Pratt (1986), Casper (1980), Coe & Rotenberry (2003), Du Bois (1959), Gustafson (1975), Heckenlively (1967, 1970), Hellmayr (1938), Hewes (1971), Howell & Webb (1995), Hunn (1978), Jannssen (1974), Johnson & van Riper (2004), Johnson *et al.* (2002), Meier (1974), Menk & Stevenson (1978), Miller *et al.* (1957), Phillips *et al.* (1964), Pidgeon *et al.* (2003, 2006), Rising & Beadle (1996), Russell & Monson (1998), Schwilling (1954), Scott *et al.* (1971), Smyth & Bartholomew (1966), Storer (1955), Urban (1959), Wolf (1977).

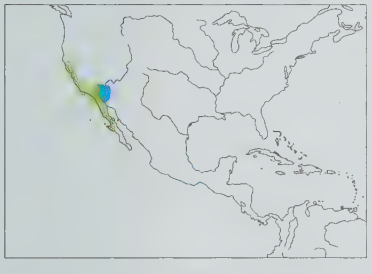
Genus *ARTEMISIOSPIZA* Klicka & Banks, 2011

90. Bell's Sparrow

Artemisiospiza belli

French: Bruant de Bell **German**: Beifußammer **Spanish**: Chingolo de Bell
Other common names: Bell's Sage Sparrow; Saltbush Sparrow (*canescens*); San Clemente Sage Sparrow (*clementeae*)

Taxonomy. *Emberiza belli* Cassin, 1850, near Sonoma, California, USA.
Until recently placed in genus *Amphispiza*, and considered conspecific with *A. nevadensis*, but recent molecular work indicates that the two are, instead, members of a well-resolved clade of "grassland" sparrows that includes genera *Pooecetes*, *Oriturus*, *Passerculus*, *Ammodramus* (in part), *Melospiza* and *Xenospiza*. Present genus newly erected to accommodate these two species. Race *canescens*, closely similar in appearance to *A. nevadensis* and possibly hybridizing with it where ranges meet, has been thought perhaps to represent a separate species; further research required. Race *cinerea* intergrades with nominate in NC Baja California. Race *clementeae* should perhaps be subsumed into nominate. Four subspecies provisionally recognized.
Subspecies and Distribution.
A. b. belli (Cassin, 1850) – California on W slopes of C Sierra Nevada (S to Mariposa County) and coastal ranges (from Trinity County and Shasta County) S to extreme NW Mexico (NW Baja California S to c. 29° N).
A. b. clementeae (Ridgway, 1898) – San Clemente I, off SW California.
A. b. cinerea (C. H. Townsend, 1890) – C Baja California (S to 26° N).
A. b. canescens (Grinnell, 1905) – breeds in interior SC California (S San Joaquin Valley, Inyo region, and S & W edges of Mojave Desert) and adjacent W Nevada; non-breeding also W to SW California, E to S Nevada and W Arizona, and S to NE Baja California.



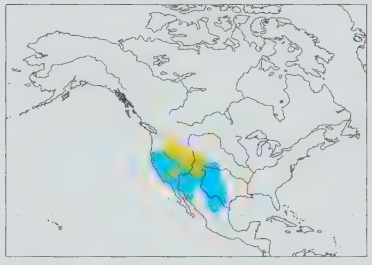
Descriptive notes. 13·7–15·7 cm; 12·7–16·8 g. A medium-sized sparrow, with long tail often held cocked. Nominate race has head and nape brownish-grey, crown faintly streaked; supraloral spot and eyering white, lores dark, ear-coverts grey; narrow dark moustachial stripe, broad white submoustachial stripe and broad dark malar stripe; upperparts brownish with obscure streaking, rump brown; tail dark brown, outer web and tip of outer rectrices white (in unworn plumage); upperwing dark brown, feathers edged buff, median and greater coverts also with pale buff tips (forming two obscure wingbars); throat white; underparts buffy white, sides and flanks buffier and streaked dark, conspicuous dark brown central breast spot, belly dull white; iris dark brown; bill greyish, upper mandible often mostly duskier; legs dull brownish-red, greyer and often darker on feet. Sexes similar. Juvenile is dark brown, greyer on head and paler below, with streaked crown, back and breast, pale brown superciliary stripe, two broken buff wingbars. Race *clementeae* is very similar to nominate, but with larger bill, perhaps paler coloration, and with eyering and supraloral spot buffy; *cinerea* is paler; *canescens* is paler than nominate, and has streaking on crown and upperparts distinct (indistinct on nominate). Voice. Song described as "tweesitity-slip tweesitity-slip swer". Call a short, bell-like "tink".
Habitat. Generally in dry chaparral and coastal sage scrub, inland valleys, and lower foothills. Characteristic of dense chamise (*Adenostoma fasciculatum*), but also in California sagebrush (*Artemisia californica*), or brittlebush (*Encelia farinosa*), and mixed brush on sand dunes near coast; found in *Lycium* ("frutilla") in Baja California. Sea-level to 1400 m. Race *canescens* characteristically found in desert scrub where saltbush (*Atriplex*) prevalent; to 2500 m on E side of Sierra Nevada.
Food and Feeding. Variety of animal and plant items. Generally seeds and other vegetable matter. Young fed with insects. Forages principally on or near ground and low in vegetation. Typically, runs on ground, tail held cocked. In open country tends to run from bush to bush; in closed situations moves under vegetation, making it difficult to see. Resident populations remain in pairs throughout non-breeding season.
Breeding. Season late Mar to Jun (*canescens*), or mid-Apr to mid-May through early Jun (nominate). Probably monogamous. Singing and territory maintenance may begin in Jan–Feb. Nest built by female, taking 6–8 days, a cup of coarse grasses, with lining of finer grasses, wool and hair, placed low in bush, to c. 0·7 m up, usually not on ground; nominate race often in brittlebush, chamise, black sage (*Salvia mellifera*), California buckwheat (*Eriogonum fasciculatum*), California sagebrush, and the like, *clementeae* in boxthorn (*Lycium californicum*), and *canescens* in rabbitbrush (*Chrysothamnus*) and saltbush. Clutch 3–5 eggs, usually 4, whitish to pale blue and spotted with brown, rusty brown or black; incubation by female only, period 10–16 day; chicks fed by both parents, nestling period 9–10 days. Sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*), which may cause nest abandonment.
Movements. Far N populations of nominate race migratory; insular populations resident. Some nominate birds breeding in C California migrate downslope and S in winter, during which time *canescens* (from interior) and nominate (from coast) can be found together in same habitat. Race *canescens* moves upslope in summer after breeding, and in autumn descends and proceeds to move S to wintering areas. Some move down into lower desert, or to lower Colorado Valley.
Status and Conservation. Not globally threatened. Classified as "Declining" in the USA (Yellow WatchList priority species for conservation). San Clemente race *clementeae* protected under the Endangered Species Act in the USA since 1977. Fairly common to locally common. Formerly common on San Clemente I, but introduced goats (*Capra*), pigs (*Sus*), cats (*Felis*) and rats (*Rattus*) have decimated local populations; removal of feral animals and restoration of natural habitat recommended.
Bibliography. Akcakaya *et al.* (2005), Beadle & Rising (2002), Bent & Austin (1968), Cicero & Johnson (2006, 2007), Ellison (1999), Everett *et al.* (1994), Grinnell (1915), Hellmayr (1938), Howell & Webb (1995), Iliff (2003), Johnson & Marten (1992), Klicka & Banks (2011), Lebbin *et al.* (2010), Martin & Carlson (1998), Miller *et al.* (1957), Misenhelter & Rotenberry (2000), Patten & Unitt (2002), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), van Rossem (1932), Russell & Monson (1998), Sullivan *et al.* (2005), Willey (1990, 1997), Wolf (1977).

91. Sage Sparrow

Artemisiospiza nevadensis

French: Bruant des armoises **German**: Salbeiammer **Spanish**: Chingolo de Nevada

Taxonomy. *Poospiza belli nevadensis* Ridgway, 1874, West Humboldt Mountains, Nevada, USA.
Until recently placed in genus *Amphispiza*, and considered conspecific with *A. belli*, but recent molecular work indicates that the two are, instead, members of a well-resolved clade of "grassland" sparrows that includes genera *Pooecetes*, *Oriturus*, *Passerculus*, *Ammodramus* (in part), *Melospiza* and *Xenospiza*. Present genus newly erected to accommodate these two species. Range meets that of *A. belli* of race *canescens*, which is closely similar in appearance to present species, and the two may hybridize; further research required. N birds sometimes separated as race *campicola* but differences slight and perhaps clinal. Monotypic.
Distribution. Breeds in Great Basin of W USA from E Washington and S Wyoming S to CE California, SE Nevada, NE Arizona and N New Mexico. Non-breeding C California E to SW Utah and C New Mexico, S to N Mexico (N Baja California, N Sonora and N Chihuahua) and W Texas.



Descriptive notes. 14–18 cm; 15·3–21·9 g. A medium-sized sparrow, with long tail often held cocked. Has greyish head, crown faintly streaked, white supraloral spot and eyering, dark lores, grey ear-coverts; broad white submoustachial stripe, indistinct narrow dark grey malar stripe (often broken, sometimes absent); upperparts sandy brown, moderately distinct blackish streaking on mantle and back, rump plain brown; tail dark brown, outer web and tip of outer rectrices white (in unworn plumage); upperwing brown, feathers narrowly edged lighter brown, median and greater coverts also with whitish-buff tips (forming two diffuse wingbars); throat white; underparts buffy white, conspicuous dark brown central breast spot, breast and flanks lightly streaked, belly dull white; iris dark brown; bill dark grey, sometimes paler on lower mandible; legs dark brownish, feet greyer and duskier. Differs from *A. belli* mainly in larger size, paler coloration, more obvious streaking above. Sexes alike in coloration. Juvenile is brownish above, paler and with buffish wash below, with streaked crown, upperparts and breast and flanks, pale brown superciliary stripe broken at centre. Voice. Song a weak, plaintive, high-pitched series of tinkling notes. Alarm call a short, bell-like "tsip".
Habitat. In breeding season found in big sagebrush (*Artemisia tridentata*) or sagebrush–saltbush (*Artemisia–Atriplex*); at higher elevations may be found in sagebrush interspersed with scattered junipers (*Juniperus*) or pinyon (*Pinus* cf. *edulis*). In SE California in winter commonly in weedy scrub (especially *Suaeda*), often near water. On migration may be found in creosote bush (*Larrea*), rabbitbrush (*Chrysothamnus*) and greasewood (*Sarcobatus vermiculatus*). Sea-level to nearly 2500 m.
Food and Feeding. Variety of animal and plant items. Generally eats a variety of seeds and other vegetable matter. Probably eats animal food in winter when available. Young fed with insect food. Arthropods taken include grasshoppers (Orthoptera), chinch bugs (Hemiptera), nymphal and adult leafhoppers (Homoptera), beetles (Coleoptera), ants (Formicidae) and other Hymenoptera, and lepidopteran caterpillars, as well as spiders (Araneae). Forages principally on or near ground; typically, runs on the ground, from bush to bush, with tail held cocked. Also gleans insects low in vegetation. Sometimes in small groups outside breeding season.
Breeding. Season Mar–Jul; may be double-brooded, but later broods possibly replacement clutches. Monogamous. Quite unusually, often already paired when arriving on breeding grounds. Nest built by female, taking 1–2 days, a cup of coarse grasses, lining with finer grasses, wool, feathers and hair, placed in depression in ground or, more commonly, low (10–100 cm above ground) in bush, most commonly big sagebrush, sometimes bitterbrush (*Purshia*), rabbitbrush, greasewood, tumbleweed (*Salsola iberica*) or bunchgrass. Clutch 3–5 eggs, usually 4, whitish to pale blue and spotted with brown, rusty brown or black; incubation by female, period 10–16 days; chicks fed by both parents, nestling period 9–10 days. Nests sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*), which may cause nest abandonment.
Movements. Migratory, withdrawing from most of breeding range; some S populations possibly resident. Arrival on breeding grounds mid-Mar to late Apr, later in N breeding areas than in S; arrives already in pairs, suggesting that partners may migrate together. Peak of autumn migration in mid-Sept, passage continuing through mid-Nov. Casual in winter N to Oregon, possibly to SW Canada (from SW British Columbia), and E to W Montana, W Kansas and W Oklahoma, apparently also Nova Scotia (Briar I).
Status and Conservation. Not globally threatened. Probably not uncommon; status difficult to determine, as species often difficult to see. May be common in optimum habitat. Sensitive to changes in habitat, especially conversion of sagebrush terrain to grassland.
Bibliography. Beadle & Rising (2002), Bent & Austin (1968), Best & Petersen (1982, 1985), Cicero & Johnson (2006, 2007), Forsythe (1995), Grinnell (1915), Gustafson (1975), Hellmayr (1938), Howell & Webb (1995), Johnson & Marten (1992), Klicka & Banks (2011), Martin & Carlson (1998), Meents *et al.* (1982), Miller *et al.* (1957), Moldenhauer (1970a, 1970b), Patten & Unitt (2002), Petersen & Best (1985b, 1986, 1987), Petersen *et al.* (1986), Pyle (1997), Reynolds (1981), Rich (1978, 1980a, 1980b, 1981, 1983a, 1983b, 1985a, 1985b), Ridgway (1901), Rising & Beadle (1996), Shackford (1989), Wiens (1982), Wiens *et al.* (1990), Winter & Best (1985).

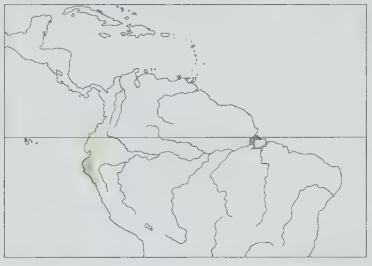
Genus *RHYNCHOSPIZA* Ridgway, 1898

92. Tumbes Sparrow

Rhynchospiza stolzmanni

French: Bruant de Tumbes **German**: Stolzmannammer **Spanish**: Chingolo de Tumbes

Taxonomy. *Haemophila stolzmanni* Taczanowski, 1877, Tumbes, Peru.
Genus formerly subsumed into *Aimophila*; recent molecular studies, however, indicate that present species and *R. strigiceps* are close relatives of each other, and only distantly related to other species currently included in *Aimophila*. Monotypic.
Distribution. Tumbesian region of SW Ecuador (W Loja) S to NW Peru (from Tumbes S to N La Libertad).



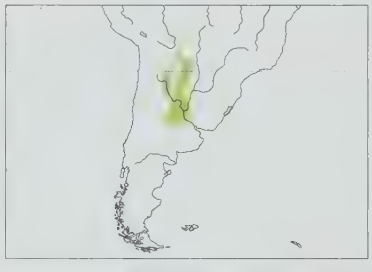
Descriptive notes. 14·5 cm; 23·7–27·6 g. A short-tailed sparrow with thick-based conical bill, striped crown and streaked back; feet relatively large. Has grey central crownstripe, cinnamon-brown lateral crownstripe, grey face with brown eyeline, grey supercilium with paler, whitish, supraloral area, broken white eyering, short brown stripe below eye (beginning at gape), short blackish moustachial stripe, whitish submoustachial area, and narrow blackish malar line; upperparts dull brown with darker streaks; tail feathers very dark brown with greyish edges; upperwing brownish, rusty shoulder patch created by rusty lesser upperwing-coverts, with median and greater upperwing-coverts fringed grey-buff, primaries with whitish-buff edges, secondaries with cinnamon edges, tertials fringed pale buff, marginal coverts yellow (creating yellow area at bend of wing on perched bird); off-white below, with clean white throat, slightly greyer on breast, pale buff flanks; iris dark; upper mandible black, lower mandible and tip blue-grey to dull orange; legs pinkish. Sexes similar. Juvenile is similar to adult, but duller and more muted in coloration, and finely streaked on breast. Voice. Song variable, in two or three parts, some rather mechanical and others much more fluid and sweet, e.g. "toosoo-toosoo" and "tuswee'chi'i'i'i'i". Call a metallic "tink", sometimes several in close succession.
Habitat. Arid scrub, and semi-desert with cacti, bushes, as well as open dry forest, and riparian scrub; partial to locations with nearby water. In particular, prefers at least sparse grass cover nearby or adjacent to desert scrub. To 1000 m.
Food and Feeding. Diet insects and seeds; large and deep bill suggests ability to take relatively large seeds. Forages terrestrially; singly and in pairs, not in flocks.
Breeding. Breeds in wet season, Jan–May. Nest a cup of grass, lined with finer vegetation and down, positioned on ground in a grassy patch, often close to shrub or tree. Clutch 4 eggs, pale whitish-blue or white. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Common to fairly common throughout its small range.
Bibliography. Armani (1985), Byers, Curson & Olsson (1995), DaCosta *et al.* (2009), Paynter (1967), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Williams (1981b).

93. **Stripe-capped Sparrow**

Rhynchospiza strigiceps

French: Bruant à calotte rayée **Spanish**: Chingolo Coronicastaño
German: Streifenscheitelammer

Taxonomy. *Zonotrichia strigiceps* Gould, 1839, Santa Fe, Argentina.
Genus formerly subsumed into *Aimophila*; recent molecular studies, however, indicate that present species and *R. stolzmanni* are close relatives of each other, and only distantly related to other species currently included in *Aimophila*. Two subspecies recognized.
Subspecies and Distribution.
A. s. dabbenei (Hellmayr, 1912) – SE Bolivia S to NW Argentina (Jujuy, Salta and Tucumán).
A. s. strigiceps (Gould, 1839) – SC Paraguay S to NC Argentina (to Córdoba and N Buenos Aires).



Descriptive notes. 15–16 cm; 20·5–23·7 g. A long-tailed, short-winged sparrow with medium-sized conical bill, striped crown and streaked back. Nominate race has grey central crownstripe, cinnamon-brown lateral crownstripe, grey face with cinnamon-brown postocular stripe, black preocular stripe and paler supraloral area; narrow black moustachial stripe sometimes mixed with cinnamon-brown, black malar stripe; upperparts pale brown with darker streaks; tail feathers dark brown with light buff edges; upperwing brownish, warmer shoulder patch created by warm brown lesser upperwing-coverts, with median and greater coverts fringed grey-brown, primaries with whitish-buff edges, secondaries with cinnamon edges, tertials edged rusty; off-white below, with clean white throat, narrow blackish lateral throat-stripes and whitish malar area; diffuse greyish breastband, buff flanks; iris dark; upper mandible black, lower mandible mainly ivory-coloured; legs pinkish. Sexes similar. Juvenile is similar to adult, but duller and more muted in coloration, and finely streaked on breast. Race *dabbenei* is larger and darker than nominate, darker face pattern including extensive black on lores and around bill base, darker crownstripes, and darker rufous edging on wing-coverts and tertials. Voice. Song far-carrying, strident and sweet. Males have diverse repertoire of song types, and will sing one many times before switching to next. In general songs are in two or three parts: two-part songs begin with stuttering series of strident notes followed by slow trill, "teet teet teet teet twreeeeeeeee", different types varying in length and pitch of trill, as well as in quality of introductory notes; three-part songs similar, but introduced by 2 or 3 soft notes before louder part begins. Call a metallic "tweep".
Habitat. Open and dry sites with a shrub component, including shorter and more open *chaco* woodlands, to agricultural areas where dry scrub and shrub left at edges; also requires a certain amount of grass in territory, usually beneath taller shrub layer. To 1000 m.
Food and Feeding. Diet both seeds and insects; provisions young entirely with insects. Forages on ground. Usually seen alone, but sometimes forages in pairs; in non-breeding season may form small loose flocks.
Breeding. Season Oct–Mar, slightly later in NW Argentina than in C Argentina. Nest a well-formed cup of dry grasses, lined with finer material, placed at base of bush or beneath taller and denser stand of grass. Clutch 3–4 eggs, pale blue. Nests occasionally parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common throughout its range. Present in several protected areas in Argentina.
Bibliography. Armani (1985), Byers, Curson & Olsson (1995), Canevari *et al.* (1991), DaCosta *et al.* (2009), Hoy (1971), Kratter *et al.* (1993), Ridgely & Tudor (1989), Short (1976).

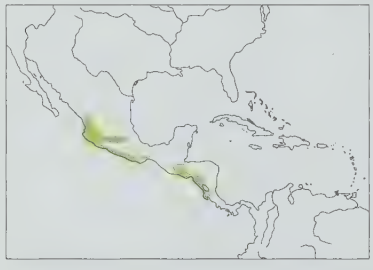
Genus *PEUCAEA* Audubon, 1839

94. **Stripe-headed Sparrow**

Peucaea ruficauda

French: Bruant ligné **German**: Rostschwanzammer **Spanish**: Chingolo Cabecilistado
Other common names: Russet-tailed Sparrow

Taxonomy. *Chondestes ruficauda* Bonaparte, 1853, Nicaragua.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Various studies suggest that this species is part of a group that includes also *P. humeralis*, *P. mystacalis*, *P. sumichrasti* and *P. carpalis*, this group being sister to a clade containing *P. cassinii*, *P. aestivalis* and *P. botterii*. Proposed race *ibarrorum* (described from La Avellana, in Guatemalan Southern Pacific lowlands) included within *ruficauda*. Four subspecies recognized.
Subspecies and Distribution.
P. r. acuminata (Salvin & Godman, 1886) – Pacific slope of Mexico from S Durango and S Zacatecas S to SE Guerrero, E to Morelos and S Puebla.
P. r. lawrencii (Salvin & Godman, 1886) – S side of Isthmus of Tehuantepec in Oaxaca and extreme W Chiapas, in S Mexico.
P. r. connectens (Griscom, 1930) – valley of R Motagua, in E Guatemala.
P. r. ruficauda (Bonaparte, 1853) – Pacific slope from SE Guatemala S to NW Costa Rica.



Descriptive notes. 15–19·5 cm; 25·4–30·4 g (*acuminata*), 31·5–44·7 g (*lawrencii*). Medium-sized to fairly large sparrow, larger in S than in N. Nominate race has crown and side of face blackish-brown, pale spot on rear ear-coverts, white median crownstripe, broad white supercilium; upperparts mainly rufous-brown, streaked blackish, rump and uppertail-coverts brown to cinnamon brown with obscure darker streaks; tail rufous; upperwing blackish-brown, feathers narrowly edged pale buff, edges of secondaries rufous, median and greater coverts and tertials with broader rufous edges and pale buff tips; throat white; breast and upper flanks pale grey, indistinct necklace of greyish splotches, belly whitish, lower flanks and undertail-coverts washed cinnamon; iris deep brownish-red; upper mandible blackish, lower mandible mostly pale bluish-grey to ivory-coloured; legs pale pinkish. Sexes similar. Juvenile is like adult, but black areas brownish, throat speckled with dusky, belly duskier than adult. Races differ in size and plumage: *lawrencii* is larger than nominate, dark areas of head browner, upperparts greyer-looking, less rufous, tail duller; *connectens* is intermediate between previous and nominate; *acuminata* is much smaller than others, dark areas of head blacker, no pale spot on ear-coverts, upperparts paler and browner, less rufous, underparts paler. Voice. Song a continuous jumble of high squeaky notes, perhaps accelerated with excitement; mates greet with chattering duet. Call a nasal "chuh".
Habitat. Xeric grasslands with scattered trees dominated by legumes; on rocky slopes, brushy fence rows and edges of fields; locally in overgrazed fields dominated by flat-pad cactus (*Platyopuntia*); also disturbed roadsides. Sea-level to 1400 m.
Food and Feeding. Principally seeds, small insects, spiders (Araneae), and fruits; feeds young with insects. Usually forages on ground, but also low in vegetation. At all seasons found in groups of generally 3–7 individuals, occasionally more.
Breeding. Season Apr–Nov, sometimes later on coast than inland; probably double-brooded. Cooperative breeder, up to seven individuals attend nest. Nest a deep cup made from dry grasses and twigs, lined with finer grasses and hair, placed 0·3–1·5 m above ground and usually in dense and spiny bush. Clutch 2–4 eggs, pale blue. No information on incubation and nestling periods.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common to common; often common or very common in appropriate habitat. Somewhat more local in interior.
Bibliography. Anon. (1998), Armani (1985), Binford (1989), Davis, J. (1953, 1960a), Griscom (1932), Howell & Webb (1995), Rowley (1962, 1984), Selander & Giller (1959), Stiles & Skutch (1989), Storer (1955), Webster (1959a), Wolf (1977).

95. **Black-chested Sparrow**

Peucaea humeralis

French: Bruant à plastron **German**: Schwarzbrustammer **Spanish**: Chingolo Pechinegro

Taxonomy. *Haemophila humeralis* Cabanis, 1851, Tehotepec, Puebla, Mexico.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Various studies suggest that this species is part of a group that includes also *P. ruficauda*, *P. mystacalis*, *P. sumichrasti* and *P. carpalis*, this group being sister to a clade containing *P. cassinii*, *P. aestivalis* and *P. botterii*. Birds of N Colima have sometimes been separated as race *asticta*, but doubtfully valid. Monotypic.
Distribution. WC & SC Mexico from S Jalisco and Colima E to Morelos and Puebla, S to Guerrero and SW Oaxaca.
Descriptive notes. 15–15·5 cm; 18–27·6 g. A medium-sized sparrow. Has head blackish, white loral spot and moustachial stripe; white throat bordered by thin black malar stripe and black chestband (in fresh plumage, black areas, including on head, partly obscured by pale rufous feather fringes); upperparts rufous, mottled darker brown, becoming olive-brown on rump and uppertail-coverts; tail and upperwing blackish-brown, feathers edged paler brown, two whitish wingbars; underparts whitish, flanks and undertail-coverts washed with cinnamon; iris brown; upper mandible black, lower mandible blue-grey; legs pale pinkish. Sexes similar. Juvenile is duller than adult, with grey-



ish head and chestband, rufous-streaked crown. Voice. Song, sometimes in duet, typically a high liquid twittering preceded by one to a few short introductory notes, "bzz, bzz, bzz, t-chip ichip tip-i-see"; also has chatter-song, lasting 1·5–2 seconds, or a soft "whisper song". Call "pit-za"; also "chip", sometimes followed by trill, also a thin "tzeet".
Habitat. Arid tropical scrub-forest and thorn-forest with trees 11–32 m tall and with continuous canopy of varying heights; at 300–1500 m.
Food and Feeding. Little information on diet; in breeding season, at least, mainly animal items, especially insects, such as lepidopteran larvae, grasshoppers (Orthoptera), termite (Isoptera) workers, also some seeds and fruit. Usually feeds in canopy, where it catches insects often by foliage-gleaning in manner of a vireo (Vireonidae) or by hover-picking. Generally forages singly or in pairs; larger groups unusual, and probably family parties.
Breeding. Season May–Sept; probably double-brooded, and perhaps multi-brooded. Apparently monogamous, and generally seen in pairs. Nest made from dry grasses and twigs, lined with fine grasses and cattle hair, often with canopy of dry grass constructed over it, placed on or near ground in thick cover. Eggs whitish-blue with dark spots. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Balsas Region and Interior Oaxaca EBA. Often common or very common in appropriate habitat.
Bibliography. Anon. (1998), Armani (1985), Binford (1989), Hellmayr (1938), Howell & Webb (1995), Rowley (1962), Storer (1955), Wolf (1977).

96. Bridled Sparrow

Peucaea mystacalis

French: Bruant à moustaches **German**: Zügelammer **Spanish**: Chingolo Embridado

Taxonomy. *Zonotrichia mystacalis* Hartlaub, 1852, Río Frío, between Puebla and Mexico City, Mexico.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Various studies suggest that this species is part of a group that includes also *P. ruficauda*, *P. humeralis*, *P. sumichrasti* and *P. carpalis*, this group being sister to a clade containing *P. cassinii*, *P. aestivalis* and *P. botterii*. Monotypic.
Distribution. S edge of C plateau of Mexico in E México, S Puebla, CW Veracruz and N & C Oaxaca.



Descriptive notes. 15–16·5 cm; 19·3–25·9 g. A medium-sized sparrow. Has crown and nape grey, faintly streaked darker, side of face grey, white supraloral stripe, broken eyering and submoustachial stripe enclosing black loral area and area beneath eye, throat black; upperparts brown with broad blackish streaks, scapulars, rump plain rusty fading to dull brown on uppertail-coverts; tail feathers blackish with thin grey edges; upperwing greyish-brown with pale feather edges, median and greater coverts also with broad whitish tips (forming two whitish wingbars); breast and side of neck grey, belly white, becoming rufous-buff posteriorly and on undertail-coverts; iris brown; upper mandible black, lower mandible pale blue-grey to pale pinkish; legs flesh-coloured. Sexes similar. Juvenile is like adult, but duller, grey above, mottled darker grey, with pale supercilium and throat, breast greyish-white with thin, broken grey streaks. Voice. Song a series of slightly sneezy, sharp and sweet chipping notes, becoming an excited liquid chatter, e.g. "w-sik, w-sik w-sik, w-sik w-sik...w-syu w-syu"; duetting occurs. Call a sharp liquid "check", "tzeet" or "tut".
Habitat. Semi-open arid tropical scrub, thickets and grassy clearings, and open leguminous thorn-forest interspersed with large cacti; in Oaxaca found in scrubby oaks (*Quercus*) and in clearings in early successional thorn-scrub. At 900–1800 m.
Food and Feeding. Little information on diet; eats seeds, small insects (orthopterans), spiders (Araneae), and fruits. Forages principally near ground or low in vegetation, or on ground; at times may hover-glean. Often in pairs; forms foraging flocks during non-breeding season.
Breeding. Season May–Jul; double-brooded. Monogamous. Nest a cup of dry grass and twigs, lined with finer grasses and hair, placed close to or on ground, sometimes below cactus, or low in shrub. Clutch 3–4 eggs, whitish-blue. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Balsas Region and Interior Oaxaca EBA. Often common or very common in appropriate habitat.
Bibliography. Anon. (1998), Armani (1985), Binford (1989), Hellmayr (1938), Howell & Webb (1995), Palacios-Silva *et al.* (2005), Storer (1955), Wolf (1977).

97. Cinnamon-tailed Sparrow

Peucaea sumichrasti

French: Bruant à queue rousse **German**: Zimtschwanzammer **Spanish**: Chingolo Colicanela
Other common names: Sumichrast's Sparrow

Taxonomy. *Haemophila sumichrasti* Lawrence, 1871, Juchitán, Tehuantepec, Oaxaca, Mexico.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Various studies suggest that this species is part of a group that includes also *P. ruficauda*, *P. humeralis*, *P. mystacalis* and *P. carpalis*, this group being sister to a clade containing *P. cassinii*, *P. aestivalis* and *P. botterii*. Monotypic.
Distribution. Pacific slope of SE Oaxaca and extreme SW Chiapas, in S Mexico.
Descriptive notes. 14·5–16·5 cm; 23·1–30·1 g. A fairly large sparrow. Has rufous crown with narrow darker streaks, grey median crownstripe, pale grey supercilium paler anteriorly, blackish preocular stripe, rufous postocular stripe extending to and curving down around rear ear-coverts;



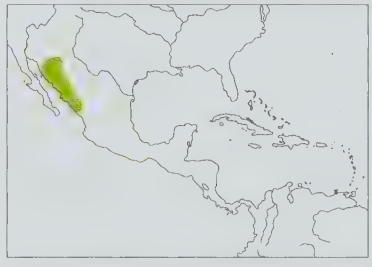
ear-coverts greyish, area below eye whitish, short black moustachial stripe sometimes with some rufous admixed, whitish submoustachial stripe, thin black malar stripe, white chin and upper throat; upperparts greyish-buff with rufous-edged broad blackish streaks, rump to tail rufous, uppertail-coverts and tail feathers with narrow buff edges; upperwing mostly blackish-brown with pale feather edgings, lesser coverts rufous, median and greater coverts and tertials with broader edges and whitish tips (forming two indistinct wingbars); throat white, breast pale grey with faint buffy wash, belly whitish, flanks and undertail-coverts washed light cinnamon-buff; iris deep brown; upper mandible usually dark horn-brown to greyish, lower mandible pinkish-flesh; legs horn-colour or pink. Sexes similar in coloration. Juvenile resembles adult, but duller and less distinctly marked above, more yellowish-buff below, with dusky streaks on breast. Voice. Song a sprightly tinkling series of chipping notes, sometimes whistle-like, often with 1–5 introductory notes, e.g. "bzz, bzz, bzz, t-chip ichip tip-i-see"; sometimes a soft whisper song, by two birds close together; sometimes sings in duet. Call "tee, tee, tee", or shortened to a simple "tzee".
Habitat. Slightly open areas in arid tropical scrub (with *Jatropha* and *Ipomoea*) up to 6 m tall, also thickets and grassy clearings; apparently favours more wooded habitats than those preferred by *P. ruficauda*. Sea-level to 900 m.
Food and Feeding. Little information on diet; probably seeds, small insects, spiders (Araneae) and fruits. Sometimes takes nectar. Apparently eats principally animal matter when feeding young. Forages principally on or near ground or low in vegetation. Often in pairs or small groups.
Breeding. Egg-laying from early Jun to early Sept, and bird in breeding condition on 22nd May in Oaxaca; double-brooded. Nest not described; probably placed near ground. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Isthmus of Tehuantepec EBA. Locally fairly common to common. Estimated total population fewer than 50,000 individuals. Has very small global range, and is possibly suffering from habitat degradation. Population thought to be stable, but little information. Habitat fragmented following construction of Pan-American Highway; also, many forest areas now degraded. Research required to assess impact of potential threats.
Bibliography. Amadon & Eckelberry (1955), Anon. (1998, 2010c), Armani (1985), Binford (1989), Butchart & Stattersfield (2004), Hellmayr (1938), Howell & Webb (1995), Miller *et al.* (1957), Stattersfield & Capper (2000), Wolf (1977).

98. Rufous-winged Sparrow

Peucaea carpalis

French: Bruant à épaulettes **German**: Rostflügelammer **Spanish**: Chingolo Alirrufo

Taxonomy. *Peucaea carpalis* Coues, 1873, Tucson, Arizona, USA.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Various studies suggest that this species is part of a group that includes also *P. ruficauda*, *P. humeralis*, *P. mystacalis* and *P. sumichrasti*, this group being sister to a clade containing *P. cassinii*, *P. aestivalis* and *P. botterii*. Geographical variation largely clinal, and races weakly differentiated; *bangsi* intergrades with nominate in NC Sonora and with *cohaerens* in N Sinaloa, and sometimes considered to be inseparable from latter. When species treated in same genus as *Amphispiza bilineata* (e.g. both placed in *Aimophila*), race *bangsi* of latter has priority; in such a case, race *bangsi* of present species assumes replacement name *distinguenda*. Three subspecies tentatively recognized.
Subspecies and Distribution.
P. c. carpalis Coues, 1873 – extreme S USA (SC Arizona) and adjacent NW Mexico (S to C Sonora).
P. c. bangsi (R. T. Moore, 1932) – NW Mexico (NC Sonora S to N Sinaloa).
P. c. cohaerens (R. T. Moore, 1946) – N & C Sinaloa.



Descriptive notes. 13·5–14·5 cm; 12·6–17·5 g. A small, rather slim sparrow. Nominate race has crown and nape rufous, grey median crownstripe, broad grey supercilium, grey side of head with rusty postocular stripe, black preocular stripe; short, thin blackish moustachial stripe and malar stripe separated by pale greyish submoustachial area; upperparts buffy grey, mantle and scapulars with rusty-edged dark brown streaks, rump paler; tail feathers dark grey-brown with narrow paler edges; upperwing dark brown, lesser coverts rufous, median and greater coverts broadly edged buffish and with buff-white tips (forming two indistinct wingbars), flight-feathers narrowly edged greyish-buff, tertials with broader pale edges; throat whitish, side of neck and underparts pale grey, becoming paler on belly, flanks washed pale buff; iris deep brown; bill yellowish to pinkish-flesh, usually with extensive dusky-horn on upper mandible; legs pinkish or yellowish-flesh to brownish. Sexes similar. Juvenile is similar to adult, but more buff overall, with rufous areas more dark brown, breast and flanks with prominent dark streaks. Races differ in size and in plumage darkness, nominate largest and greyest above: *cohaerens* is smallest and darkest, with rufous cast on rump and back; *bangsi* is intermediate in size between previous and nominate, slightly browner above than nominate. Voice. Song a plaintive rapid series of whistled notes, often with 1–3 introductory notes, e.g. "chip burr chip-ip-ip-ip-ip-ip-ip", first note(s) higher than following trill (or sometimes on same pitch, or lower); also a "chip chip whecoo". Call a distinctive high-pitched "seep", also "chink".
Habitat. Desert scrub (Arizona and Sonora) and tropical thorn-scrub (Sinaloa), with mixed bunchgrass, and in open farmland in tropical deciduous forest, especially mesquite (*Prosopis*), but also hackberry (*Celtis*) and acacia (*Acacia*) with cholla cactus (*Opuntia*). Present from sea-level up to 1200 m.
Food and Feeding. Diet consists of grass and weed seeds, and arthropods. In winter, mostly seeds (e.g. of *Aristida*, *Panicum*, *Paspalum*); in summer, mostly animal items, typically insects, especially inchworms (Geometridae) and other caterpillars, and also some spiders (Araneae). Forages principally on or near ground and low in vegetation. Often in pairs or small groups.

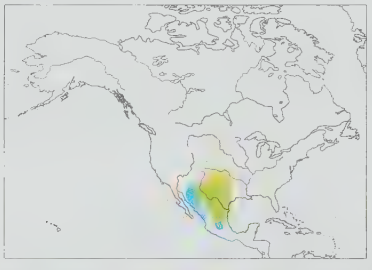
Breeding. Breeds generally during summer, Jun to early Oct, depending on rains, beginning usually after a day of monsoon rainfall exceeding 14 mm, rarely nests in spring; sometimes double-brooded. Monogamous; pair-bond may be maintained throughout year. Nest constructed by female, taking 3–4 days to complete work, a large and deep cup made from grasses, lined with finer "cholla grass" and hair, usually placed 15 cm to 2 m (commonly c. 0·5 m) above ground in spiny tree or cholla cactus, easily found. Clutch 2–5 eggs, most commonly 3 after summer rains, 2–4 after spring rains, whitish to pale greenish and unspotted; incubation by female, period 11 days; chicks fed by both adults, nestling period 8–9 days. Nests sometimes parasitized by Brown-headed Cowbird (*Molothrus ater*), but breeding period overlaps little with that of latter.
Movements. Resident; some short-distance movements may occur when food limited. After very wet years, where breeding success high, extends range to areas within 100 km of regular breeding sites, this attributed to post-breeding dispersal by young.
Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Often common or very common in appropriate habitat. Global population estimated at c. 74,000 individuals. In N of range, numbers fluctuate according to amount of rainfall. In many areas, habitat degraded as a consequence of overgrazing and urbanization.
Bibliography. Anderson (1965), Anon. (1998), Armani (1985), Austin & Ricklefs (1977), Binford (1989), Deviche *et al.* (2006), Hellmayr (1938), Howell & Webb (1995), Lebbin *et al.* (2010), Lowther, Groschupf & Russell (1999), Moore (1946), Phillips (1951), Pitelka (1951), Russell & Monson (1998), Small, T.W. *et al.* (2007), Storer (1955), Wolf (1977).

99. Cassin's Sparrow

Peucaea cassinii

French: Bruant de Cassin **German**: Cassinammer **Spanish**: Chingolo de Cassin

Taxonomy. *Zonotrichia cassinii* Woodhouse, 1852, near San Antonio, Texas, USA.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Closely related to *P. aestivalis* and *P. botterii*, all having aerial song displays; molecular analyses suggest that this group is close to a clade consisting of *P. ruficauda*, *P. humeralis*, *P. mystacalis*, *P. sumichrasti* and *P. carpalis*. Monotypic.
Distribution. Breeds from C & S USA (SW South Dakota, C Wyoming, E & C Colorado E to WC Kansas, and C Oklahoma, S to SW New Mexico, and S Texas) and N Mexico (S to N Chihuahua, S Coahuila, Zacatecas, San Luis Potosí, and SE Tamaulipas). Non-breeding SW USA (SE Arizona, SW New Mexico, W Texas, possibly also E Nevada) S in Mexico to S Sinaloa, San Luis Potosí, N Nuevo León and N Tamaulipas, rarely to Guanajuato.



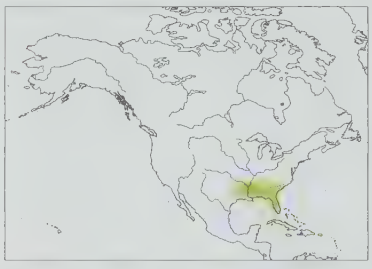
Descriptive notes. 13–15 cm; 14–23·5 g. A medium-sized sparrow with a relatively small bill and rounded tail. Head is streaked with grey and dark brown, indistinct supercilium buff and grey, faint brown moustachial stripe, and thin dark malar stripe; feathers of mantle and scapulars brown, with darker brown markings and paler grey to buff fringes, uppertail-coverts with brown spots; tail dark brown, central feather pair with dark shaft streak, outer three pairs with whitish tips, outermost also edged whitish (pale areas indistinct in worn plumage); upperwing blackish-brown, feathers edged pale grey, median and greater coverts also tipped pale buff (forming indistinct wingbars); chin, throat and breast grey; flanks grey, with black streaks posteriorly, belly whitish, undertail-coverts sometimes buffy; iris dark brown; bill largely dark brownish-grey, pale bluish-grey on cutting edges and all of lower mandible; legs dull pinkish. Sexes similar. Juvenile is similar to adult, but back brown, feathers with buffy tips and darker brown central streaks, greater coverts edged with white, and light streaking on breast and throat. Voice. Song, often in flight, also at night, a clear, usually descending sweet liquid trill, followed by 2 notes, second higher than first, also preceded by 2 soft notes (seldom heard), "ti ti tzeeeeeeeeeee tay tay". Also a chitter flight song, a rapid series of chipping notes. Call "chip" when around young, or alarmed; also a soft "sip".
Habitat. Arid grassland with scattered bushes, desert scrub and tropical thorn-scrub, with grass, and in open farmland in tropical deciduous forest. Sea-level to 2150 m.
Food and Feeding. During nesting period feeds principally on insects, especially grasshoppers (Orthoptera), Lepidoptera larvae, bugs (Hemiptera), ants, wasps and bees (Hymenoptera), and occasionally beetles (Coleoptera), as well as spiders (Araneae) and snails (Gastropoda); also seeds. Forages mostly on or near ground and low in vegetation. Sometimes in small groups outside breeding season.
Breeding. Timing not well understood: males start to sing after arrival in spring (in Kansas in late Apr); in SW New Mexico and SE Arizona (where rarely breeds in spring) also sings in late summer after monsoon rains (late Jul and Aug), but not known if these birds are breeding; it has been suggested that birds failing to breed early in season in Great Plains may move SW and breed in Aug, but no direct evidence; possibly double-brooded, with early brood in plains, and later one in SW. Apparently monogamous. In song flight, male sings as it rises up to c. 6 m, sets its wings, and floats back to a low bush, perhaps 10 m away. Nest built by female, a cup of dry grasses and stems, lined with rootlets, finer grasses and horsehair, placed on ground or within 20 cm of it in shrub or bunchgrass. Clutch 3–5 eggs, most commonly 3–4 eggs, white and unspotted; incubation by female, period 11 days; chicks fed by both parents, nestling period 7–9 days. Nests parasitized very uncommonly by Brown-headed Cowbird (*Molothrus ater*).
Movements. Present all year in S part of range, but ringing studies indicate that breeding and non-breeding populations there are different. N populations, S to C Texas, appear to be migratory; present only in winter in C Mexico, indicating some N–S movement. Appears to be somewhat nomadic; breeds in desert areas when rainfall levels and grass heights adequate, perhaps moving to entirely different area in following year; has been hypothesized that this species may breed in N part of range, then migrate S to deserts of SW USA and breed again during monsoon. More study needed to elucidate exact migratory strategy. In spring, arrives in Kansas, Oklahoma and N Texas from late Mar to late Apr, main arrival in mid-Apr; birds wintering in Arizona leave between late Apr and early May. In autumn, most movement out of N breeding grounds in middle to late Sept, rarely some remaining into Nov. Vagrant, largely in spring, to NE as far as SE Canada (S Ontario, Nova Scotia) and NE USA (Maine); vagrant also on California coast.
Status and Conservation. Not globally threatened. Locally common or very common in appropriate habitat. Breeds in some years, rarely, in S California E of the Sierra. Populations in Great Plains may be declining, but evidence on this not clear. Breeds more commonly in native grasses than in areas planted with exotic species. Near urban areas, much suitable habitat has been destroyed by urban development.
Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), Binford (1989), Bowers & Dunning (1985), Burke (2001), Davis (1963), Dorn & Dorn (1995), Dunning, Bowers *et al.* (1999), Hellmayr (1938), Howell & Webb (1995), Hubbard (1977), Hubbard & Crossin (1974), Kingery & Julian (1971), Mason (1992), Miller *et al.* (1957), Phillips (1944), Rising & Beadle (1996), Russell & Monson (1998), Savage & Dick (1969), Schnase *et al.* (1991), Storer (1955), Wolf (1977).

100. Bachman's Sparrow

Peucaea aestivalis

French: Bruant des pinèdes **German**: Bachmanammer **Spanish**: Chingolo de Bachman
Other common names: Pine Woods Sparrow

Taxonomy. *Fringilla aestivalis* M. H. C. Lichtenstein, 1823, Georgia, USA.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Closely related to *P. cassinii* and *P. botterii*, all having aerial song displays; molecular analyses suggest that this group is close to a clade consisting of *P. ruficauda*, *P. humeralis*, *P. mystacalis*, *P. sumichrasti* and *P. carpalis*. Geographical variation largely clinal, and races weakly differentiated. Three subspecies recognized.
Subspecies and Distribution.
P. a. illinoensis Ridgway, 1879 – breeds in EC USA from Arkansas, SE Oklahoma and E Texas E to S Kentucky and S Louisiana; non-breeding E Texas and along Gulf Coast E to Mississippi R.
P. a. bachmani (Audubon, 1833) – breeds SE USA from S Kentucky and S Virginia S to S Mississippi, S Alabama and S Georgia; non-breeding in S of range (from Mississippi E to C North Carolina) S to Gulf Coast and C Florida.
P. a. aestivalis (M. H. C. Lichtenstein, 1823) – breeds from E South Carolina and E Georgia S to S Florida; non-breeding S Georgia and Florida.



Descriptive notes. 12–16 cm; 18·4–22·6 g. Medium-sized sparrow with relatively large bill, flat head, and long, rounded tail. Nominate race has thin buffy-grey median crownstripe, supercilium somewhat lighter grey behind eye, buffy in front of eye, enclosed by dull rusty to brown lateral crownstripe and postocular stripe; pale buff eyering, side of face and throat buffy, thin malar stripe; upperparts brown with strong blackish and rusty-brown streaking (centres of feathers often blackish); tail brown to rusty brown; upperwing brown, washed rusty, yellow at bend of wing; underparts greyish-buff, belly contrastingly whitish; iris dark brown; upper mandible dusky, lower mandible paler; legs flesh-colour to pink. Sexes similar. Juvenile has crown and back dark brown or black, mantle and scapulars edged buffy or reddish-brown (but less rufous than adult), underparts whitish or creamy, breast and flanks streaked with brown. Race *bachmani* is like nominate, but is more rusty on head and upperparts; *illinoensis* is even more rusty than previous, and generally paler, with buffy wash on breast. Voice. Song, sometimes in short aerial display, highly variable but distinctive, generally consists of a long, sweet note followed by a clear trill, sometimes also with a third element; flight song (uncommon) sometimes more bubbling and exuberant. Call a thin, high "chip" or "pseet".
Habitat. Lowland pine (*Pinus*) savanna, particularly mature, open pine forest with fairly rank understorey of wiregrass (*Aristida stricta*), palmettos (*Serenoa*) and weeds; also in clear-cuts with grassy undergrowth, and in oak–palmetto (*Quercus–Serenoa*) scrub and grasslands away from pines. Found in limestone glades where growth of woody vegetation limited by poor soil and fire. In N found in degraded pastures, often brushy hillsides; in Indiana occurs in overgrown old fields with broomsedge (*Andropogon virginicus*), deciduous trees and red cedars (*Juniperus virginiana*). Sea-level to 900 m.
Food and Feeding. Feeds on grass seeds (e.g. *Panicum*), also on insects, primarily beetles (Coleoptera) and lepidopteran larvae; young fed mostly with insects. Forages on ground, gleaning from surface; jumps to glean or catch prey. Occasionally searches low in bushes. Shy. Singly and in pairs.
Breeding. Season mid-Apr through Sept; often double-brooded. Monogamous; apparently pairs relatively quickly after arrival on breeding grounds, but nest-building delayed by several weeks after pair formation. Male sometimes performs aerial display with song. Nest built by female, accompanied by male, a cup (may be domed) constructed from grasses and rootlets, lined with finer grasses and horsehair, placed on ground, usually (not always) in dense cover at base of grass clump, small shrub or pine seedling; closely associated with clumps of broomsedge or wiregrass when nesting. Clutch 1–5 eggs, most commonly 4, whitish or pale blue and unspotted; incubation by female, period 12–14 days; chicks fed by both parents, nestling period 9–10 days. Nests parasitized rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Migration poorly known, as species becomes difficult to see when not singing. N populations migratory; S populations resident. In spring, arrival in breeding areas between late Mar and mid-Apr; autumn migration even less well understood, spans period from late Aug to late Oct. Race *illinoensis* recorded as casual visitor N to S Canada (Ontario) and in USA in NE Kansas, Michigan, New York and New Jersey.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Locally common in optimum habitat; uncommon to rare in many places. During 1890–1915, expanded range N to N Illinois, C Ohio and SW Pennsylvania (with records even to S Ontario) following farm abandonment, and into South Carolina following clearing of old pine forests. Now uncommon or irregular N of Carolinas, SC Kentucky and SC Missouri. Global population estimated at 250,000 mature individuals, and decreasing. Declined at fairly rapid rate for several decades, but rate of decline now slower. Now absent over most of N parts of range and uncommon in most of S because of logging, fire suppression and habitat fragmentation, such that many suitable habitat patches no longer occupied. In some areas suffers some disturbance by birdwatchers. S pine forests often clear-cut and managed in a way that does not benefit this species; on the other hand, it can be common in areas managed to protect Red-cockaded Woodpecker (*Picoides borealis*) and where understorey regularly burnt, keeping down growth of woody vegetation. Occurs in many protected areas.
Bibliography. Anon. (1998, 2010c), Beadle & Rising (2002), Brooks (1938), Butchart & Stattersfield (2004), Cox & Jones (2004), Dorsey (1976), Dunning (1993a), Dunning & Watts (1990, 1991), Haas & Titus (1998), Haggerty (1988, 1992, 1995, 1998, 2000), Hellmayr (1938), Lebbin *et al.* (2010), McKitrick (1979), McNair & Nicholson (1991), Meanley (1959, 1989, 1990), Mengel (1951), Murray *et al.* (2004), Nicholson (1976), Perkins & Vickery (2005), Perkins *et al.* (2009), Pittman (1960), Plentovich, Tucker *et al.* (1998), Rising & Beadle (1996), Stattersfield

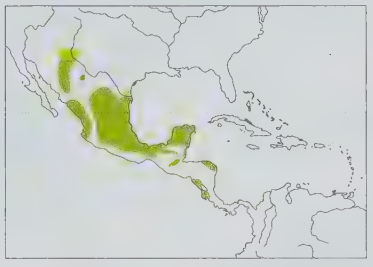
& Capper (2000), Stober & Krementz (2000, 2006), Storer (1955), Tucker, Hill & Holler (1998), Tucker, Robinson & Grand (2004, 2006), Watts *et al.* (1998), Weston (1968), Wolf (1977).

101. **Botteri's Sparrow**

Peucaea botterii

French: Bruant de Botteri **German**: Botteriammer **Spanish**: Chingolo de Botteri
Other common names: Peten/Yellow-carpalled Sparrow (*petenica/vantynei/spadiconigrescens/vulcanica*)

Taxonomy. *Zonotrichia botterii* P. L. Sclater, 1858, vicinity of Orizaba, Veracruz, Mexico.
Formerly placed in *Aimophila*, but molecular-genetic studies indicate that such treatment would make that genus polyphyletic. Closely related to *P. cassinii* and *P. aestivalis*, all having aerial song displays; molecular analyses suggest that this group is close to a clade consisting of *P. ruficauda*, *P. humeralis*, *P. mystacalis*, *P. sumichrasti* and *P. carpalis*. S races *petenica*, *vantynei*, *spadiconigrescens* and *vulcanica* have in the past been considered to represent a separate species. Race *petenica* intergrades with nominate in E Mexico (Veracruz). Some races poorly differentiated, grading clinally into others; *texana* sometimes considered synonymous with *arizonae*; proposed race *tabascensis* (described from S Huimanguillo, in W Tabasco) included within *petenica*. Nine subspecies recognized.
Subspecies and Distribution.
P. b. arizonae Ridgway, 1873 – extreme S USA in SE Arizona (Cochise County) and SW New Mexico, possibly also W Texas, and N Mexico S to S Sonora and N Durango and discontinuously in N & S Coahuila; non-breeding also to SC Mexico (Morelos).
P. b. texana (A. R. Phillips, 1943) – S Texas and NE Mexico (E Tamaulipas).
P. b. goldmani (A. R. Phillips, 1943) – W coast of Mexico from S Sinaloa S to Nayarit.
P. b. mexicana (Lawrence, 1867) – C highlands of Mexico from SE Durango, Zacatecas and San Luis Potosí S to Colima, C Michoacán and Distrito Federal.
P. b. botterii (P. L. Sclater, 1858) – SE & S highlands of Mexico from S San Luis Potosí S through Puebla and W Veracruz to C Guerrero, Oaxaca and W Chiapas.
P. b. petenica (Salvin, 1863) – lowlands of SE Mexico from EC Veracruz (near city of Veracruz), Tabasco and E Chiapas E to N Yucatán, N Guatemala (Petén) and Belize.
P. b. vantynei (Webster, 1959) – highlands of C Guatemala.
P. b. spadiconigrescens (T. R. Howell, 1965) – lowlands of N Honduras and NE Nicaragua.
P. b. vulcanica (W. deW. Miller & Griscom, 1925) – highlands of W Nicaragua and NW Costa Rica.
Descriptive notes. 13·5–15 cm; 15·7–25·5 g. A medium-sized sparrow with large bill, flat head, and long, rounded tail. Nominate race is moderately dark brown in appearance, has crown to upperparts greyish, streaked dark brown, streaks variably edged rufous, scapulars with rufous wash; highly variable, variation difficult to assess (samples from range often include wintering birds from other populations), but dorsally darkest in E San Luis Potosí, Veracruz and Puebla, more reddish in W Chiapas, and apparently paler in Oaxaca; side of face greyish to grey-brown, faint dark eyestripe behind eye, lighter grey supercilium somewhat obscure; tail dark brown, outer pair of feathers paler; upperwing dark brown, feathers with pale rufous-buff edges, bend of wing pale yellow; chin and throat whitish; underparts light brownish to greyish-buff, belly whiter; iris dark brown; upper mandible dusky, lower mandible bluish; legs pinkish. Sexes similar. Juvenile is more buffish generally than adult, has buffy supercilium and lores, throat faintly streaked, buff breast, and thin brown streaks on breast and flanks. Races differ mainly in plumage tones: *arizonae* is much more rufous above than nominate; *texana* is pale, clearly paler and greyer above than nominate; *goldmani* is



similar to *arizonae*, but darker red above; *mexicana* is darker above than previous, with streaks broader and blackish; *petenica* is small, very dark, almost blackish (with greyish feather edges) above, and very pale below; *vantynei* is similar to previous, but not quite so dark (dark brown) above and darker below; *spadiconigrescens* is very dark above, like *petenica*, but feather edges browner, also a shade darker below; *vulcanica* resembles *petenica*, but larger, a little less dark above, much more dusky below. Voice. Song, sometimes in short aerial display, characteristically consists of two "che-lick" elements followed by a variable series of notes, "wit-wit-wit-wit-t-t-t-tseee wit wit", becoming more rapid, like a bouncing ball. Call a sharp "chip", "pit" or "tsip".
Habitat. Grasslands, savanna, coastal prairie, pine (*Pinus*) forests, and lowland pine savanna in tropical and subtropical zones; requires perches (e.g. bushes, stone walls, fences) for songposts. In Arizona, breeds in arid grasslands and open oak (*Quercus*) woodland at 1050–1500 m, in open encinal (evergreen woodlands dominated by oak) and sacaton (*Sporobolus*) grasslands; also in upland mesquite (*Prosopis*) and oak woodlands. In coastal Texas and Tamaulipas, breeds in periodically inundated coastal prairie, in saltgrass (*Distichlis*) prairie, and at higher elevations in grasslands with widely separated mesquite, yucca (*Yucca*), huisache (*Acacia farnesiana*) and hackberry (*Celtis pallida*). In Belize, Honduras, and Nicaragua breeds in grasslands in lowland pine ridges. Sea-level to 2500 m.
Food and Feeding. Insects, also seeds of sacaton and other plants. Feeds young with variety of insects, especially grasshoppers (Orthoptera) and stick-insects (Phasmida), larval Lepidoptera, and beetle larvae (Coleoptera). Forages mostly on ground; shy and elusive, often difficult to observe. In pairs; sometimes in small groups, probably family parties.
Breeding. In Arizona season late May through Aug; usually single-brooded; in some areas nesting activities seem to be triggered by rains. Monogamous. Male sometimes performs aerial display with song. Nest constructed from dry grass, lined with fine grasses, rootlets and hair, placed on ground in dense grass, most commonly sacaton, but variety of other species also used; nest woven into the grass, and often has woven entrance way or tunnel. Clutch 2–4 eggs (usually 3) in Arizona, 3–5 (usually 4) in Texas, eggs white and unmarked; incubation by female, period 12 days; chicks fed by both parents, nestling period 10 days. Nests parasitized very rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Migratory in far N of range in USA (Arizona, and probably S Texas); resident elsewhere. Absent from Arizona breeding areas Oct–May; in Texas probably absent between Oct and mid-Apr.
Status and Conservation. Not globally threatened. Locally abundant in N of range (USA); fairly common to common in Mexico and S to Costa Rica, becoming more local in S parts. At risk in Texas as a result of habitat loss. Habitat loss may have caused this species' extirpation in Arizona in 19th century, but it recovered in numbers in 20th century.
Bibliography. Anon. (1998), Armani (1985), Beadle & Rising (2002), Binford (1989), Conway & Benson (1990), Dickerman & Phillips (1967), Griscom (1932), Harper (1930), Hellmayr (1938), Howell & Webb (1995), Hubbard (1972a), Jones & Bock (2005), Miller *et al.* (1957), Ohmart (1968), Phillips *et al.* (1964), Rising & Beadle (1996), Russell (1964), Russell & Monson (1998), Storer (1955), Swanson (1985), Webb & Bock (1996), Webster (1959b), Wolf (1977).


inches 3
cm 8
ssp superciliosus
ssp sumichrasti
103
ssp rufivirgatus
102
ssp crassirostris
104
ssp rhyptothorax
ssp nigrirostris ♂
106
ssp axillaris ♂
ssp conirostris
ssp taciturnus ♀ ♂
ssp striaticeps
105
ssp umbrinus
ssp dorbignii ♂
107
ssp flavirostris ♀
♂
109
ssp polionotus ♂ ♀
108
ssp occidentalis
ssp schlegeli ♀ ♂
ssp erythrorhynchus
110
ssp nigriceps
ssp spectabilis
111
112
ssp aurantiirostris
ssp canidorsum ♂
ssp abeillei

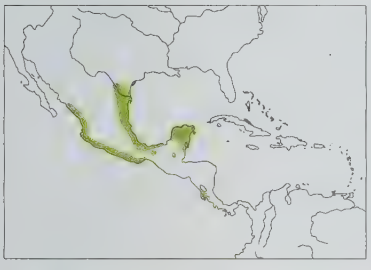
Genus *ARREMONOPS* Ridgway, 1896

102. Olive Sparrow

Arremonops rufivirgatus

French: Tohi olive **German**: Olivrückenammer **Spanish**: Cerquero Oliváceo
Other common names: Schott's Sparrow; Texas Sparrow (*rufivirgatus*); Nicoya/Pacific Sparrow ("Pacific group"); Yucatan Sparrow ("Yucatan group")

Taxonomy. *Embernagra rufivirgata* Lawrence, 1851, Brownsville, Texas, USA.
Relationships of genus not well understood; molecular evidence suggests that it is close to *Rhynchospiza*, *Peucaea* and some *Ammodramus*. This species sometimes considered to form a superspecies with *A. tocuyensis*. Races form three groups, "*rufivirgatus* group" (*rufivirgatus*, *ridgwayi* and *crassirostris*), brighter-plumaged "Yucatan group" (*verticalis* and *rhyptothorax*), and even brighter and shorter-tailed "Pacific group" (*superciliosus*, *sinaloae*, *sumichrasti* and *chiapensis*); these sometimes considered to represent three separate species, but further study needed. Race *ridgwayi* weakly differentiated, and possibly an intergrade between nominate and *crassirostris*; *verticalis* intergrades with *crassirostris* in E Tabasco and Campeche and with *rhyptothorax* in C Yucatán. Nine subspecies recognized.
Subspecies and Distribution.
A. r. sinaloae Nelson, 1899 – W Mexico from C Sinaloa S to Nayarit.
A. r. sumichrasti (Sharpe, 1888) – W coast of Mexico from Jalisco, Colima, Michoacán and Guerrero S to Isthmus of Tehuantepec (Oaxaca).
A. r. rufivirgatus (Lawrence, 1851) – extreme S USA (S Texas) and NE Mexico from NE Coahuila (San Juan de Sabinas) and Nuevo León S to S coastal Tamaulipas.
A. r. ridgwayi (Sutton & Burleigh, 1941) – S interior of Tamaulipas, E San Luis Potosí, Hidalgo and N Veracruz.
A. r. crassirostris (Ridgway, 1878) – Atlantic coast of SE Mexico from C & S Veracruz S to E Puebla and N Oaxaca and E Tabasco.
A. r. verticalis (Ridgway, 1878) – E Tabasco and Yucatán Peninsula (SE Mexico) S to N Guatemala (Petén) and N Belize.
A. r. rhyptothorax Parkes, 1974 – N Yucatán Peninsula.
A. r. chiapensis Nelson, 1904 – C valley of Chiapas, in S Mexico.
A. r. superciliosus (Salvin, 1865) – Pacific coast of Costa Rica from Nicaragua border S to Santo Domingo.



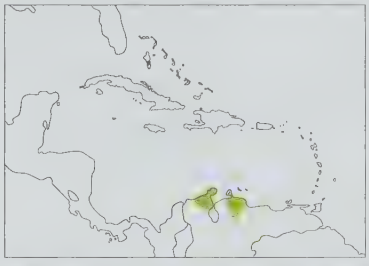
Descriptive notes. 13·5–15 cm; 15–30 g (Texas). A fairly stout, dull olive-green sparrow. Nominate race has head dull grey, dull brown lateral crownstripe, thin brown eyestripe; upperparts, including upperwing and tail, dull olive-green, bright yellow bend of wing; throat greyish-white; underparts pale greyish to greyish-green with dull buff wash, belly paler, undertail-coverts more buffish; iris brown; upper mandible dusky, lower mandible paler horn; legs light brownish. Sexes similar. Juvenile is mostly brownish, paler below, with brown streaking on crown, nape, mantle, throat, breast and flanks. Races differ in overall size, bill size, and colour of crown stripes and underparts, nominate with thinner bill than others: *ridgwayi* is intermediate between nominate and *crassirostris*; *crassirostris* is darker and browner, with more rusty diffuse lateral crownstripes, deep buff-brown flanks, relatively large and thick bill; *verticalis* is brighter above than previous races, has lateral crownstripes narrower, more sharply defined and streaked with black (especially in front of eye); *rhyptothorax* has upperparts and tail paler and less richly green than last, underparts whiter; *superciliosus* has lateral crownstripes dark chestnut, supercilium distinctly buff, upperparts bright olive-green, breast and flanks strongly washed buff; *sumichrasti* has lighter chestnut head-stripes than previous; *chiapensis* has dark green back and darker grey median crownstripe than last; *sinaloae* is greyer in general than *sumichrasti*. Voice. Song a monotonous series of accelerating chipping notes, "chip chip chip chip chip-chip-chip-chipchipchipchip". Call a squeak or insect-like buzz.
Habitat. Tangles of thorny shrubs, e.g. mesquite (*Prosopis*), Texas ebony (*Pithecollobium flexicaule*), huisache (*Acacia smallii*) and retama (*Parkinsonia aculeata*), and streamside cane, willow (*Salix*) and live oak (*Quercus*); humid evergreen forest and edge. Sea-level to 1800 m.
Food and Feeding. Few data on diet; known to consume small insects, spiders (Araneae), seeds, and occasionally fruits. Forages principally on ground and low in vegetation. Often uses "double-scratch" method, whereby it remains stationary and scratches backward with both feed simultaneously, exposing food under litter. Generally singly and in pairs; occasionally in small parties, presumably families.
Breeding. Nests with eggs mid-Mar to early Sept in Texas (lower Rio Grande Valley), but most nest May–Jun and Aug–Sept, and apparently double-brooded; season may be shorter (late Mar to early Jun) in drier thorn-scrub habitats; May–Aug in S Mexico and Apr–Jul in Costa Rica. Nest domed, with side entrance, constructed from twigs, grasses and stems, sparse lining sometimes of a few finer grasses and hair, placed generally no more than 1·5 m from ground in low bush or cactus in densely vegetated area. Clutch 2–5 eggs, white to pale pinkish and unspotted; incubation by female, no information on duration; no information on other aspects of parental care and nestling period. Nests parasitized by Bronzed Cowbird (*Molothrus aeneus*); most nests of present species in S Texas are parasitized, and clutches reduced by 78% by the parasite.
Movements. Generally sedentary; some may move during very cold seasons, or because of drought.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat; common to fairly common in most of Mexico, but uncommon in NE Coahuila (San Juan de Sabinas). Populations in S Texas have declined since early 1930s because of widespread brush removal, but still locally common.
Bibliography. Armani (1985), Binford (1989), Brush (1998a), Carter (1986), Dunning (2008), Fischer (1978), Howell & Webb (1995), Land (1970), McCarthy (2006), Oberholser (1974), Parkes (1974a), Ridgway (1901), Rising & Beadle (1996), Russell (1964), Stiles & Skutch (1989), Urban (1959), Vega & Rappole (1994).

103. Tocuyo Sparrow

Arremonops tocuyensis

French: Tohi de Tocuyo **German**: Tocuyoammer **Spanish**: Cerquero de El Tocuyo

Taxonomy. *Arremonops tocuyensis* Todd, 1912, Tocuyo, Lara, Venezuela.
Relationships of genus not well understood; molecular evidence suggests that it is close to *Rhynchospiza*, *Peucaea* and some *Ammodramus*. This species sometimes considered to form a superspecies with *A. rufivirgatus*. Monotypic.
Distribution. NE Colombia (Guajira Peninsula) and NW Venezuela (N Zulia, Falcón and Lara).



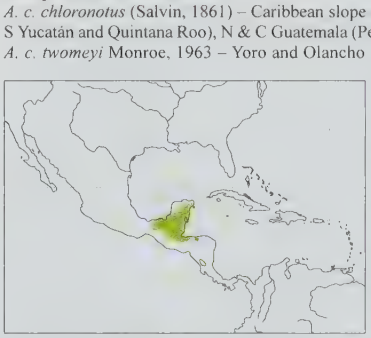
Descriptive notes. 13–14 cm. A relatively small sparrow with long tail and medium-sized bill. Largely olive above, off white below, with greyish head striped with black. Has grey head, including median crownstripe, with broad blackish lateral crownstripes coalescing on nape–hindneck, broad pale grey supercilium (slightly paler than median crownstripe), blackish eyeline, including lores, greyish ear-coverts (darker than median crownstripe and supercilium); upperparts plain olive; tail dusky, feathers edged dull olive-green; wing with vivid greenish-olive wash, including edging of flight-feathers, folded wing shows yellow at edge of shoulder; throat and underparts white, breast tinged smoke-grey and flanks and undertail-coverts buffy cream; underwing-coverts pale yellow; iris brownish; upper mandible blackish, lower mandible contrastingly leaden blue; legs dark pinkish. Sexes alike. Juvenile is generally olive-yellow and streaked both above and below, head lacks striped pattern of adult, instead has pale yellowish supercilium, with crown slightly darker and streaked. Voice. Song, from partially hidden perch 1–4 m up, most often at dawn, variable, tends to break out into three distinct parts, e.g. "tit, tit'ti'ti'ti'tsuee tsuee" or "sweeu sweeu eeee tu'tu'tu'tu", softer and sweeter than that of *A. conirostris*. Call a high-pitched "tiip".
Habitat. Thickets and shrubby sites adjacent to arid dry forest in tropical zone; general preference for shrubby borders of low-canopy deciduous forest, also patches of thorn-scrub and other dry shrubby sites, often adjacent to tall grass. Absent from driest sites dominated by acacia (*Acacia*) and cacti. Sea-level to 200 m, exceptionally to 1100 m.
Food and Feeding. Little known. Tends to forage on or near ground, singly and in pairs. Very inconspicuous and difficult to see.
Breeding. Nest a domed structure with side entrance, built from leaves, rootlets and twigs, lined with fine rootlets, placed usually on ground under bush or very low down in bush. Clutch 2–3 eggs, white. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Caribbean Colombia and Venezuela EBA. Uncommon to fairly common, and local. Despite the fact that this species has a small range, its numbers appear to be stable; no clear imminent threat to populations.
Bibliography. Armani (1985), Byers, Curson & Olsson (1995), Hilty (2003), Restall *et al.* (2006), Ridgely & Tudor (1989), Todd (1912).

104. Green-backed Sparrow

Arremonops chloronotus

French: Tohi à dos vert **German**: Grünrückenammer **Spanish**: Cerquero Dorsiverde

Taxonomy. *Embernagra chloronota* Salvin, 1861, Choctum, Alta Verapaz, Guatemala.
Relationships of genus not well understood; molecular evidence suggests that it is close to *Rhynchospiza*, *Peucaea* and some *Ammodramus*. Sometimes considered conspecific with *A. conirostris*, with which virtually sympatric in NC Honduras, but differs significantly in juvenile plumage, size and vocalizations. Two subspecies recognized.
Subspecies and Distribution.
A. c. chloronotus (Salvin, 1861) – Caribbean slope of SE Mexico (from Tabasco and N Chiapas E to S Yucatán and Quintana Roo), N & C Guatemala (Petén and Alto Verapaz), Belize and NW Honduras.
A. c. twomeyi Monroe, 1963 – Yoro and Olancho Departments, in NC Honduras.



Descriptive notes. 15–16 cm; 15–31·2 g. A fairly stout, dull olive-green sparrow with striped head. Nominate race has head dull greenish-grey, with long dull blackish lateral crownstripe and eyestripe; upperparts, including tail, dull olive-green; upperwing feathers dark brown with broad olive edges, edges narrower and yellower on remiges, bright yellow bend of wing; throat greyish-white; breast and flanks greyish-green, belly paler, undertail-coverts yellowish; iris dark red-brown; upper mandible blackish, lower mandible dull blue-grey; legs flesh-coloured. Sexes similar in coloration. Juvenile is like adult, but duller. Race *twomeyi* is slightly smaller than nominate, has grey parts of head paler, greyish-white (rather than grey), upperparts brighter green, breast light buff (not grey). Voice. Song 1–2 introductory notes followed by a series of chipping notes, "chew-chew-chew-chew-chew", or a series of 8–10 paired notes, "tur chip, tur chip, tur chip..."; unlike song of *A. rufivirgatus*, does not accelerate. Call a sharp "pink", thin "tsik", "seeee" or "seet".
Habitat. Tropical lowland evergreen forest and edge, and coffee plantations, from sea-level to 900 m. Race *twomeyi* found in arid scrub and thorn-forest.
Food and Feeding. Seeds, as well as insects and berries. Forages principally on ground and low in vegetation. Shy. Usually singly or in pairs; occasionally small groups, presumed family parties.

On following pages: 105. Black-striped Sparrow (*Arremonops conirostris*); 106. Pectoral Sparrow (*Arremon taciturnus*); 107. Half-collared Sparrow (*Arremon semitorquatus*); 108. Sao Francisco Sparrow (*Arremon franciscanus*); 109. Saffron-billed Sparrow (*Arremon flavirostris*); 110. Orange-billed Sparrow (*Arremon aurantiirostris*); 111. Golden-winged Sparrow (*Arremon schlegeli*); 112. Black-capped Sparrow (*Arremon abeillei*).

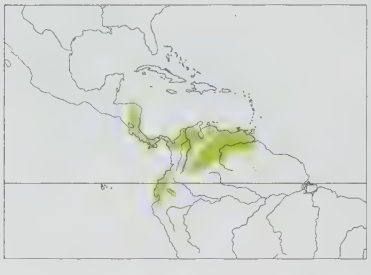
Breeding. Nesting observed in late Apr and early May in C Guatemala (Chamá). Nest domed, with side entrance, made from grass, rootlets and twigs, lined with finer materials, placed in low bush, or on ground under bush and between tree roots or other thick vegetation. Clutch 3 eggs, sometimes 4, whitish. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common to common in appropriate habitat. Status of race *twomeyi* uncertain.
Bibliography. Armani (1985), Griscom (1932), Howell & Webb (1995), Jones (2003), McCarthy (2006), Monroe (1963, 1968), Ridgway (1901), Salgado-Ortiz *et al.* (2001), Skutch (1954), Todd (1923b).

105. **Black-striped Sparrow**

Arremonops conirostris

French: Tohi ligné **German**: Panamaammer **Spanish**: Cerquero Negrilistado

Taxonomy. *Arremon conirostris* Bonaparte, 1850, Brazil; error = Colombia.
Relationships of genus not well understood; molecular evidence suggests that it is close to *Rhynchospiza*, *Peucaea* and some *Ammodramus*. Sometimes considered conspecific with *A. chloronotus*, with which virtually sympatric in NC Honduras, but differs significantly in juvenile plumage, size and vocalizations. Seven subspecies recognized.
Subspecies and Distribution.
A. c. richmondi Ridgway, 1898 – tropical zone from E Honduras S to W Panama.
A. c. viridicatus Wetmore, 1957 – Coiba I, off Veraguas, in S Panama.
A. c. striaticeps (Lafresnaye, 1853) – C & E Panama (both slopes) and Pacific slope of Colombia S to W Ecuador.
A. c. conirostris (Bonaparte, 1850) – Caribbean coast of Colombia from Bolívar (upper Sinú Valley) E to foothills of Santa Marta Mts, S in Magdalena Valley (except uppermost parts), also E slopes of E Andes in Arauca and Boyaca; also N & W Venezuela (Falcón and Lara E to Sucre, S to SW Táchira, Apure, Guárica and N Bolívar) and extreme N Brazil (R Branco region).
A. c. inexpectatus Chapman, 1914 – arid tropical and subtropical zones of upper Magdalena Valley, in Colombia.
A. c. umbrinus Todd, 1923 – E Colombia (Norte de Santader) and W Venezuela (S & W of L Maracaibo).
A. c. pastazae Krabbe & Stejskal, 2008 – E Ecuador (R Pastaza, in Pastaza).



Descriptive notes. 16·5 cm; 26–42 g. Boldly striped head and plain back. Nominate race has head grey, with broad black lateral crownstripe, narrow black eyestripe; upperparts, including wings and tail, olive-green, yellow at bend of wing; throat whitish; underparts pale grey, belly whitish, rear flanks and undertail-coverts with olive-buff wash; iris dark red-brown; bill blackish; legs flesh-coloured to brownish-grey. Sexes alike in coloration. Juvenile has yellowish-olive head striped with dark brown, upperparts brownish-olive and streaked with dusky, underparts yellowish-olive and boldly streaked, flanks streaked dark brown, bill yellowish at base; adult plumage acquired at c. 4 months of age. Races differ rather little, mainly in size and in plumage tones: *richmondi* is like nominate, but slightly smaller, also much brighter olive above, grey of head darker, chest ash-grey; *striaticeps* has black stripes on crown narrow, green of upperparts lighter and more yellowish, grey on underparts paler and less extensive; *viridicatus* is like previous, but darker; *inexpectatus* is dullest and smallest, brownish-olive on upperparts; *umbrinus* also is relatively small and dull, but larger and brighter than last; *pastazae* is similar to nominate, but larger, with proportionately larger bill, greyer upperparts with little or no greenish tone, throat pure white, belly whiter, undertail-coverts light greyish. Voice. Song a series of whining notes with rising or downward inflection, preceded by clear, thin accelerated whistles, "seee-seee-seee churry-churry-churry", or "tock tock chuck, tock tock chuck"; in Guatemala a ringing "ching ching ching ching". Call a metallic, nasal "churk" or "tsook"; in Guatemala a sharp, but soft, metallic "pink".
Habitat. Low thickets, weedy fields, young second growth, shaded gardens and humid woodland edges; sea-level to 1600 m. In E Ecuador, race *pastazae* found in dense stands of the shrub *Tessaria integrifolia* growing on temporary river sandbars.
Food and Feeding. Variety of insects, especially grasshoppers and other orthopterans, also seeds, and fruits (e.g. berries from *Miconia* trees); occasionally takes small vertebrates (small lizards and frogs). Will feed on fruit (bananas, oranges) on feeding shelves, and dried maize. Seen to feed what were probably newborn mice (Muridae) to young. Forages on and near ground; hops, but does not walk on ground. Also gleans insects from low vegetation.
Breeding. Season Jan–Oct, but most nesting activity in Apr–Jul, e.g. Apr–May (sometimes to Dec) in Colombia; perhaps sometimes double-brooded. Nest built by female, a bulky, oven-shaped structure with entrance at side, built from coarse leaves, ferns, grasses, weed stems and/or banana leaves, lined with finer material, placed up to 2 m above ground in dense vegetation. Clutch 2 eggs, rarely 1 or 3, whitish and unmarked; incubation by female, period 13–14 days; chicks fed by both parents, nestling period c. 11 or 12 days; fledglings accompanied by parents.
Movements. Sedentary; a few may move upslope to breed.
Status and Conservation. Not globally threatened. Fairly common to common in appropriate habitat in most of range. Often difficult to detect; possibly more numerous than may appear. Newly described race *pastazae* appears to be locally common.
Bibliography. Armani (1985), Dunning (2008), Howell & Webb (1995), Krabbe & Stejskal (2008), Monroe (1963, 1968), Moynihan (1963a), Parker *et al.* (1995), Skutch (1954, 1983).

Genus *ARREMON* Vieillot, 1816

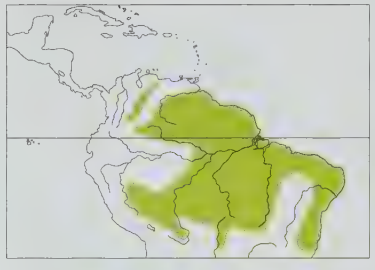
106. **Pectoral Sparrow**

Arremon taciturnus

French: Tohi silencieux **German**: Schwarzbrust-Buschammer **Spanish**: Cerquero Pectoral

Other common names: Yellow-shouldered Sparrow (*axillaris*)

Taxonomy. *Tanagra taciturna* Hermann, 1783, Cayenne, French Guiana.
Until recently considered conspecific with *A. semitorquatus*. In recent study found to be parapatric with latter, and no intermediate specimens or evidence of gene flow. Three subspecies recognized.
Subspecies and Distribution.
A. t. axillaris P. L. Sclater, 1855 – E of base of E Andes in Venezuela (Portuguesa S to E Táchira) and Colombia (Boyacá, Casanare and Meta).
A. t. taciturnus (Hermann, 1783) – E Colombia (in R Orinoco valley), Venezuela (Bolívar and Amazonas), the Guianas, C & NE Brazil (E from Mato Grosso and Amazonas, S to Minas Gerais and Espírito Santo) and NE Bolivia (Beni).
A. t. nigrirostris P. L. Sclater, 1886 – SE Peru (Cuzco and Puno) and N Bolivia (La Paz and Cochabamba).



Descriptive notes. 15 cm; 22–32 g. A medium-sized, chunky sparrow with relatively thick-based but long bill. Male nominate race has black head, narrow white supercilium that begins immediately before eye (but not reaching bill base), and grey median crownstripe and nape; black ear-coverts and base of malar end at abrupt edge and contrast with white throat and sides of foreneck; upperparts, including upperwing and tail, greenish-olive, becoming vivid yellowish-green on wing-coverts (particularly at shoulder); white of throat contrasts also with black pectoral band, otherwise white below, with greyish wash on flanks; iris dark reddish-brown; bill black; legs grey with pink wash. Female is similar to male, but duller, particularly on underparts: has upperparts duller olive and yellow on shoulder less bright and less extensive, off-white to creamy white below, black pectoral band replaced by narrow greyish or dusky band. Juvenile lacks obvious pattern of adult, has dark olive crown, dusky face with some white on supercilium, yellowish shoulder patch not developed, upperparts dark olive, buffy yellow below, darker breast and flanks. Race *axillaris* has breastband restricted to black spur on each side of breast, yellow on shoulder more extensive and including yellow edging on greater coverts, bill bicoloured, with yellowish lower mandible; *nigrirostris* male has broken breastband like previous, female lacks all evidence of breastband, both sexes have all-black bill like nominate. Voice. Song, from low perch, often a log, sometimes from ground, simple, a series of high-pitched hisses, "zitip, zeee zeee zeee" or "chit-tic-tzzzzz, tzzzzz, tzzzzzz". Call a sharp "tziip".
Habitat. Open undergrowth in humid forest and in older second growth within tropical zone; will utilize coffee plantations when adjacent to some humid forest. Sea-level to 1000 m; may reach 1500 m S of R Orinoco.
Food and Feeding. No information on diet; likely a mix of seeds and arthropods. Forages largely on ground, usually hidden in undergrowth; also in low shrubs in undergrowth. Sometimes forages by scratching at and shifting leaf litter while on ground. Often in pairs.
Breeding. Nest a sphere with side entrance, made from grasses, placed in low shrub or base of palm. Clutch 2 eggs, whitish and spotted with brown and purple. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common. Has reasonably large range; no evidence of population declines.
Bibliography. Armani (1985), Buzzetti & Silva (2005), Dunning (2008), Hilty (2003), Raposo (1997), Restall *et al.* (2006), Ridgely & Tudor (1989), Sick (1993).

107. **Half-collared Sparrow**

Arremon semitorquatus

French: Tohi à semi-collier **Spanish**: Cerquero Semiacollarado
German: Halsband-Buschammer

Taxonomy. *Arremon semitorquatus* Swainson, 1838, Rio de Janeiro, Brazil.
Until recently considered conspecific with *A. taciturnus*. In recent study found to be parapatric with latter, and no intermediate specimens or evidence of gene flow. Monotypic.
Distribution. Atlantic montane areas of SE Brazil (Espírito Santo S to NE Rio Grande do Sul).



Descriptive notes. 15 cm; 22–28 g. A medium-sized and chunky sparrow with relatively thick-based yet longish bill. Male has black head, narrow white supercilium beginning immediately above bill base, grey median crownstripe, nape and neck sides; black ear-coverts and base of malar end at abrupt edge and contrast with white throat; upperparts, including upperwing and tail, greenish-olive, becoming slightly more vivid and yellowish-green on shoulder (lesser upperwing-coverts); black patch at each side of breast (broken breastband), centre of breast and belly white, flanks grey; iris dark reddish-brown; upper mandible black, lower mandible orange to orange-yellow; legs greyish-pink. Female is similar to male in pattern, but duller, particularly below: upperparts duller olive than on male, throat and underparts off-white to creamy white with buff wash. Juvenile lacks obvious pattern of adult, is dark olive above, with dusky face, little or no yellow at shoulder, buffy yellow below, darker breast and flanks. Voice. Song a high-pitched series of three whistles, each whistle descending in frequency, and each lower in pitch than previous one, "tzee–tzeuuu-tzééúúúú", sometimes 4 notes involved; a second type of song follows an up-down, up-down pattern, "swee-swóóó swee-swóóó". Call a sharp ringing "tiip" with metallic quality.
Habitat. Occupies undergrowth and understorey of montane forest, second growth, and overgrown fields and gardens; attracted particularly to gulleys with shrubby growth. Recorded at elevations of 300–1000 m.
Food and Feeding. No details of diet. Forages on ground, often by scratching in leaf litter. Tends to be found singly, sometimes in pairs or family groups.
Breeding. Season appears to be in austral spring, Sept–Dec; birds in moult by Feb. Nest a large bulky sphere made from dry grasses, twigs and dry leaves, placed on or near ground. Clutch 2 eggs, whitish with brownish spots and blotches. No other information.

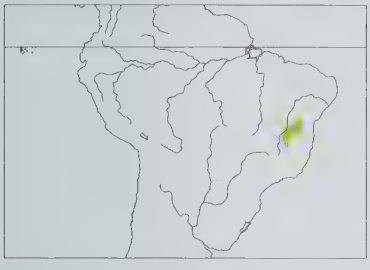
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Has small but sufficiently extensive range. Apparently, no imminent threats to this species' habitat or populations.
Bibliography. Armani (1985), Euler (1900), Mallet-Rodrigues & Marinho de Noronha (2009), Mitchell (1957), Raposo (1997), Raposo & Parrini (1997), Willard *et al.* (1991).

108. Sao Francisco Sparrow

Arremon franciscanus

French: Tohi du Sao Francisco **Spanish**: Cerquero Franciscano
German: Franziskusbuschammer

Taxonomy. *Arremon franciscanus* Raposo, 1997, Rio São Francisco, Minas Gerais, Brazil. Monotypic.
Distribution. S Bahia and N Minas Gerais, in E Brazil.



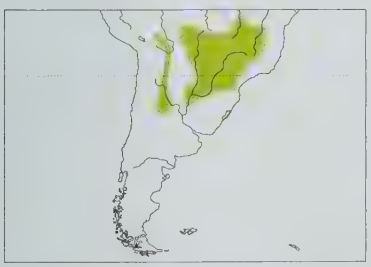
Descriptive notes. 15 cm; 21–25 g. A medium-sized, chunky sparrow with relatively thick-based, longish bill; comparatively shorter-tailed and longer-billed than *A. semitorquatus*. Male has black head, wide white supercilium beginning immediately above bill base, narrow whitish median crownstripe, grey nape and neck side; black ear-coverts and base of malar end at abrupt edge and contrast with white throat; chin black; upperparts, including upperwing and tail, greenish-olive, sometimes becoming slightly more vivid and yellowish-green on shoulder (lesser upperwing-coverts); black patch at each side of breast (broken breastband), centre of breast and belly white, flanks pale grey; iris dark reddish-brown; upper mandible with black ridge along culmen and orange-yellow sides, lower mandible orange to orange-yellow; legs greyish. Female and juvenile apparently undescribed. Voice. Song variable, tends to be composed of repeated introductory notes, or a more complex series of introductory notes before a trill of varying speed, and is high-pitched and sibilant, commonly "twip-twip tsip-tsip-tsip-tsip"; another variant has up-down pattern in introductory notes, then trill, "tsip-tsup tsip-tsup chp-chp-chp-chp". Call a sharp ringing "tiip" with metallic quality.
Habitat. Found in thick xerophitic *caatinga* scrub; also in undergrowth and edge of taller "arboreal" *caatinga* (at Mata do Jaíba), but tending to keep to lower and denser scrub.
Food and Feeding. Appears to forage while on ground. No other information.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to locally fairly common. Has small range, within which it is patchily distributed. Declines in population are suspected owing to degradation of *caatinga* scrub. However, a recent survey assessed the species' overall range as covering c. 56,000 km², which would suggest that it may be more secure than hitherto reckoned; population thought unlikely to number less than 10,000 mature individuals. Further fieldwork required in order to determine if it has suffered, or is currently undergoing, serious decline in numbers. Occurs in Chapada Diamantina National Park and Cavernas do Peruaçú Environmental Protection Area.
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), D'Angelo Neto & de Vasconcelos (2004, 2005), Kirwan *et al.* (2004), Raposo (1997), Stattersfield & Capper (2000), de Vasconcelos, D'Angelo Neto *et al.* (2006).

109. Saffron-billed Sparrow

Arremon flavirostris

French: Tohi à bec jaune **German**: Gelbschnabel-Buschammer **Spanish**: Cerquero Piquiamarillo

Taxonomy. *Arremon flavirostris* Swainson, 1838, interior of Bahia, Brazil.
Has been suggested as forming a superspecies with *A. taciturnus*, *A. aurantiirostris*, *A. schlegeli* and *A. abeillei*. Four subspecies recognized.
Subspecies and Distribution.
A. f. dorbignii P. L. Sclater, 1856 – C & S Bolivia (Cochabamba, W Santa Cruz, Chuquisaca and Tarija) and NW Argentina (Jujuy and Salta S to Catamarca).
A. f. devillii Des Murs, 1856 – E Bolivia (E Santa Cruz) and C Brazil (C Mato Grosso E to W Goiás and W São Paulo).
A. f. flavirostris Swainson, 1838 – C & E Brazil (SE Mato Grosso E to S Goiás, Bahia, W Minas Gerais and N & C São Paulo).
A. f. polionotus Bonaparte, 1850 – S Brazil (S Mato Grosso and W Paraná), Paraguay and NE Argentina (Misiones, Corrientes, E Formosa and E Chaco).



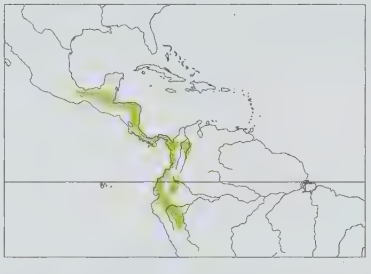
Descriptive notes. 15–16·5 cm; 20–33 g. A stocky, long-billed and short-tailed sparrow. Male nominate race has head black, bold white supercilium from above eye back to nape side, black ear-coverts contrasting strongly with snow-white throat; nape and uppermost mantle grey, rest of upperparts, including wings and tail, green, bend of wing yellow; white of throat separated from white underparts by narrow blackish pectoral line, flanks greyish; iris dark brown; bill orange-yellow to orange-red, black along culmen; legs pink to grey. Female is similar to male, but slightly duller in coloration (evident in direct comparison), with white areas tinged more or less buff. Juvenile is similar to adult, but duller all over. Race *dorbignii* is mostly green on upperparts, like nominate, but has broad grey central crownstripe, full white supercilium usually extending anteriorly to bill base, also pectoral band very narrow; *devillii* has upperparts grey, with olive restricted to wing-coverts; *polionotus* is entirely grey on upperparts, with yellow bend of wing, has supercilium as in nominate, narrow trace of a grey central crownstripe. Voice. Song, from ground or low perch, a series of high-pitched hissing notes, "tsit, tsee-tsi-tsi, tseep-seep-tseep". Call a faint "tseet".
Habitat. Undergrowth of deciduous woodland, as well as thickets at edge of moist tropical forest; in Paraguay ranges from subhumid forest and scrub-forest to humid forest edge. Although a forest species, usually found near edges, trails, or clearings or treefall gaps. Sea-level to 1400 m.
Food and Feeding. No information on diet. Forages terrestrially, usually hidden in understorey but may come into the open at edge of shrubbery. Singly and in pairs or family groups.
Breeding. Nest a large cup made from dry grasses and vegetation, placed on ground. Clutch 3 eggs, in Argentina light buff or bluish-grey with chocolate-brown or light brown speckles and scrawls. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon to locally common. Has large range, within which it appears to be a generalist of forest and forest-edge habitat. No evidence of any decline, and no known threats.
Bibliography. Armani (1985), Canevari *et al.* (1991), Hayes (1995), de la Peña (1989), Ridgely & Tudor (1989), da Silva (1991), Storer (1989b), Tye & Tye (1992), Wetmore (1926).

110. Orange-billed Sparrow

Arremon aurantiirostris

French: Tohi à bec orange **Spanish**: Cerquero Piquinaranja
German: Goldschnabel-Buschammer

Taxonomy. *Arremon aurantiirostris* Lafresnaye, 1847, Panama.
Has been suggested as forming a superspecies with *A. taciturnus*, *A. flavirostris*, *A. schlegeli* and *A. abeillei*. Eight subspecies recognized.
Subspecies and Distribution.
A. a. saturatus Cherrie, 1891 – Caribbean slope of SE Mexico (S Veracruz, N Oaxaca, NE Chiapas and Tabasco), N & C Guatemala (Petén, Alta Verapaz and Izabal) and Belize.
A. a. rufidorsalis Cassin, 1865 – Caribbean slope from Honduras S to extreme NW Panama.
A. a. aurantiirostris Lafresnaye, 1847 – Pacific slope of Costa Rica and both slopes of Panama (E to Canal Zone).
A. a. strictocollaris Todd, 1922 – extreme E Panama and adjacent Colombia (N Chocó).
A. a. occidentalis Hellmayr, 1911 – Pacific slope of W Colombia (S from middle Atrato Valley) and NW Ecuador.
A. a. erythrorhynchus P. L. Sclater, 1855 – N Colombia in upper Sinú Valley, lower Cauca Valley and middle Magdalena Valley.
A. a. spectabilis P. L. Sclater, 1855 – SE Colombia (Putumayo) S through E Ecuador to NC Peru (San Martín).
A. a. santarosae Chapman, 1925 – SW Ecuador S from Chimbo Valley.



Descriptive notes. 14·5–16·5 cm; mean 34·5 g (Costa Rica). Medium-sized, chunky sparrow with stout bill. Nominate race has black head, including chin and malar area, with grey median crownstripe, white supercilium becoming greyish posteriorly (sometimes most of supercilium grey), and white throat and side of foreneck; hindneck grey, upperparts olive-green, wing and tail darker green, yellow bend of wing; broad black breastband, belly whitish, flanks grey; iris dark brown; bill bright orange; legs pale brownish. Sexes alike in coloration. Juvenile is mostly brown above, with paler supercilium and throat, breastband narrower than on adult, flanks greener, bill dark. Races differ mainly in size and in plumage darkness: *saturatus* is larger and darker than nominate; *rufidorsalis* has wider and longer supercilium extending forwards nearly to bill, and lacking grey wash posteriorly; *strictocollaris* has extensive black on face, narrow supercilium, grey throat, and black crescent on breast; *occidentalis* brighter olive-green above than nominate, has grey crownstripe and whitish supercilium, wing bend orange, remiges brown and contrasting with olive coverts, narrow black breastband, underparts whiter, legs pale pink to flesh-coloured; *erythrorhynchus* similar to previous but with paler central crownstripe, more citrine upperparts, brighter, lemon-yellow bend of wing, brighter bill colour; *spectabilis* has central crownstripe darker and smaller than in nominate, supercilium pale, upperparts strongly tinged olive-brown, bend of wing flame-orange, paler underparts with much narrower breastband; *santarosae* similar to *erythrorhynchus* but with broader breastband and rather browner upperparts. Voice. Song on Caribbean slope high-pitched and thin, "ts' seew ts'seew seeew seer", with alternating staccato notes and high, thin whistles; on Pacific slope a tinkling series of high-pitched squeaky or metallic notes. Call a low-pitched "chip".
Habitat. Occupies undergrowth of dense tropical rainforest, forest edge, also guamil (abandoned cultivation with natural regrowth of tall grasses, thorn-scrub and small trees) and thickets; at 240–3500 m.
Food and Feeding. Few data available. Diet includes a variety of insects and seeds. Forages on and near ground. Unobtrusive.
Breeding. Season Feb–Sept in Costa Rica, May–Oct in Panama, and Jan–May in Colombia. Nest a bulky domed or oven-shaped structure with side entrance, built from dead leaves, sticks, grass and fern fronds, lined with fine pale-coloured rootlets, placed in dense tangle of vines 2–4 m from ground in thicket. Clutch 2 eggs, white with brown to blackish markings; incubation by female, period 14–17 days; chicks fed by both parents, nestling period 13 days.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Status not well known owing to the species' elusive nature. Apparently fairly common to common in appropriate habitat. Thought to be an important disperser of seeds of *Calathea inocephala* in Costa Rica.
Bibliography. Armani (1985), Binford (1989), Dunning (2008), Griscom (1932), Hilty & Brown (1986), Howell & Webb (1995), Jones (2003), Miller *et al.* (1957), Moermond (1983), Monroe (1968), O'Daniel (1989), Olson (1983c), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Ridgway (1901), Skutch (1954), Stiles & Skutch (1989), Wetmore *et al.* (1984).

111. Golden-winged Sparrow

Arremon schlegeli

French: Tohi de Schlegel **German**: Goldflügel-Buschammer **Spanish**: Cerquero Alidorado

Taxonomy. *Arremon schlegeli* Bonaparte, 1850, Santa Marta, Colombia.

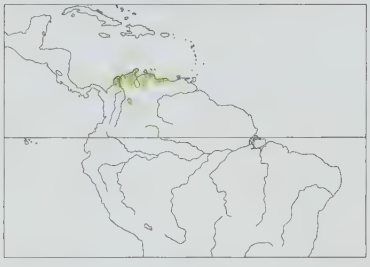
Has been suggested as forming a superspecies with *A. taciturnus*, *A. flavirostris*, *A. aurantiirostris* and *A. abeillei*. Three subspecies recognized.

Subspecies and Distribution.

A. s. schlegeli Bonaparte, 1850 – Caribbean coast of Colombia (except Guajira Peninsula) and Venezuela, and Venezuelan Andes.

A. s. fratruelis Wetmore, 1946 – Serrania de Macuira (on Guajira Peninsula), in N Colombia.

A. s. canidorsum J. T. Zimmer, 1941 – W slope of E Andes in Santander, in N Colombia.



Descriptive notes. 16 cm; 23–32 g. A stocky and pot-bellied, yet long-billed and short-tailed sparrow. Male nominate race has head down to malar area and side of neck black, connecting to large black patch on side of breast; upper mantle grey, scapulars and lower mantle to rump olive-greenish with yellow tinge, tail dark grey; flight-feathers dark grey, contrasting bright green upperwing-coverts and brighter yellow on bend of wing and shoulder; chin black, throat white; underparts white, flanks very pale grey; iris dark brown; bill bright yellow; legs pinkish-grey. Female is similar to male, but in direct comparison slightly duller in coloration. Juvenile lacks black on head and bright green on wing, is dull brownish-green above, paler below, with dusky streaking on belly, blackish bill; begins to acquire black on head as spots, gradually becoming more like adult. Race *fratruelis* is larger than nominate, with relatively larger bill; *canidorsum* has entirely grey upperparts, including back and rump (but wing-coverts greenish), rear end of black "helmet" blends in gradually with grey of back. Voice. Song, often from low hidden perch in early morning, mostly early in rainy season, a high and thin series of repeated notes, "soot soot soot see". Call "tzip".

Habitat. Open deciduous woodland and arid second growth, also clearings with dense shrubbery in arid areas; 250–1400 m.

Food and Feeding. Diet consists of fruits, insects and seeds. Forages on ground and in undergrowth, sometimes higher up in shrubs. May scratch at leaf litter in search of food items. Solitary and in pairs.

Breeding. Most singing activity occurs early in rainy season, suggesting rainy season breeding period; breeds between Apr and Sept in Colombia. Nest spherical with side entrance, or described as a cup with a domed roof, made from dead leaves and twigs, lined with fine grass, placed 0·5 m up in rock crevice. Eggs pinkish-white, with a few black spots around wide end. No other information available.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Uncommon to fairly common. Although this species has a small range, it seems generally to be reasonably numerous. No broad-scale threat apparent.

Bibliography. Armani (1985), Dunning (2008), Hilty (2003), Restall *et al.* (2006), Ridgely & Tudor (1989), Todd & Carriker (1922), Tye & Tye (1992).

112. **Black-capped Sparrow**

Arremon abeillei

French: Tohi d'Abeillé **German**: Kapuzenbuschammer **Spanish**: Cerquero Coroninegro
Other common names: Slaty-backed Sparrow (*abeillei*); Maranon Sparrow (*nigriceps*)

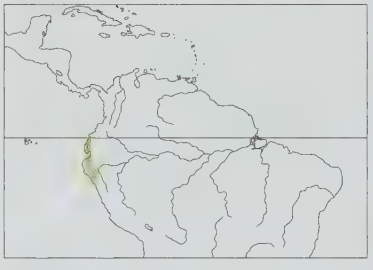
Taxonomy. *Arremon abeillei* Lesson, 1844, Guayaquil, Ecuador.

Has been suggested as forming a superspecies with *A. taciturnus*, *A. flavirostris*, *A. aurantiirostris* and *A. schlegeli*. Distinctive race *nigriceps* possibly merits elevation to full species rank; further study required. Two subspecies recognized.

Subspecies and Distribution.

A. a. abeillei Lesson, 1844 – SW Ecuador (from Manabí) S on Pacific slope to NW Peru (S to Cajamarca).

A. a. nigriceps Taczanowski, 1880 – upper Marañón Valley in E Cajamarca, in NW Peru.



Descriptive notes. 15 cm; average 25·9 g. A stocky, long-billed and short-tailed sparrow. Nominate race has head down to malar area black, except for bold white supercilium from above eye back to nape; upperparts, including wing and tail, blue-grey, very narrow pale wingbars on median and greater coverts of some individuals (possibly only females); throat white, contrasting strongly with well-demarcated black of face side and with black breastband; underparts below breastband white, flanks grey; iris dark brown; bill black; legs flesh-coloured to greyish. Sexes alike. Juvenile undescribed. Race *nigriceps* has upperparts greenish, and white supercilium extending anteriorly to bill base. Voice. Song of nominate race a variable series of high thin whistles and trills, "tsew tsew tsitetetetete"; song of *nigriceps* similar, but slower, "sweée, sweée, si-si-si-si-si-si". Call a dry and high-pitched "ti" or "tik", also a whistled "sweee".

Habitat. Undergrowth of deciduous forest and dry woodland, also second growth and dry scrub; 0–1800 m.

Food and Feeding. No information on diet. Forages on ground; usually scratches in leaf litter under cover of understorey. Singly and in pairs.

Breeding. Singing increases during rainy season, implying that breeding takes place then, Jan–May. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA and Marañón Valley EBA. Fairly common within its rather small range. No evidence of any declines; not known to be experiencing any broad-scale habitat problem.

Bibliography. Armani (1985), Restall *et al.* (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

PLATE 51 ➤



PLATE 51

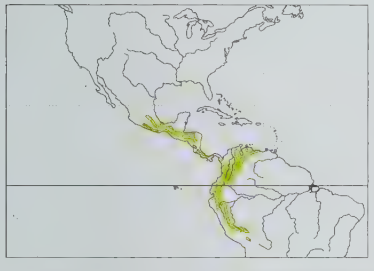
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113. Chestnut-capped Brush-finch

Arremon brunneinucha

French: Tohi à nuque brune **Spanish**: Cerquero Coronicastaño
German: Braunkopf-Buschammer
Other common names: Mexican Chestnut-capped Sparrow, Chestnut-capped Atlapetes; Plain-breasted/San Martin Brush-finch (*apertus*)

Taxonomy. *Embernagra brunnei-nucha* Lafresnaye, 1839, Mexico = Jalapa, Veracruz.
Often placed in genus *Buarremon* or *Atlapetes*. Proposed race *nigrilatera*, described from Cerro Baúl (Oaxaca), in S Mexico, considered synonymous with *suttoni*. Nine subspecies currently recognized.
Subspecies and Distribution.
A. b. brunneinucha (Lafresnaye, 1839) – E Mexico from San Luis Potosí and Veracruz S to NE Oaxaca.
A. b. apertus (Wetmore, 1942) – Sierra de Tuxtla, in S Veracruz (Mexico).
A. b. suttoni (Parkes, 1954) – Guerrero E to C Oaxaca, in S Mexico.
A. b. macrourus (Parkes, 1954) – Chiapas (S Mexico) and SW Guatemala.
A. b. alleni (Parkes, 1954) – Honduras, N El Salvador and W Nicaragua.
A. b. elsae (Parkes, 1954) – Costa Rica and W & C Panama.
A. b. frontalis Tschudi, 1844 – extreme E Panama, Colombia, W & N Venezuela (except in Falcón and Yaracuy), Ecuador (except W slope from SW Chimborazo S to NW Azuay) and Peru.
A. b. allinornatus (Phelps, Sr & Phelps, Jr, 1949) – Sierra de San Luis (Falcón) and Sierra de Aroa (Yaracuy), in NW Venezuela.
A. b. inornatus (P. L. Sclater & Salvin, 1879) – SC Ecuador from SW Chimborazo S to NW Azuay (vicinity of R Chimbo and R Chachan).



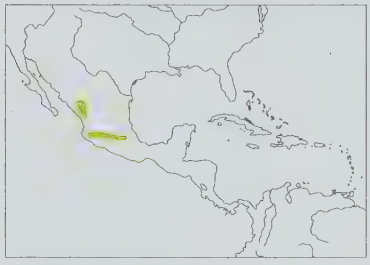
Descriptive notes. 16·3–19·5 cm; c. 32–47 g. Fairly large brush-finch. Nominate race has large black mask from forehead and forecrown down to gape and rearwards broadly around eye through ear-coverts to side of neck, small white supraloral spot, rest of crown and nape chestnut, becoming yellowish-tawny on side of crown; throat white (often puffed out), bordered below by narrow black pectoral band; upperparts olive-green, wing and tail darker olive, yellow bend of wing; underparts below breastband greyish, whiter on belly; iris dark brown to reddish-brown; bill black; legs dull blackish-brown. Sexes alike in coloration. Juvenile has cap sooty brown, upperparts dull greenish-brown to sooty brown, throat and breast dull sooty olive with heavy dusky streaking, upper mandible dull orange, base of lower mandible yellowish, tip dusky; pectoral band develops early, in Costa Rica (race *elsae*) in c. 2 months. Races differ mainly in plumage markings and coloration: *apertus* lacks (or nearly lacks) yellow supercilium, also lacks pectoral band, is greyish below, with white central line from chest down to vent; *suttoni* has brown of crown extending to mantle, yellow supercilium bold; *macrourus* is like nominate, but larger, longer-tailed and whiter below; *alleni* has pectoral band, but lacks supercilium; *elsae* is like nominate (although geographically distant), but has more black on crown, a narrow, short stripe on central forehead, and the yellow-tawny on side of crown reduced or absent, sometimes with strong olive-green tinge on flanks; *frontalis* has bill on average longer and thicker than in other races, three white marks on black frontal band, breastband variable; *inornatus* has irregular black marks on side of breast, lacks breastband, whitish below; *allinornatus* has all-white breast (no breastband), short bill, similar to previous but longer wing and tail. Voice. Song a jumble of high-pitched, slurred whistles and staccato notes, "peetee-zeer, peetee-súueet". Call a weak, high-pitched "pink", "seet" or "chink"; alarm of sharp, rapidly uttered notes.
Habitat. Thick undergrowth of dense tropical forest and thickets, at 400–3500 m; in Panama usually above 900 m. In Costa Rica found in epiphyte-laden subtropical forest, where seems to prefer thickest undergrowth; also in secondary forest in tangled lower growth. In Guatemala in temperate forests of oaks (*Quercus*) and other broadleaf trees, mixed with pines (*Pinus*), also in thick stands of "cypress" on some of the higher slopes, and at edges of corn fields; to 3050 m. Where sympatric with members of *A. torquatus* group, commonly found at lower elevations than latter; in some places the reverse, i.e. higher than *A. torquatus* group members.
Food and Feeding. Variety of insects and seeds. Forages on and near ground; hops on ground. Skulks. Turns over leaves to find food items, but does not scratch with feet. Sometimes follows army-ant (Formicidae) swarms. Often raises crown and throat feathers. Solitary and in pairs.
Breeding. In Mexico, laying mid-May to Jun and breeding Aug in Guerrero, breeding early Apr in C Oaxaca; fledglings in late Jul in Guatemala; nests in mid-Apr to Aug (most starting Apr) in Costa Rica; fledglings seen mid-Mar in Panamá; nesting Mar–Aug in Colombia. Nest a bulky, open cup of twigs and dry leaves, lined with finer materials such as rootlets and horsehair, placed below 2 m from ground in shrub or small dense tree. Clutch 2 eggs, sometimes only 1, white and unmarked; incubation by female, period 14 days; nestling period 13 days.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Status difficult to determine, as species skulks in dense undergrowth and is generally rather difficult to observe. Probably fairly common in appropriate habitat.
Bibliography. Armani (1985), Dickey & van Rossem (1938), Dunning (2008), Griscom (1932), Hilty (2003), Hilty & Brown (1986), Miller *et al.* (1957), Murray & Hardy (1981), Parkes (1959a), Remsen & Graves (1995b), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Gwynne (1989), Ridgely & Tudor (1989), Ridgway (1901), Skutch (1967a), Stiles & Skutch (1989), Wetmore *et al.* (1984).

114. Green-striped Brush-finch

Arremon virenticeps

French: Tohi à raies vertes **German**: Grünscheitel-Buschammer **Spanish**: Cerquero Verdilistado

Taxonomy. *Buarremon virenticeps* Bonaparte, 1855, Mexico = Desierto de los Leones, near Mexico City, Distrito Federal, Mexico.
Sometimes placed in genus *Buarremon* or *Atlapetes*. Has sometimes been treated as conspecific with *A. torquatus*. Birds from Sinaloa described as race *verecundus*, but appear too poorly differentiated to warrant recognition. Monotypic.
Distribution. W Mexico in S Sinaloa, N Nayarit and S Durango, and from Jalisco and Colima E to W Puebla.



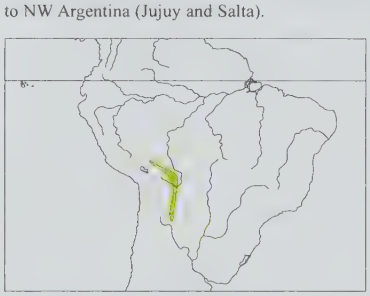
Descriptive notes. 18–20·5 cm; one male 41 g. Relatively large brush-finch. Has blackish head with white median stripe on forehead becoming greenish along midline of crown, short white supraloral stripe disconnected from long greenish to greenish-yellow stripe extending from above eye backwards onto nape; upperparts, including wings and tail, greyish-olive to olive-green; throat white; underparts grey, becoming whitish on belly and olive posteriorly; iris dark brown; bill dark grey; legs flesh-coloured to purplish-grey. Sexes similar in coloration. Juvenile has head blackish-brown with darker mask and indistinct paler stripes, upperparts, wings and tail brownish-olive, throat and underparts olive-brown, white mottling on throat, belly streaked buffy yellow. Voice. Song a variable, prolonged series of high, thin notes, "ssi ssi-ssi", etc. Call a thin, sharp "ssii".
Habitat. Undergrowth of humid montane evergreen forest and pine–oak (*Pinus–Quercus*) forest, at 1500–3500 m.
Food and Feeding. Little information; diet probably a variety of insect and plant food. Forages on and near ground. Singly and in pairs.
Breeding. Season Apr–Jun in Morelos, late Jun to early Aug in volcanic belt, and Jul on Pacific slope. Nest a deep cup of grasses, dried leaves and pine needles, lined with cattle hair and fine rootlets, well concealed 1–2 m up in vegetation. Clutch 2 eggs (Morelos). No further information available.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Sierra Madre Occidental and Trans-Mexican Range EBA. Status not well known. Apparently uncommon, but perhaps merely difficult to find.
Bibliography. Armani (1985), Dunning (2008), Howell & Webb (1995), Miller *et al.* (1957), Ridgway (1901), Rowley (1962).

115. White-browed Brush-finch

Arremon torquatus

French: Tohi à tête rayée **German**: Streifenkopf-Buschammer **Spanish**: Cerquero Cabecilistado
Other common names: Stripe-headed/Stripe-capped Brush-finch

Taxonomy. *Embernagra torquata* d'Orbigny and Lafresnaye, 1837, Carcuata, Yungas, Bolivia.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. costaricensis*, *A. atricapillus*, *A. basilicus*, *A. perijanus*, *A. assimilis*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Three subspecies currently recognized.
Subspecies and Distribution.
A. t. torquatus (d'Orbigny & Lafresnaye, 1837) – Andes of La Paz and W Cochabamba, in W Bolivia.
A. t. fimbriatus (Chapman, 1923) – Andes of E Cochabamba, W Santa Cruz and Chuquisaca, in SC Bolivia.
A. t. borellii (Salvadori, 1897) – lower elevations of Andes of S Bolivia (Chuquisaca and Tarija) S to NW Argentina (Jujuy and Salta).



Descriptive notes. 19 cm. Large brush-finch. Nominate race has white median stripe on forehead becoming grey along midline of crown, long white stripe extending from supraloral area back onto side of nape, broad blackish lateral crownstripe, broad blackish band from lores through ear-coverts; upperparts, including wings and tail, olive; throat white, conspicuous blackish chestband, whitish or light grey below, tinged with olive on flanks and side; iris dark brown; bill blackish; legs fleshy-brown to greyish. Sexes alike in coloration. Juvenile has dark parts of head sooty black, duller than on adult, upperparts olive-green, and is grey below, fading to dull buff on belly. Race *fimbriatus* similar to nominate but supraloral stripe reaches almost to base of bill, and chestband margined white; *borellii* lacks dark chestband. Voice. Song, from ground or low vegetation, a high-pitched sibilant series of whistles, lasting c. 3 seconds, e.g. "pze-zee-psee zaa sweee"; sometimes a longer more complex song, and sometimes short songs lasting 1·5 seconds spaced c. 1 second apart. Call a short sharp note.
Habitat. Occupies understorey in moist forest, also second growth and shrubby borders; 700–3050 m.
Food and Feeding. Little information on diet; probably insects and seeds. Forages on ground; usually rummages around in leaf litter, moving and flipping leaves with its bill. Generally occurs in singles and in pairs.

On following pages: 116. Costa Rican Brush-finch (*Arremon costaricensis*); 117. Black-headed Brush-finch (*Arremon atricapillus*); 118. Bangs's Brush-finch (*Arremon basilicus*); 119. Perija Brush-finch (*Arremon perijanus*); 120. Grey-browed Brush-finch (*Arremon assimilis*); 121. Caracas Brush-finch (*Arremon phaeopleurus*); 122. Paria Brush-finch (*Arremon phygas*); 123. Sooty-faced Finch (*Arremon crassirostris*); 124. Olive Finch (*Arremon castaneiceps*); 125. Tanager Finch (*Oreothraupis arremonops*); 126. Large-footed Finch (*Pezopetes capitalis*); 127. Yellow-thighed Finch (*Pselliophorus tibialis*); 128. Yellow-green Finch (*Pselliophorus luteoviridis*).

Breeding. Season Dec–Feb. Nest placed in dense shrub, usually within 2 m of ground. Clutch 2 eggs, white or palest blue; incubation by female, period 15·75 days (in NW Argentina); nestling period 12·75 days (NW Argentina).
Movements. Sedentary.
Status and Conservation. Not assessed. Uncommon to locally common. This species has a broad distribution, and appears to be generally common within its range; may even benefit from some forest disturbance.
Bibliography. Armani (1985), Auer *et al.* (2007), Cadena & Cuervo (2010), Canevari *et al.* (1991), Dunning (2008), Fjeldså & Krabbe (1990), Remsen & Graves (1995b), Ridgely & Tudor (1989).

116. **Costa Rican Brush-finch**

Arremon costaricensis

French: Tohi du Costa Rica **German**: Panamabuschammer **Spanish**: Cerquero Costarricense

Taxonomy. *Buarremon costaricensis* Bangs, 1907, Boruca, Costa Rica.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. atricapillus*, *A. basilicus*, *A. perijanus*, *A. assimilis*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Monotypic.
Distribution. Mountains of SW Costa Rica and adjacent W Panama (Chiriquí).



Descriptive notes. 17·4–20 cm; 40–49·5 g. Large brush-finch. Head is black, with broad grey median crownstripe and grey stripe extending from supraloral area back onto side of neck and nape; upperparts, wing and tail olive-green; throat, breast and belly white, becoming grey on sides and flanks, and olive-tinged on rear flanks, vent and undertail-coverts; iris dark reddish; bill dark grey; legs dark pink. Sexes alike. Juvenile has dark areas of head sooty black, duller than those of adult, upperparts olive-green, grey below, fading to dull buff on belly. Voice. Song high-pitched and thin, a relatively simple series of 1–3 alternated, distinct high-pitched phrases interspersed with silent periods. Call sharp and metallic.
Habitat. Undergrowth of dense, humid tropical forest and thickets, at 240–1500 m. Sometimes found in dense bamboo thickets, also sometimes at forest edge and openings close to dense vegetation.
Food and Feeding. Variety of insects and seeds; has been seen to eat decaying leaves. Forages on or near ground.
Breeding. Season Feb–Sept. Nest built by both sexes, a bulky open cup made from stems, vines, leaves and rootlets, lined with fine rootlets, fungal filaments and fibres stripped from leaves, placed 2–4 m (usually less than 3 m) up in dense vegetation such as vine thicket or tangle. Clutch 2 eggs; incubation carried out by female, period 15 days; chicks fed by both parents, nestling period 12 days.
Movements. Sedentary.
Status and Conservation. Not assessed. Status unclear; perhaps common in appropriate habitat, but difficult to find.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Ridgely & Gwynne (1989), Ridgway (1901), Stiles & Skutch (1989), Wetmore *et al.* (1984).

117. **Black-headed Brush-finch**

Arremon atricapillus

French: Tohi à tête noire **German**: Schwarzkopf-Buschammer **Spanish**: Cerquero Cabecinegro

Taxonomy. *Buarremon atricapillus* Lawrence, 1874, Bogotá, Colombia.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. basilicus*, *A. perijanus*, *A. assimilis*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Two subspecies currently recognized.
Subspecies and Distribution.
A. a. tacarcunae (Chapman, 1923) – E Panama (lower subtropical zone E from Panamá province).
A. a. atricapillus (Lawrence, 1874) – N Colombia in W, C & E Andes.



Descriptive notes. 19 cm; average 49·5 g. A stocky brush-finch looking relatively large-headed, and with longish bill; bill larger and thicker than those of other members of "*A. torquatus* complex". Nominate race has cap and face black (looks black-hooded), black ends discretely below cheek and ear-coverts and contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); below, white of throat extends to underparts, with grey on side of breast and greyish-olive flanks and vent; iris dark chestnut-brown; bill black; legs blackish. Sexes alike in coloration. Juvenile is dull greenish-olive above, slightly darker on head and dull brown on wings and tail, tawny below from throat to vent; adult plumage moults in patchy manner. Race *tacarcunae* has vague greyish median crownstripe and supercilium. Voice. Song a high-pitched series of rambling notes which proceed without breaks. Call a sharp note.
Habitat. Humid and wet forest and brushy borders, also dense old second growth. Favours dense undergrowth and edges in moist montane forest; likes thick and tangled habitat. Occurs at 500–1500 m.
Food and Feeding. Stomach contents insects, including ants (Formicidae) and beetles (Coleoptera), as well as seeds. Forages on ground, tending to keep under cover. Uses bill, not legs, to scratch at leaf litter. In pairs or singly.
Breeding. Season late Apr to Jun. No other information.
Movements. Sedentary.
Status and Conservation. Not assessed. Until recently was treated as a race of *A. torquatus*, and requires assessment. Uncommon and local, sometimes fairly common. Has a relatively small global range, but appears not to be under any particular large-scale threat.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Hilty & Brown (1986), Paynter (1978), Remsen & Graves (1995b), Ridgely & Gwynne (1989), Wetmore *et al.* (1984).

118. **Bangs's Brush-finch**

Arremon basilicus

French: Tohi de Bangs **German**: Bangsbuschammer **Spanish**: Cerquero de Bangs
Other common names: Colombian/Sierra Nevada Brush-finch

Taxonomy. *Buarremon basilicus* Bangs, 1898, Pueblo Viejo, 8000 feet [c. 2440 m], Magdalena, Colombia.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. atricapillus*, *A. perijanus*, *A. assimilis*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Monotypic.
Distribution. Santa Marta Mts, in N Colombia.



Descriptive notes. 19 cm. A stocky brush-finch looking relatively large-headed, and with longish bill. Has cap and face black, with grey median crownstripe and grey supercilium from above eye; black well demarcated below cheek and ear-coverts, not reaching back onto side of neck (as in closely related species) and contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); white of throat divided from white underparts by black pectoral band, otherwise side of breast grey and flanks to vent brownish-olive; iris dark chestnut-brown; bill black; legs blackish. Sexes alike in coloration. Juvenile is browner than adult above, head dusky and lacking striping, and is pale brownish with darker brown streaking below. Voice. Song a high-pitched sibilant series of notes, typical of "*A. torquatus* group", but with very fast delivery and almost nervous sound, this due also to inclusion of some quavering high-pitched whistles. Call a sharp note.
Habitat. Occupies undergrowth in humid montane forest, particularly near edges and borders; 600–2800 m.
Food and Feeding. Little information on diet. Forages on ground; tends to feed under cover of vegetation. Scratches at leaf litter with bill. In pairs and singly.
Breeding. Fledglings observed Mar–Jul. No other information.
Movements. Resident.
Status and Conservation. Not assessed. Until recently was treated as a race of *A. torquatus*, and requires assessment. Locally common. Has a relatively very small global range, but may be stable in terms of population numbers. In view of its small range, however, any potential threats need to identified.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Paynter (1978), Remsen & Graves (1995b), Restall *et al.* (2006), Todd & Carriker (1922).

119. **Perija Brush-finch**

Arremon perijanus

French: Tohi de la Perija **German**: Perijábuschammer **Spanish**: Cerquero de Perijá
Other common names: Phelps's Brush-finch

Taxonomy. *Atlapetes torquatus perijanus* Phelps, Sr and Gilliard, 1940, La Sabana, 1200 m, Río Negro, Zulia, Venezuela. Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. atricapillus*, *A. basilicus*, *A. assimilis*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Monotypic.
Distribution. Perijá Mts, on N Colombia–W Venezuela border.



Descriptive notes. 19 cm. A stocky brush-finch looking relatively large-headed, and with longish bill. Has cap and face black, with grey median crownstripe and grey supercilium reaching nearly to bill base, both median crownstripe and supercilium becoming more whitish near bill, supercilium widening behind eye and meeting grey side of neck, grey colour extending down to side of breast; black ends discretely below cheek and ear-coverts, contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); white of throat separated from white underparts

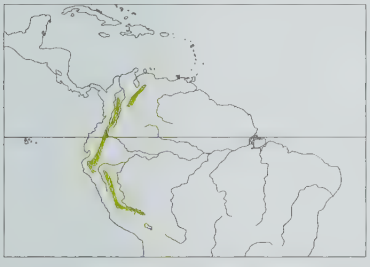
by narrow and sometimes nearly broken black pectoral band, grey on side of breast passes on to greyish-cinnamon from flanks to vent; iris chestnut-brown to deep reddish; bill black; legs blackish. Sexes alike. Juvenile undescribed. Voice. No information.
Habitat. Occupies undergrowth in humid montane forest, particularly near edges and borders; 700–1800 m.
Food and Feeding. No details of diet. Forages on ground, using bill to scratch at leaf litter. In pairs and singly.
Breeding. Birds in breeding condition between Feb and Aug. No other information.
Movements. Resident.
Status and Conservation. Not assessed. Status not known. Until recently was treated as a race of *A. torquatus*, and requires assessment. Has relatively small global range. Any potential threats need to be identified.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Remsen & Graves (1995b), Restall *et al.* (2006).

120. Grey-browed Brush-finch

Arremon assimilis

French: Tohi à raies grises **German**: Schmalschnabel-Buschammer **Spanish**: Cerquero Picofino
Other common names: Grey-striped/Slender-billed Brush-finch

Taxonomy. *Tanagra assimilis* Boissonneau, 1840, Santa Fe de Bogotá, Colombia.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. atricapillus*, *A. basilicus*, *A. perijanus*, *A. phaeopleurus* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Four subspecies currently recognized.
Subspecies and Distribution.
A. a. larensis (Phelps, Sr & Phelps, Jr, 1949) – Andes of W Lara and W Táchira, in W Venezuela.
A. a. assimilis (Boissonneau, 1840) – Andes of Merida, in W Venezuela, and Colombia (all three ranges, but not W slope of W Andes; and S from Antioquia and Cundinamarca) S to Andes of NW Peru (Amazonas and Cajamarca).
A. a. nigrifrons (Chapman, 1923) – subtropical zone of Andes in SW Ecuador (El Oro and Loja) and NW Peru (Piura S to La Libertad).
A. a. poliophrys (Berlepsch & Stolzmann, 1896) – temperate zone of Andes in C & S Peru (Huánuco, Junín and Cuzco).



Descriptive notes. 19–20 cm. A stocky brush-finch which looks relatively large-headed, with longish bill. Nominate race has cap and face black, with grey median crownstripe and grey supercilium reaching nearly to bill base, both median crownstripe and supercilium becoming more whitish near bill, supercilium also widening behind eye and joining to grey side of neck, grey colour reaching down to side of breast; black ends discretely below cheek and ear-coverts, contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); underparts white, like throat, with grey side of breast extending to flanks and then onto greyish-olive vent; iris deep chestnut-brown; bill black; legs fleshy-pink to grey. Sexes alike. Juvenile is olive, with dusky cheeks and yellowish bill. Race *nigrifrons* has less extensive median crownstripe not reaching forehead, grey supercilium greatly reduced, almost absent behind eye; *larensis* has broad grey supercilium, becoming white in supraloral area, also has black pectoral band; *poliophrys* is similar to previous, also having black pectoral band, but with supercilium more extensive. Voice. Song a high, sibilant series of thin whistles with short spaces between separate phrases (often of three elements), e.g. "weseer-twee twesee? Sewtsee? Weseer-twee twesee? Sewtsee?...". Race *larensis* may intersperse nasal notes within high-pitched song. Call a high "ti" and a "tseer".
Habitat. Occupies humid montane forest, also forest edge and older second growth; occurs at elevations of 1500–3600 m.
Food and Feeding. No information on diet. Forages on ground; tends to scratch at leaf litter with its bill, not its feet. Singly and or in pairs.
Breeding. Fledglings recorded in Jun in Colombia (Cauca); in Ecuador in Aug (in NW), Jul (El Oro) and Sept (Loja), and in Peru in Aug (Amazonas), Jun (Huánuco) and Nov (Puno). No other information.
Movements. Resident.
Status and Conservation. Not assessed. Until recently was treated as a race of *A. torquatus*. Uncommon to locally common. Has a very large range within which it is generally reasonably widespread and numerous. No imminent threat to habitat or populations known.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Fjeldså & Krabbe (1990), Hilty (2003), Remsen & Graves (1995b), Schulenberg *et al.* (2007).

121. Caracas Brush-finch

Arremon phaeopleurus

French: Tohi de Sclater **German**: Sclaterbuschammer **Spanish**: Cerquero de Sclater
Other common names: Buffy-flanked/Sclater's Brush-finch

Taxonomy. *Buarremon phaeopleurus* P. L. Sclater, 1856, Caracas, Venezuela.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. atricapillus*, *A. basilicus*, *A. perijanus*, *A. assimilis* and *A. phygas*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Monotypic.
Distribution. Mountains of Aragua, Miranda and Distrito Federal, in N Venezuela.



Descriptive notes. 19 cm. A stocky brush-finch which looks relatively large-headed, with longish bill. Has cap and face black, with grey median crownstripe and greyish-white supercilium that nearly reaches to bill base, both median crownstripe and supercilium becoming more whitish near bill, supercilium also widening behind eye and joining with grey neck side, grey colour extending down to side of breast; black ends discretely below cheek and ear-coverts, contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); white of throat separated from underparts by black breastband, with side of breast grey, flanks to vent olive-buff; iris chestnut-brown; bill black; legs dull fleshy to blackish. Sexes alike. Juvenile apparently undescribed. Voice. No information.
Habitat. Undergrowth in humid montane forest, particularly near edges and borders; 700–1800 m.
Food and Feeding. No information on diet. Forages on ground; scratches at leaf litter with its bill. Singly and in pairs.
Breeding. Season May–Jul. No other information.
Movements. Resident.
Status and Conservation. Not assessed. No information on status. Has relatively small global range, but may be stable in terms of numbers. Until recently was treated as a race of *A. torquatus*, and requires assessment; any potential threats need to be identified.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Hilty (2003), Paynter (1978), Restall *et al.* (2006).

122. Paria Brush-finch

Arremon phygas

French: Tohi de Berlepsch **German**: Berlepschbuschammer **Spanish**: Cerquero de Berlepsch
Other common names: Berlepsch's/Venezuelan Brush-finch

Taxonomy. *Buarremon torquatus phygas* Berlepsch, 1912, Los Palmares, Sucre, Venezuela.
Until recently was often placed in genus *Buarremon* (or *Atlapetes*), and considered conspecific with *A. torquatus*, *A. costaricensis*, *A. atricapillus*, *A. basilicus*, *A. perijanus*, *A. assimilis* and *A. phaeopleurus*. Recent molecular data indicated that this group was sister to present genus, while other *Buarremon* might be more closely related to another genus then used, *Lysurus*, rendering *Buarremon* polyphyletic; decision was therefore made, on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, to subsume *Buarremon* and *Lysurus* in present genus. In addition, molecular and morphological data indicated that all members of above-mentioned group should be treated as separate species. Monotypic.
Distribution. Mountains of N Anzoátegui, Sucre and N Monagas, in NE Venezuela.



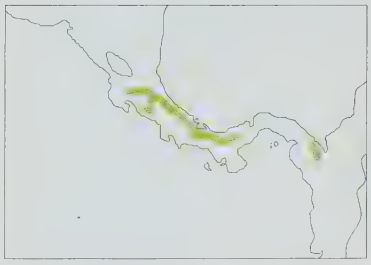
Descriptive notes. 19 cm. A stocky brush-finch looking relatively large-headed, with longish bill. Has cap and face black, vestigial trace of grey median crownstripe, and whitish rear supercilium that begins behind eye; neck side grey, this colour reaching down to side of breast; black ends discretely below cheek and ear-coverts, contrasting strongly with white throat; upperparts, including wings and tail, olive-green (looking more grass-green in good light); white throat separated from white underparts by black breastband, with side of breast and flanks grey, flanks with greenish tinge; iris deep chestnut-brown; bill black; legs blackish. Sexes alike. Juvenile is dusky olive above, darker on head, with indistinct pale olive supercilium, greyish-cinnamon with darker streaking below, slightly whiter throat, greyish lower mandible. Voice. Song described as a high-pitched and sibilant "éé-sit, ezzaweet...éé-sit...ezzaseet...ease-sit...tséé-a-teet..." that continues in rambling fashion without a clear break.
Habitat. Undergrowth in humid montane forest, particularly near edges and borders; 1000–1200 m.
Food and Feeding. No details of diet. Forages on ground, scratching at leaf litter with its bill. Singly and in pairs.
Breeding. Season May–Jul. No other information.
Movements. Resident.
Status and Conservation. Not assessed. Status not known. Until recently treated as a race of *A. torquatus*. Has small global range, but it may be stable in terms of numbers; any potential threats need to be identified.
Bibliography. Armani (1985), Cadena & Cuervo (2010), Hilty (2003), Paynter (1978), Restall *et al.* (2006).

123. Sooty-faced Finch

Arremon crassirostris

French: Tohi masqué **German**: Dickschnabel-Buschammer **Spanish**: Cerquero Carisucio
Other common names: Sooty-faced/Barranca Brush-finch, Barranca Finch

Taxonomy. *Buarremon crassirostris* Cassin, 1865, Barranca, Costa Rica.
Often placed in genus *Lysurus*; on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, this genus, and also, *Buarremon*, now subsumed in present genus. Probably forms a superspecies, and sometimes considered conspecific, with *A. castaneiceps*. Proposed race *eurous* (described from Cerro Tacarcuna, in E Panama), supposedly duller and with darker crown, known from only a single specimen; considered untenable. Monotypic.
Distribution. Mountains of C Costa Rica (Aguacate Mts) S through Panama (Bocas del Toro, Chiriquí, Veraguas, Coclé and E Darién) to adjacent W Colombia (Cerro Tacarcuna).
Descriptive notes. 15·0–17·1 cm; 37–40·5 g. Fairly large. Has crown rusty, side of face and throat blackish-grey, white submoustachial stripe; upperparts dark olive-green, upperwing and tail slightly browner; underparts mostly dark olive-green, lower breast and belly extensively yellow; iris dark brown or chocolate-brown; upper mandible dark grey, lower mandible pale yellow or whitish; legs dull flesh-coloured. Sexes alike in coloration. Juvenile is rich olive-brown above, with centre of



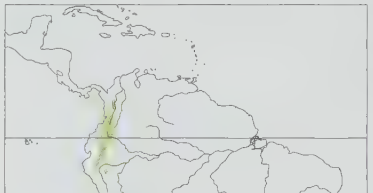
belly dull yellow, with blackish smudges. Voice. Song high-pitched, thin, emphatic "pseee-pséét"; also high-pitched, thin whistled "see see seeya sue sue sisi see". Call a sharp, thin, whistled "pu-pee".
Habitat. Dense, humid tropical forests and thickets, at 600–2340 m. Found in dense undergrowth in ravines and stream bottoms, or near wet forests in hilly areas.
Food and Feeding. Diet includes a variety of insects, spiders (Araneae), also berries. Forages on and near ground; hops over the ground, flicking wings and tail. Sometimes follows army ants (Formicidae).
Breeding. One nest found, in Costa Rica in May. Nest a domed structure with side entrance, made from moss, fern leaves and spike-moss (*Selaginella*), lined with bamboo leaves and fern rootlets, placed 1·5 m above ground and attached to fern stem, soft moss extending for 67 cm below the structure; contained 2 eggs, ivory-coloured with vinaceous-pink spots and speckles, spots concentrated at wide end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA and Darién Highlands EBA. Uncommon and local. Probably overlooked, as it is difficult to find.
Bibliography. Barrantes (1994a), Dunning (2008), Hilty & Brown (1986), Ridgely & Gwynne (1989), Ridgway (1901), Stiles & Skutch (1989), Wetmore *et al.* (1984).

124. **Olive Finch**

Arremon castaneiceps

French: Tohi lysure **German**: Olivbuschammer **Spanish**: Cerquero Capirrufo
Other common names: Olive Brush-finch

Taxonomy. *Buarremon castaneiceps* P. L. Sclater, 1860, Río Napo, Ecuador.
Often placed in genus *Lysurus*; on basis of similarities in molecular data, plumage, voice, behaviour and micro-habitat, this genus, and also, *Buarremon*, now subsumed in present genus. Probably forms a superspecies, and sometimes considered conspecific, with *A. crassirostris*. Monotypic.
Distribution. W Andes of Colombia (W slope S from Antioquia, also E slope in Nariño) S on both slopes in Ecuador to Peru (to Cajamarca and Amazonas; also on E slope from Pasco S to Marcapata Valley, in Cuzco).



Descriptive notes. 15·5–16·5 cm; 34·5–39 g. A thickset, pot-bellied finch with relatively thick-based triangular bill. Face and throat to upper breast are dark grey, contrasting with rusty cap; rest of body, including upperparts, and lower breast to undertail-coverts, entirely olive-coloured and unstreaked; wing slightly darker, and tail blackish-grey with wide olive fringes and more olive central rectrices; iris dark brown; upper mandible dark grey, lower mandible pale grey; legs dusky. Sexes alike. Juvenile is similar to adult, but crown duller and face and throat olive, overall slightly more uneven-looking in general plumage colour than adult. Voice. Song a pleasant yet fast series of high-pitched sibilant whistles, duration more than 10 seconds, cascades up and down somewhat in pitch, but all notes quite high in frequency, individual notes rather strident in nature. Call a high, descending "tsew"; alarm call a chattering whistle, "tststststsi".
Habitat. Occupies dense understorey in humid lower montane forest, also vine tangles in ravines or at forest edge; fondness for habitat near streams, particularly mossy ravines. Occurs at elevations of 750–1800 m.
Food and Feeding. Poorly known. No details of diet. Forages at or near ground.
Breeding. Season mainly Mar–Apr in NE Ecuador (Napo). Twelve nests studied in Napo: nest is a large green ball of moss, rootlets and live fern leaves, with hooded side entrance opening into chamber lined with green fern leaves mixed with rootlets and dry strips of *Asplundia* (Cyclanthaceae) leaves, three were built on rock face and anchored to plants which supported base, remaining nine in vine tangle or supported by fine twigs in shrubbery. In another study, nest a fully domed structure with side entrance, made from mosses, lining of dry leaves, placed 1·5 m above a stream and attached to small ferns which secured it to a rock face on bank. Clutch 2 eggs, immaculate white in one study, in another (Napo) eggs white with red-brown speckling, sometimes concentrated at wide end. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Local and uncommon to rare. Rare to uncommon and local in Ecuador; rare and local in Peru. Possibly overlooked. Has a moderately sized global range, within which no evidence of any significant population declines.
Bibliography. Armani (1985), Cadena, Klicka & Ricklefs (2007), Greeney & Gelis (2006a), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg & Gill (1987), Schulenberg *et al.* (2007).

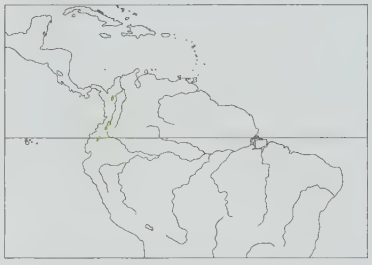
Genus *OREOTHRAUPIS* P. L. Sclater, 1856

125. **Tanager Finch**

Oreothraupis arremonops

French: Tohi élégant **German**: Tangarenbuschammer **Spanish**: Cerquero Tangarino
Other common names: Finch-like Tanager

Taxonomy. *Saltator arremonops* P. L. Sclater, 1855, north of Quito, Ecuador.
Relationships unclear. Originally thought to be a saltator (*Saltator*) in the cardinal family (Cardinalidae) on basis of thick bill, and has been considered a tanager (Thraupidae), yet aspects of plumage, behaviour, voice and nesting suggest affiliation with *Atlapetes*. Monotypic.
Distribution. Very patchily in W Andes of Colombia (Antioquia, Valle del Cauca, Cauca and Nariño) and NW Ecuador (Imbabura and Pichincha).



Descriptive notes. 20–20·5 cm. A big bulky finch with pot-bellied structure, relatively short bill with curved culmen, and upper mandible sometimes overhanging lower. Head is black, broken by broad whitish-grey median crown-stripe and bold, wide whitish-grey stripe from above and just in front of eye extending backwards and broadening distinctly, terminating on rear side of neck; hindneck and entire upperparts to uppertail-coverts tawny with olive wash, upperwing and tail blackish with tawny edgings; chin and upper throat black, lower throat and underparts bright tawny, washed olive on flanks, with contrasting white belly patch that reaches forwards to lower breast in distinct V-shape; iris dark chestnut; bill black; legs dull brownish. Sexes alike. Juvenile is duller and browner than adult, brown above with dusky side of head, and with throat and belly partly yellow, breast olive and obscurely streaked. Voice. Song high-pitched and buzzy, starting with 3–5 more nasal notes before continuing as stilting chatter, "tzz tzz tzzz tz-zz-zz-tz tz tz tz tz tz", sounding stronger towards end; longer and more complex version given as duet. Call a high-pitched "tseet"; a frog-like "wert" also described.
Habitat. Undergrowth of montane forest, often mossy cloudforest; 1200–2700 m.
Food and Feeding. No information on diet. Forages on and near ground, usually in moist undergrowth, under low shrubs, in leaf litter of mossy forest; tends to be secretive. Often scratches at leaf litter. Generally in pairs or family groups.
Breeding. One nest with egg found in Nov and dependent juveniles in Nov and Dec in Ecuador (Pichincha), and juveniles with adults observed in Jun in Colombia (Cauca). Nest was cup-shaped, constructed largely from moss, with partial roof covering back half and a mossy lip at front, with an orchid (*Elleanthus tetrogeiton*) incorporated into the nest structure, placed c. 1 m above ground on a near-vertical bank; nest sheltered by roof of sticks and twigs, but unclear whether nest was built below roof or roof was constructed by the birds themselves. Nest contained 1 egg, bluish-white. No other information.
Movements. Resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Chocó EBA. Rare and very local. Has fragmented range; known from only a handful of localities, and these generally under land-use pressures. Estimated global population in range 10,000–19,000 mature individuals; believed to be decreasing. In Colombia, population in Munchique National Park (Cauca) estimated at 1000 mature individuals. In Ecuador, modern records from Tandayapa area (Pichincha) and from Cotacachi–Cayapas National Park (Imbabura). Impression of rarity may be due in part to the inaccessibility of its habitat (wet, with steep slopes). Nevertheless, much habitat lost in recent decades. Human colonization following road-building, in Colombia especially the Cali–Buenaventura (Valle del Cauca) and Pasto–Tumaco (Nariño) highways, coupled with extensive logging concessions, have been main causes of habitat loss; further, deforestation rates increasing, primarily as a result of logging, human settlement, livestock grazing, cultivation of coca, and gold-mining. Although montane forests less threatened than those in lowlands, some habitat already lost, especially below 2000 m; rarely, areas of cloudforest illegally burnt, e.g. during severe drought, in order to provide grazable terrain. Occurs in a few protected areas, including Munchique and Farallones de Cali National Parks and Tambito and La Planada Nature Reserves (Colombia) and Cotacachi–Cayapas National Park and Mindo–Nambillo Protection Forest (Ecuador).
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Greeney *et al.* (1998), Lowen *et al.* (2000), Restall *et al.* (2006), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Stattersfield & Capper (2000), Storer (1958).

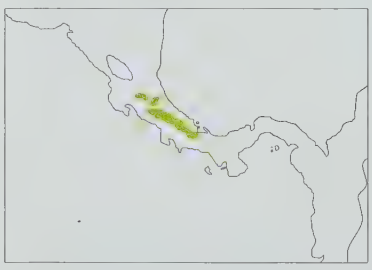
Genus *PEZOPETES* Cabanis, 1861

126. **Large-footed Finch**

Pezopetes capitalis

French: Tohi à grands pieds **German**: Großfuß-Buschammer **Spanish**: Cerquero Patigrande
Other common names: Big-footed Sparrow

Taxonomy. *Pezopetes capitalis* Cabanis, 1861, Costa Rica.
Genus sometimes subsumed in *Atlapetes*. Monotypic.
Distribution. Mountains of Costa Rica (Cordillera Central) S to extreme W Panama (W Bocas del Toro and W Chiriquí).



Descriptive notes. 17·4–20 cm; 55·8–55·9 g. A chunky, large, dark finch with rather slender bill, and large legs and feet. Forecrown, sides of crown, nape, thin postocular streak, and foreface to area around eye, malar area and throat dark charcoal, otherwise head and neck grey; upperparts darkish golden-olive, remiges and tail dusky grey with darkish golden-olive fringes, broadest on secondaries and tertials; underparts slightly paler golden-olive than back; iris mouse-brown or reddish; bill black; legs dull brownish to dusky or blackish. Sexes alike in coloration. Juvenile is buffy brown below, paler on centre of belly and breast; immature has grey of head replaced with dark olive, smudged with black, upperparts scaled black, underparts buff-olive, streaked black, flanks washed brown. Voice. Song, especially in Apr (less often in May, rarely after Jun) a medley of short, rich warbles and whistles, often with disjointed, dry trills, or a loud, high-pitched "pee pee pee pee", followed by lower "chu chu chu". Call a high, thin, soft "psee".

Habitat. Forest understorey, bamboo-choked ravines, open stands of bamboo under oaks (*Quercus*), second growth, and brushy pastures in high mountains. At 1500–3350 m, mostly above 3000 m.
Food and Feeding. Probably eats a variety of insects, spiders (Araneae), and worms; picks berries from shrubs (e.g. melastomes) and small trees. Forages on and near ground; hops, rather than walks. Searches in soil and leaf litter, using powerful two-foot scratches. In pairs throughout year.
Breeding. Season Mar–Jun, peaks in Mar–Apr. Nest built by one member of pair, presumably female, most material collected, all from ground, in immediate environs of nesting shrub; a loosely constructed cup of mosses, bamboo leaves and other plants, lined with finer pale-coloured grasses, often built on thick foundation of bamboo leaves or in dense bush, 0·3–2·5 m above ground. Clutch 1–2 eggs, most commonly 1 (rare within this family), whitish or pale blue with lilac spots or brownish marks, most heavily distributed at wide end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Common in Costa Rica in appropriate habitat; fairly common in highlands of W Chiriquí and adjacent Bocas del Toro, in Panama.
Bibliography. Armani (1985), Dunning (2008), Klein *et al.* (1991), Ridgely & Gwynne (1989), Ridgway (1901), Sassi (1939), Skutch (1967a), Stiles & Skutch (1989), Wetmore *et al.* (1984).

Genus *PSELLIOPHORUS* Ridgway, 1898

127. Yellow-thighed Finch

Pselliophorus tibialis

French: Tohi à cuisses jaunes **German**: Gelbschenkel-Buschammer **Spanish**: Cerquero Musliamarillo
Other common names: Yellow-thighed Sparrow/Sparrow-finch

Taxonomy. *Tachyphonus tibialis* Lawrence, 1864, San José, Costa Rica.
Genus sometimes subsumed in *Atlapetes*. Sometimes considered conspecific with *P. luteoviridis*. Monotypic.
Distribution. Mountains of Costa Rica (S from Cordillera de Tilarán) and extreme SW Panama (W Chiriquí).



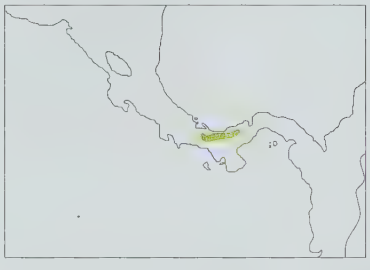
Descriptive notes. 17–18·5 cm; 26·8–34·8 g. A medium-sized, slender dark finch with long tail and rather long, slender bill. Head is mostly dull black, except for slate-grey on rear ear-coverts to lower throat, sometimes extending to all of ear-coverts, cheek, chin and throat; can have a few whitish feathers, especially on upper eyelid and on side of forehead; upperparts slate-grey, with darker to blackish wings and tail; underparts slate-grey, sometimes with olive-green tinge, especially on breast; conspicuous swollen yellow thigh; iris dark brown to red-brown; bill black; legs flesh-coloured or dusky. Sexes alike in coloration. Juvenile is similar to adult, but duller above, tinged with brownish below, and thigh are dark grey. Voice. Song a short, breezy phrase in high, dry tone, "cheedle tweep sher tweeip", or "pitty me sweet sweet"; sometimes given by two birds together. Call a heavy metallic "tchuk" or "tchek", also an accelerated hard chatter.
Habitat. Humid forest, brushy openings, second growth, bamboo-choked ravines, and adjacent shady pastures; at 1200–1700 m.
Food and Feeding. Probably a variety of insects, spiders (Araneae) and berries, and nectar of tubular flowers. Feeds on and near ground, also higher, to treetops. Active and noisy. On the ground, often searches among litter for arthropods. Plucks small, white protein capsules (Müllerian bodies) from brown hairy bases of petioles of *Cecropia* leaves. Sometimes follows army ants (Formicidae). Found in pairs and family groups; joins mixed-species flocks, but does not gather in single-species flocks.
Breeding. Season Mar–May. Nest a bulky cup of straw, grass and dried bamboo leaves, lined with fine vegetable fibres or bamboo leaves, placed 0·7–4 m up in coarse grasses, bamboo or densely foliaged tree in wood or clearing. Clutch 2 eggs, white to palest blue with brown to lilac speckles or spots throughout; no information on incubation period; nestling period 12 days.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Common in Cordillera Central and Cordillera de Talamanca, and fairly common in the Cordillera de Tilarán, in Costa Rica. Common in highlands of W Chiriquí, in Panama.
Bibliography. Armani (1985), Dunning (2008), Ridgely & Gwynne (1989), Ridgway (1901), Sassi (1939), Skutch (1967a), Stiles & Skutch (1989), Wetmore *et al.* (1984).

128. Yellow-green Finch

Pselliophorus luteoviridis

French: Tohi jaune-vert **German**: Griscombuschammer **Spanish**: Cerquero Verdiamarillo
Other common names: Yellow-green Sparrow/Sparrow-finch

Taxonomy. *Pselliophorus luteoviridis* Griscom, 1924, Cerro Flores, 6000 feet [c. 1830 m], eastern Chiriquí, Panama.
Genus sometimes subsumed in *Atlapetes*. Sometimes considered conspecific with *P. tibialis*. Monotypic.
Distribution. Highlands of E Chiriquí and Veraguas, in WC Panama.



Descriptive notes. 17·2–18·5 cm. A medium-sized, slender dark finch with long tail. Head and throat are black, with dark slate-grey rear ear-coverts, yellowish-olive hindcollar; upperparts dark olive, becoming dullest towards rear; wing and tail blackish, bend of wing yellow; breast yellow-olive, darker olive below, only slightly paler than mantle; swollen yellow to orange-yellow thigh; iris dark brown to red-brown; bill black; legs flesh-coloured or dusky. Sexes alike in coloration. Juvenile apparently undescribed. Voice. Little information. Pairs or family groups give excited squeaky chatter-duet which incorporates sweet notes delivered in hurried manner, with tinkling quality; also "tsweet tsweet" calls.
Habitat. Highland cloudforest, borders and clearings, at 1200–1800 m.
Food and Feeding. Little known. Probably feeds on variety of arthropods and berries, taken on and near ground.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. VULNERABLE. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Little information. Probably scarce to locally fairly common; numbers thought to be decreasing. Estimated population 10,000–19,999 mature individuals. Has small global range, within which recorded at few localities. Range extends along the Serranía de Tabasará in Chiriquí and Veraguas, probably also reaching Bocas del Toro and Coclé. Has been recorded at Fortuna Forest Reserve, Cerro Flores and Cerro Colorado (adjacent peaks of Cerro Santiago massif), and above Santa Fe and Chitra (Cerro San Antonio), where scarce and poorly known. Main threat is habitat loss. Only isolated forest patches remain in E Chiriquí, and Serranía de Tabasará generally is threatened by clearance for coffee-growing, grazing, pesticides and fires; core area of the species' distribution, around Cerro Santiago (in Ngöbe-Buglé Indigenous Homeland), is suffering rapid deforestation associated with subsistence agriculture and cattle-rearing, and deforestation is now spreading to the higher elevations favoured by this species; habitat destruction occurs even within protected areas. Known to occur in Fortuna Forest Reserve (Chiriquí) and at W edge of Santa Fe National Park (Coclé); may occur also in Omar Torrijos Herrera National Park (Bocas del Toro).
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Ridgely & Gwynne (1989), Ridgway (1901), Stattersfield & Capper (2000), Wetmore *et al.* (1984).



PLATE 52

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cm 8

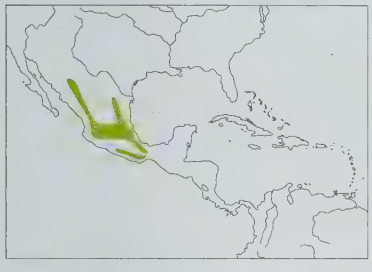
Genus *ATLAPETES* Wagler, 1831

129. Rufous-capped Brush-finch

Atlapetes pileatus

French: Tohi à calotte rousse **German**: Rotkappen-Buschammer **Spanish**: Atlapetes Coronirrufo
Other common names: Rufous-capped Sparrow

Taxonomy. *Atlapetes pileatus* Wagler, 1831, Mexico = state of Veracruz, Mexico.
Two subspecies recognized.
Subspecies and Distribution.
A. p. dilutus Ridgway, 1898 – N Mexican Plateau in SW Chihuahua, Durango, SE Coahuila, Nuevo León, SW Tamaulipas and San Luis Potosí.
A. p. pileatus Wagler, 1831 – S Mexican Plateau and S mountains from Sinaloa S to Michoacán, Guanajuato, Hidalgo and Veracruz, and in Guerrero, Oaxaca and Puebla.



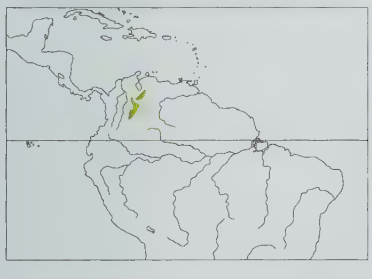
Descriptive notes. 14·5–16·5 cm; 21·5–27·5 g. Nominate race has crown rufous, side of face dark charcoal, nape and rest of head grey, throat broadly yellow; upperparts, including wings and tail, dull olive-green; underparts yellowish, olive tinge on side of breast, and usually more cinnamon on flanks and undertail-coverts; iris brown to dark red-brown; bill blackish; legs flesh-coloured to brownish. Sexes alike in coloration. Juvenile is like adult, but lacks rufous on crown, has pale wingbars, and is paler below. Race *dilutus* is paler in appearance and larger than nominate. Voice. Song 1–2 thin notes followed by 4 chipping notes, occasionally run into a trill. Call an excited "chik" or "chi-chi-chi-chi".
Habitat. Brush and undergrowth of humid pine–oak (*Pinus–Quercus*) belt of Mexican plateau, at 900–3500 m.
Food and Feeding. Variety of insects and seeds. Forages mainly on and near ground; also sometimes in bushes, keeping to tips of shrub branches. Hops on ground, and turns over leaves to find insects and other food items. Sometimes follows army-ant (Formicidae) swarms. Generally in pairs or small groups.
Breeding. Little known. Season Apr–Aug. Nest a cup made largely from dry grass, one in Morelos was placed c. 0·6 m above ground in dense vegetation. Clutch 2 eggs. No further information available.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common to fairly common in appropriate habitat. No known threats.
Bibliography. Armani (1985), Binford (1989), Dunning (2008), Howell & Webb (1995), Miller *et al.* (1957), Murray & Hardy (1981), Paynter (1978), Ridgway (1901), Rowley (1962), Sutton (1942), Urban (1959).

130. Moustached Brush-finch

Atlapetes albofrenatus

French: Tohi moustachu **German**: Weißbart-Buschammer **Spanish**: Atlapetes Bigotudo

Taxonomy. *Tanagra* (*Arremon*) *albo-frenatus* Boissonneau, 1840, Santa Fe de Bogotá, Colombia.
In Perijá Mts (NE Colombia–NW Venezuela border) there may be an undescribed taxon that is related to nominate race, intergrading with it in Norte de Santander; further study required. Two subspecies recognized.
Subspecies and Distribution.
A. a. albofrenatus (Boissonneau, 1840) – E Andes of Colombia from Norte de Santander S to Cundinamarca.
A. a. meridae (P. L. Sclater & Salvin, 1871) – Andes of Mérida and E Táchira, in W Venezuela.



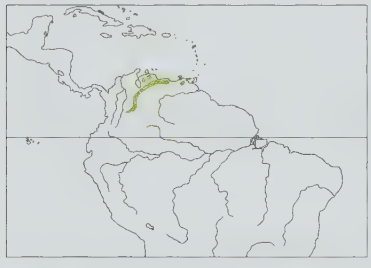
Descriptive notes. 17·5 cm; average 30 g (nominate). A relatively large-headed brush-finch with long and somewhat droopy bill. Nominate race has boldly patterned head, with rufous cap from forehead to nape, contrasting black mask, and bright white submoustachial stripe bordered below by black malar stripe, which in turn borders clean white throat; upperparts, including wings and tail, olive-green; underparts lemon-yellow, cleaner in centre, more tinged olive on sides and flanks; iris chestnut to deep red or dark brown; bill black; legs brownish to fleshy-grey. Sexes alike. Juvenile is olive above, dusky yellowish below, moustachial area dull yellow, malar stripe weakly formed, also mask duller blackish, and crown olive, rather than chestnut; in fresh plumage marginally paler tips of upperwing-coverts, forming two obscure wingbars. Race *meridae* has yellow throat and brighter, cleaner yellow underparts, malar stripe narrower or absent. Voice. Song variable, usually two parts, starting with musical set of notes and then a longer, faster series of clattering notes, "czeet czeet czeet czeet tswit-tswit-tswit-tsu-tsu-tsu-tsu-tsu-tsu"; some songs shorter, with several introductory whistles and then a slightly lower-pitched trill; also a duet, high-pitched and rollicking, with quavering quality that is distinctive. Call a high "ptiip", often repeated; also a nasal "bzzzp".
Habitat. Shrubby borders and undergrowth of humid subtropical forest, regenerating clearings, and thick growth along roads; quite tolerant of disturbed habitats. Sometimes edges of drier woodland, but where thick undergrowth present. Mostly at 1500–2500 m; down to 1000 m in Colombia.
Food and Feeding. Food includes arthropods, fruits and berries. Forages in trees and shrubs, as well as on ground. Usually in pairs or family parties.
Breeding. Fledglings found in Venezuela during May and Jun. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Cordillera de Mérida EBA and Colombian East Andes EBA. Fairly common. Has fairly extensive range, within which no evidence of any significant declines in populations.
Bibliography. Armani (1985), Hilty (2003), Hilty & Brown (1986), Paynter (1978), Ridgely & Tudor (1989).

131. Ochre-breasted Brush-finch

Atlapetes semirufus

French: Tohi demi-roux **German**: Ockerbrust-Buschammer **Spanish**: Atlapetes Semirrufo

Taxonomy. *Tanagra* (*Arremon*) *semirufus* Boissonneau, 1840, Santa Fe de Bogotá, Colombia.
Sometimes considered to form a superspecies with *A. personatus* and *A. fulviceps*; likely closely related to former, but latter may not belong in such a group. Six subspecies recognized.
Subspecies and Distribution.
A. s. benedettii Phelps, Sr & Gilliard, 1941 – mountains of Falcón, Lara and Trujillo, in NW Venezuela.
A. s. denisei (Hellmayr, 1911) – N & NE Venezuela (Carabobo and Aragua E to Monagas and Sucre).
A. s. albigula J. T. Zimmer & Phelps, Sr, 1946 – N Táchira, in W Venezuela.
A. s. zimmeri Meyer de Schauensee, 1947 – E slope of E Andes of Colombia (S Norte de Santander and NE Boyacá) and Venezuela (W Táchira).
A. s. majusculus Todd, 1919 –E slope of E Andes in N Boyacá (Colombia).
A. s. semirufus (Boissonneau, 1840) – E slope of E Andes in Cundinamarca (Colombia).



Descriptive notes. 18 cm; 29–33 g. A slim brush-finch with finely tipped and pointed bill. Nominate race has head to nape and down to breast plain tawny-orange; upperparts, including wings and tail, olive; underparts below breast yellowish, washed greenish on flanks, and yellow on undertail-coverts; iris chestnut; bill grey; legs pinkish to dusky grey. Sexes alike. Juvenile is brownish-olive above, including head, dull yellowish below, with olive chest and narrow dark streaking from breast to undertail-coverts, also often shows darker malar stripe; older immature intermediate between juvenile and adult, with tawny appearing patchily on face, and breast becoming fully tawny early on. Race *benedettii* is like nominate, but paler orange on breast, brighter greenish on flanks, juvenile dark and with wide, bold malar stripe; *denisei* is much more colour-saturated than nominate, deeper orange-tawny on head, darker olive on flanks, olive colour extending to undertail-coverts; *albigula* is paler orange on head, white on centre of throat, otherwise mostly pale yellowish below, with tawny wash on side of breast, cinnamon undertail-coverts, juvenile with pinkish bill and rather pale and nearly unstreaked below; *majusculus* has paler head and bill than nominate, whitish wash on ear-coverts and throat, undertail-coverts yellowish; *zimmeri* is like previous, but washed pale tawny on undertail-coverts and with darker bill. Voice. Song, early in morning largely during start of rainy season, a rapid "wheet-wheet, tsu-tsu-tsu" or "pi-pit, chew chew chew!".
Habitat. Shrubbery and understorey in forest borders, also secondary growth such as regenerating clearings. At 1000–2500 m in Venezuela; 2000–3500 m in Colombia.
Food and Feeding. Seeds and arthropods, also berries and small fruits. Forages on and near ground, under dense understorey; also in shrubs and small trees. On forest floor often uses bill to flick at leaves, looking for seeds and arthropods. Found in pairs and in small groups, perhaps family parties.
Breeding. Season Mar–Jul (spanning end of dry season and first half of rainy season), with peak Apr to late May. Nest built by female, a cup constructed from thick grasses, at times some small sticks on perimeter, lining of thin grasses and rootlets, usually placed 0·2–3 m from ground and concealed in grass, vine or bush, often at edge of clearing or trail. Clutch typically 2 eggs, whitish with reddish-brown spots, which are concentrated around large end; incubation by female, period 14–15 days; nestling period 10·5 days. In one study, nest failure found to be due essentially to predation of nest contents.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon in Colombia; fairly common in Venezuela. Has reasonably broad range, within which no evidence of any significant population declines or threats to habitat.
Bibliography. Armani (1985), Biancucci & Martin (2008), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Paynter (1978), Restall *et al.* (2006), Ridgely & Tudor (1989).

132. Tepui Brush-finch

Atlapetes personatus

French: Tohi des tépuis **German**: Tepuibuschammer **Spanish**: Atlapetes de Tepuí

Taxonomy. *Arremon personatus* Cabanis, 1848, Roraima, 6500 feet [c. 1980 m], Venezuela.
Sometimes considered to form a superspecies with *A. semirufus* and *A. fulviceps*; likely closely related to former, but latter may not belong in such a group. Six subspecies recognized.
Subspecies and Distribution.
A. p. paraquensis Phelps, Sr & Phelps, Jr, 1946 – Cerro Paraque and Cerro Yavi, in NW & NE Amazonas (S Venezuela).
A. p. parui Phelps, Sr & Phelps, Jr, 1950 – Cerro Parú, in NC Amazonas (S Venezuela).
A. p. duidae Chapman, 1929 – tepui region of S Venezuela, in C Amazonas (Mt Duida) and WC Bolívar (Mt Guaiquinima).

On following pages: 133. White-naped Brush-finch (*Atlapetes albinucha*); 134. Santa Marta Brush-finch (*Atlapetes melanocephalus*); 135. Pale-naped Brush-finch (*Atlapetes pallidinucha*); 136. Yellow-headed Brush-finch (*Atlapetes flaviceps*); 137. Dusky-headed Brush-finch (*Atlapetes fuscoolivaceus*); 138. Tricolored Brush-finch (*Atlapetes tricolor*); 139. White-rimmed Brush-finch (*Atlapetes leucopis*); 140. Yellow-breasted Brush-finch (*Atlapetes latinuchus*).

A. p. jugularis Phelps, Sr & Phelps, Jr, 1955 – Cerro La Neblina in S Venezuela (SE Amazonas) and adjacent N Brazil (Amazonas).
A. p. collaris Chapman, 1939 – Mt Auyan-tepui, in SE Bolívar (SE Venezuela).
A. p. personatus (Cabanis, 1848) – Mt Roraima and nearby tepuis of SE Bolívar, in SE Venezuela.

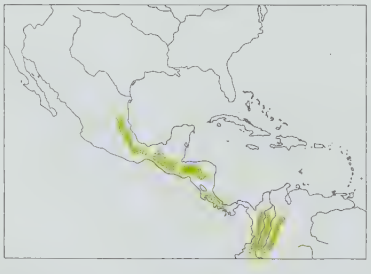


Descriptive notes. 18 cm; 29–37 g. A stocky brush-finch with long bill with slightly curved culmen. Nominate race has head to nape plain cinnamon-rufous; upperparts olive, upperwing and tail similarly coloured, but slightly more blackish; rufous head coloration stops abruptly below malar area and contrasts with yellow throat; underparts from breast to lower belly yellow, flanks, vent and undertail-coverts dusky olive; iris chestnut; bill black; legs dusky pink. Sexes alike. Juvenile is slightly browner above, most notably with brownish-grey head; rufous colour begins to appear at early stage in patchy manner. Races differ mainly in extent of rufous on head to breast: *collaris* similar to nominate but gular yellow tends to be more restricted to central throat, collar of olive or rusty streaking on breast, juvenile very dark brown above, buffy tawny with extensive streaking below; *duidae* has entire head to breast rufous, is more deeply colour-saturated and darker olive on flanks and vent, upperparts darker, juvenile reddish-brown above and dull yellowish with brown streaking below; *jugularis* has entire head and throat rufous, but extensively yellow below, with little olive wash on flanks, juvenile pale brownish above and only slightly streaked below; *paraquensis* has forehead and chin blackish, rufous on throat (not extending to breast), pale olive wash on flanks and vent, juvenile pale brown above and unstreaked pale buffy yellow below; *parui* is dark, heavily colour-saturated, and rufous extends to throat and breast, belly deep yellow, flanks and undertail-coverts dark olive, latter fringed with bright yellow. Voice. Usually rather quiet. Song, mostly at dawn, quick and sweet-sounding, from a simple "tweet swee-tee-tee-tee" to a more complex "speek! speek! speeu-téé-tu'tu'tu"; also, in duet, a rather mechanical sounding trilling chatter, starts with more widely spaced notes and blends into a trill.
Habitat. Shrubby borders and clearings, also understorey in closed wet forest in tepuis; also young as well as old second growth, particularly when associated with white sandy soil. At 1000–2500 m.
Food and Feeding. Little information. Diet arthropods and berries (often melastomes). Forages close to ground, typically cocking or flipping up tail as it does so. Sometimes drops to forage on ground, seeking insect prey and berries in shrubbery. Found in pairs and in family groups of up to four individuals.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tepuis EBA. Locally very common. Range very fragmented. Although patchy in its distribution, there is no evidence of significant declines in its numbers.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Paynter (1978), Restall *et al.* (2006), Ridgely & Tudor (1989), Willard *et al.* (1991).

133. White-naped Brush-finch
Atlapetes albinucha

French: Tohi à calotte blanche **Spanish**: Atlapetes Nuquiblanco
German: Weißnacken-Buschammer
Other common names: White-naped Atlapetes; Yellow-throated Brush-finch/Sparrow ("*gutturalis* group")

Taxonomy. *Embernagra albinucha* d'Orbigny and Lafresnaye, 1838, Cartagena; error = Caribbean slope of Mexico.
Often placed in genus *Buarremon* or *Arremon*. Races form two groups, the "*albinucha* group" (nominate and *griseipectus*) and "*gutturalis* group" (remaining races); these often treated as two separate species, but differences between them appear to be insufficient to justify such treatment. Race *fuscipygius* appears to intergrade with *griseipectus* in NW El Salvador. Poorly differentiated race *coloratus* possibly better merged with *brunnescens*. Eight subspecies recognized.
Subspecies and Distribution.
A. a. albinucha (d'Orbigny & Lafresnaye, 1838) – Caribbean slope of Mexico from Puebla and Veracruz S to Oaxaca and Chiapas.
A. a. griseipectus Dwight & Griscom, 1921 – Pacific slope of SW Chiapas (S Mexico), highlands of W Guatemala and El Salvador (San José del Sacre and Volcán de Santa Ana).
A. a. fuscipygius Dwight & Griscom, 1921 – highlands of Honduras, NW El Salvador (Los Esesmiles) and NW Nicaragua.
A. a. parvirostris Dwight & Griscom, 1921 – subtropical zone of Costa Rica.
A. a. brunnescens Chapman, 1915 – subtropical zone of W Panama (W Chiriquí).
A. a. coloratus Griscom, 1924 – subtropical zone of E Chiriquí (Panama).
A. a. azuerensis Aldrich, 1937 – Azuero Peninsula, in S Panama.
A. a. gutturalis (Lafresnaye, 1843) – upper tropical and subtropical zones of Colombian Andes S from Antioquia, Santander and Norte de Santander.

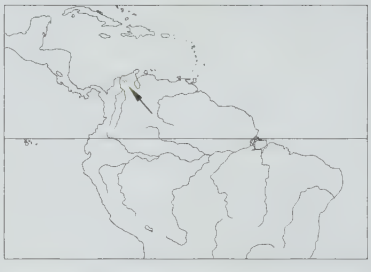


Descriptive notes. 17–21 cm; 31–37·2 g. Nominate race has black head with broad white median crownstripe; upperparts, including wings and tail, dark slaty grey with slight olive tinge; throat and underparts yellow, flanks washed dusky yellowish-grey; iris red-brown to dark brown; bill blackish; legs flesh-coloured to dark grey-brown. Sexes similar. Juvenile is like adult, but dark sooty brown above, blacker on head, yellow below, throat brightest, contrasting with dark-streaked breast, flanks tinged brownish-cinnamon. Races differ mainly in size, colour tones and pattern of underparts, nominate the only one all yellow below: *griseipectus* is lighter-coloured and more olive above than nominate, throat to uppermost breast light yellow, breast grey; *fuscipygius* is brownest of all races, median crownstripe narrow like *brunnescens*; *gutturalis* is larger and larger-billed than other races, yellow on throat, whitish on breast and underparts, with flanks and vent olive-grey; *parvirostris* is like previous, but smaller, with smaller bill, upperparts darker grey, throat paler yellow; *brunnescens* is browner than *gutturalis*, with crownstripe narrower, flanks and vent buffy brown; *coloratus* is like previous, but throat deeper yellow (sometimes orange-tinged); *azuerensis* is dark brown (not greyish) above, has blackish remiges edged reddish-brown, grey band on breast, reddish-brown flanks and vent. Voice. Song a deliberate series of notes, "tsee tseea tseea tseea tseer", sometimes transliterated as "o see, I'm weary, pity me".
Habitat. Thick undergrowth, shrubby clearings, openings in cloudforest, and borders of dense tropical forests and thickets, at 1200–3150 m. In Guatemala in temperate forests of oaks (*Quercus*) and other broadleaf trees, mixed with pines (*Pinus*), also in thick stands of "cypress" on some higher slopes. In El Salvador found in upper tropical zones, 1950–2600 m, at edges of clearings in cloudforest; recorded in pines and bracken (*Pteridium*). In Costa Rica in epiphyte-laden subtropical forest, where seems to prefer thickest undergrowth. Occurs also in tangled lower growth in secondary forest. In Colombia also in forest borders with dense shrubs and in thickets, sometimes along roadsides.
Food and Feeding. Variety of insects and seeds. Forages on and near ground. Hops on ground; turns over leaves to find insects and other foods. Sometimes follows army-ant (Formicidae) swarms. Found singly or in pairs.
Breeding. Nesting recorded in late Apr in S Mexico (Oaxaca), Apr–Jul in Costa Rica and Panama, and Mar–Sept in Colombia. Nest is an open bulky cup of twigs, dry grass and leaves, lined with pine needles and other finer materials, placed 0·6–3 m up in dense vegetation (e.g. clipped bamboo), or sometimes on ground. Clutch 2 or 3 eggs, rarely only 1, white and unmarked. No further information available.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Common to fairly common in Mexico; common in appropriate habitat in El Salvador, Costa Rica and W & S Panama; fairly common in Colombia. In Mexico, reports of nominate race also from Valley of Mexico and San Luis Potosí considered doubtful. No known threats.
Bibliography. Armani (1985), Binford (1989), Dickey & van Rossem (1938), Dunning (2008), Dwight & Griscom (1921), Griscom (1924, 1932), Hilty & Brown (1986), Land (1970), Monroe (1968), Palacios (2005), Paynter (1964b), Ridgely & Tudor (1989), Ridgway (1901), Stiles & Skutch (1989), Wetmore *et al.* (1984).

134. Santa Marta Brush-finch
Atlapetes melanocephalus

French: Tohi des Santa Marta **Spanish**: Atlapetes de Santa Marta
German: Grauohr-Buschammer

Taxonomy. *Buarremon melanocephalus* Salvin and Godman, 1880, San Sebastian, Colombia.
Monotypic.
Distribution. Santa Marta Mts (Magdalena, César and Guajira), in N Colombia.

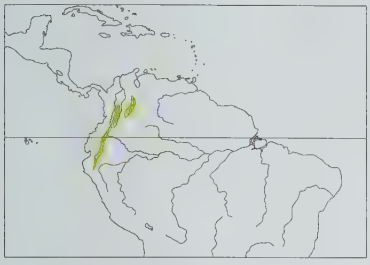


Descriptive notes. 17 cm; average 25 g. A large-bodied brush-finch with large and rounded head, relatively thick-based bill. Head to chin and malar region is black except for variable grey ear-coverts, creating pale-cheeked look; upperparts olive, upperwing and tail blackish with olive edgings; throat to undertail-coverts lemon-yellow, flanks washed olive mixed with grey; iris red-brown to dark brown; bill black; legs blackish. Sexes alike. Juvenile is similar to adult, but pale cheek patch obscured, dull yellowish with fine dark streaks below. Voice. Song loud and cascading, usually given as duet with a lot of buzzy notes, "bzt-bzt-bzt, bzbzbzbzbzzbzbzbzbz", speeding up and becoming louder towards end. Call a high nasal "bzzt...bzzt...bzzt", repeated at regular intervals.
Habitat. Shrubbery and forest borders within humid subtropical forest, also second growth and overgrown brushy pastures; absent from interior of mature forest. At 1000–3000 m.
Food and Feeding. Few data on diet. Forages in and near ground, in or beneath thickets; may forage also as high as 10 m from ground, but usually below eye level. Often accompanies mixed-species foraging flocks.
Breeding. Birds in breeding condition in Jan–Apr, and fledglings recorded Nov–Jun. Nest reported as a domed structure. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Santa Marta Mountains EBA. Common within its small area of distribution. Has a small range, but because of its apparent abundance and lack of any known population-level declines it is considered not to be at risk.
Bibliography. Fjeldså & Krabbe (1990), Hilty & Brown (1986), Restall *et al.* (2006), Ridgely & Tudor (1989), Todd & Carriker (1922).

135. Pale-naped Brush-finch
Atlapetes pallidinucha

French: Tohi à nuque claire **German**: Zimtstirn-Buschammer **Spanish**: Atlapetes Nuquipálido

Taxonomy. *Tanagra* (*Arremon*) *pallidinucha* Boissonneau, 1840, Santa Fe de Bogotá, Colombia.
Two subspecies recognized.
Subspecies and Distribution.
A. p. pallidinucha (Boissonneau, 1840) – SW Venezuela (Táchira) and E Andes of Colombia (Norte de Santander S to Cundinamarca).
A. p. papallactae Hellmayr, 1913 – C Andes of Colombia (S from Caldas) and E slope of Ecuador S to extreme N Peru (Piura–Cajamarca border).
Descriptive notes. 18 cm; 21·4–40·2 g. A relatively large-headed brush-finch with high rounded crown, and relatively thick but short and pointed bill. Nominate race has broad pale cinnamon central stripe from forehead to mid-crown, becoming white on hindcrown and nape, contrasting with black side of head; upperparts dark slate-grey, upperwing and tail blackish; throat bright yellow, this colour extending to breast and belly, washed olivaceous to grey on sides, flanks and undertail-coverts; iris dark chestnut; bill black; legs pinkish-dusky. Sexes alike. Juvenile is duller than adult, washed brownish above, narrowly streaked on crown, and streaked dusky on breast. Race *papallactae* has forehead very pale cinnamon or yellow, and olivaceous to grey wash of



underparts extends to breast, isolating yellow throat, juvenile browner and with darker underparts than nominate. Voice. Territorial song in N Peru noted as a musical and whistled "wheet-tew-tew-tew"; one vocalization a rapidly delivered cacophony of sweet, strident, buzzy and high notes, and single individuals give slightly slower song reminiscent of a siskin (*Carduelis*) owing to frequent repetition of notes; chatter-duet more complex, very hard to describe, mixes notes of various types in quick succession. Call a high-pitched soft "tip"; also a nasal "pffe", repeated several times.

Habitat. Subtropical to temperate zone in borders and understorey of humid forest, most often at or near tree-line; often in stunted shrubby second growth, elfin forest and shrubs. Occurs also in interior of temperate forest, where has preference for bamboo thickets. At 2800–3600 m.

Food and Feeding. Berries, such as those of *Miconia* or Ericaceae; also insects. Stomach contents have included seeds and other plant material, as well as insects. Tends to forage on ground or near ground, concealed in dense understorey and edges of thickets; often in shrubbery close to the ground. In pairs and family groups; often joins mixed-species foraging flocks.

Breeding. In Colombia, nest found in Sept in Bogotá, birds in breeding condition Feb–Sept in C & E Andes, and fledglings found in Mar and Jun; fledglings in Nov in Ecuador (Pichincha). One nest found, a bulky cup mostly of dry twigs and grasses, base covered with mosses, some dry leaves of *Chusquea* bamboo attached around outside, lining of tightly interwoven thin dry grass leaves, external diameter 12 cm, height 10 cm, internal diameter 6·5 cm, depth 6 cm; placed 40 cm above ground in dense thicket of grasses, supported by tall grasses (1·5 m) and one bamboo stem, these creating roof-like covering. Nest contained 1 egg, pale greenish-blue with brownish-ochre and dark lilac spots and blotches, these concentrated around larger end; egg was being incubated. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common to common; usually most common at higher elevations, above 3000 m. Has reasonably large range, high abundance in parts of that range, and no evidence of widespread habitat problems or significant population declines.

Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hilty (2003), Hilty & Brown (1986), Parker *et al.* (1985), Peraza (2009), Restall *et al.* (2006), Ridgely & Tudor (1989), Stiles *et al.* (2000).

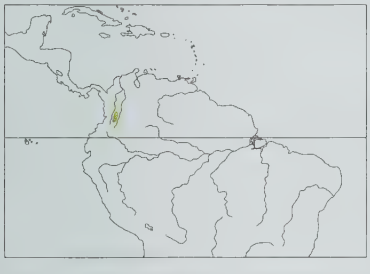
136. **Yellow-headed Brush-finch**

Atlapetes flaviceps

French: Tohi à tête olive **German**: Goldkopf-Buschammer **Spanish**: Atlapetes Cabecigualdo
Other common names: Olive-headed Brush-finch

Taxonomy. *Atlapetes flaviceps* Chapman, 1912, River Toche, 6800 feet [c. 2070 m], Tolima, Colombia.
Monotypic.

Distribution. E slope of C Andes in N Tolima, in Colombia.



Descriptive notes. 17 cm. A relatively short-billed brush-finch with large head and distinctly graduated tail; crown feathers often raised, giving round-headed appearance, and bill has even curve to culmen and gonys, making it look relatively blunt. Has head entirely yellowish, grizzled with olive on crown and face (amount of olive wash varies individually, and possibly related to age); supercilium and submoustachial stripe cleaner yellow, yellow extending to nape and back of head; upperparts, including upperwing-coverts, olive, flight-feathers and tail blackish; throat to undertail-coverts bright yellow, flanks washed olive; iris dark reddish-brown; bill blackish; legs dusky brown. Sexes alike. Juvenile has strong olive wash on head, breast and flanks. Voice. Song lasts 1·5–2 seconds, has two parts, some introductory notes and then a trilled end, "tseep-tseep-tseetp, twtitititititit", another variation "chweet-twee, to-tee-tee-tee". Partners also duet, with much longer song (5–9 seconds) with many stuttering trills and chatters, and less "clean" sound as two birds singing on top of each other and not entirely in synchrony. Call a high-pitched "tsiip", repeated at even intervals; also louder and harsher "szeeet".

Habitat. Brush adjacent to cleared areas on mountainsides, also in undergrowth within moist montane forest; will accept second growth, borders and edges of plantations and fruit orchards, as well as forest fragments. At 1900–2440 m.

Food and Feeding. Takes small fruits, insects and seeds. Fairly arboreal. Forages mostly in pairs, sometimes in small groups of up to four individuals; will join mixed-species foraging flocks with various tanagers (Thraupidae) and Golden-fronted Whitestart (*Myioborus ornatus*).

Breeding. Juveniles with parents observed in Jun, and collection of nesting material in Nov. No other information.

Movements. Thought to be resident; present all year at known sites.

Status and Conservation. ENDANGERED. Restricted-range species: present in Colombian Inter-Andean Slopes EBA. Has a very small range and very small global population, estimated at 680 mature individuals. Numbers thought to be in continuing slow decline owing to rates of habitat loss. For a long time was known from only three specimens, all from type locality in the Toche Valley (Tolima); in 1967 was captured at a second site, in La Plata Vieja Valley (in Huila). For many decades little else was known about this species, but it is now known to be locally common at type locality. No further records from the Huila locality. Continuing habitat degradation is occurring within its range.

Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), Chapman (1912), Hilty & Brown (1986), Losada-Prado *et al.* (2005), Restall *et al.* (2006), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

137. **Dusky-headed Brush-finch**

Atlapetes fuscoolivaceus

French: Tohi sombre **German**: Rußkopf-Buschammer **Spanish**: Atlapetes Sombrío

Taxonomy. *Atlapetes fusco-olivaceus* Chapman, 1914, San Agustín, 5000 feet [c. 1520 m], Huila, Colombia.
Monotypic.

Distribution. Upper Magdalena Valley (in Huila), in SW Colombia.



Descriptive notes. 17–18 cm; two males average 32·5 g. A dull-coloured brush-finch with distinctly graduated tail. Has crown down to lores, cheek and ear-coverts dusky olive, often nearing blackish on side of face, contrasting yellow submoustachial area, this in turn highlighted by narrow dark malar stripe; nape and upperparts similarly olive-dusky, slightly brighter olive on rump, and upperwing and tail slightly darker, flight-feathers with fine olive edging; throat and underparts yellow, becoming olive-washed on breast and flanks; iris reddish to deep brown; bill black; legs dusky brown. Sexes similar. Juvenile is similar to adult, but lacks blackish on face, is obscurely streaked below, and yellow submoustachial stripe is washed olive. Voice. Song a short and quickly delivered series lasting c. 1 second, "swee-see chipi", with springy and bouncy nature; chatter-duet a multi-parted series of chips, trills and other repeated notes, e.g. "ti-ti-ti-ti-ti-ti, tch-tch-tch-tch-tch, chew chew chew", lower-pitched and slower towards end. Call a high "seep".

Habitat. Humid forest edge, in shrubbery and understorey, also low second growth and clearings with dense shrub component such as overgrown pastures; not common inside forest, and if present usually near a treefall gap, or tangled opening. At 1600–2400 m.

Food and Feeding. Little information on diet. Relatively arboreal, but forages also on ground; foraging strata mainly 0·5–6 m above ground. Much foraging is through dense thickets, and moves quickly through, pecking and probing rapidly in search of food. Usually in pairs or small groups.

Breeding. Birds in breeding condition in Feb–Apr in S Huila. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Colombian Inter-Andean Slopes EBA. Fairly common to common. Has small global range, and likely to be declining moderately rapidly as a result of habitat loss and degradation. Tolerant of some degree of degradation of habitat, and able to survive, at least temporarily, in second growth and degraded forest. Study of this species' ecology needed in order to determine its precise habitat requirements and any potential threats.

Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), Chapman (1914a), Fjeldså & Krabbe (1990), Hilty & Brown (1986), Restall *et al.* (2006), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

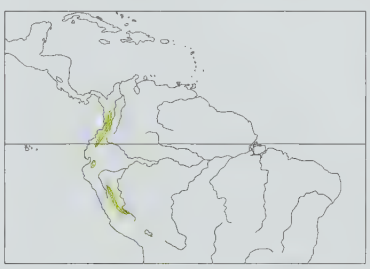
138. **Tricolored Brush-finch**

Atlapetes tricolor

French: Tohi tricolore **German**: Dreifarben-Buschammer **Spanish**: Atlapetes Tricolor
Other common names: Choco Brush-finch (*crassus*)

Taxonomy. *Buarremon tricolor* Taczanowski, 1875, Chilpes, Paltaypampa, Ninabamba, Pumarca and "Tembopata", Junín, Peru. Race *crassus* occasionally placed in *A. leucopis*, or treated as a separate species. Two subspecies currently recognized.

Subspecies and Distribution.
A. t. crassus Bangs, 1908 – W Andes of Colombia (Caldas, Valle and Nariño) and W Ecuador (Pichincha and El Oro).
A. t. tricolor (Taczanowski, 1875) – Andes of C Peru (La Libertad S to Junín and Cuzco).



Descriptive notes. 16–18 cm; 29·5–40 g. Nominate race has side of head black, contrasting wide yellowish crownstripe reaching to hindcrown and nape; upperparts dark olive to dark grey, rump and uppertail-coverts olive, tail blackish; upperwing dusky grey, feathers edged dark olive; throat and underparts bright yellow, washed olive on sides and flanks, vent and undertail-coverts; iris deep reddish-brown; bill black; legs greyish. Sexes alike. Juvenile has dull, dark rufous crown, dark brown back, and brown underparts sometimes streaked. Race *crassus* differs from nominate in having larger bill, darker back, tawny-gold headstripe, and more extensive olive on underparts. Voice. Song, given quite persistently, high-pitched and in two or three parts, tends to begin with 2 downslurred introductory notes, "tsuwee tsuwee, tsee-tsee, tsi-tsi-tsi", also described as a long series of accelerating notes terminating in dry trill; chatter-duet includes trills and descending nasal notes, and is relatively quick, high-pitched and sibilant, "pi tuee-chi tu-tu-tu zzz téw téw téw téw". Call a high "ti".

Habitat. Undergrowth in shrubby clearings and edge of humid forest; forest openings, and open mossy cloudforest. At 700–3050 m.

Food and Feeding. No details of diet. Forages at variable heights; can be distinctly more arboreal than many brush-finches, foraging 5–10 m from ground. Found alone and in pairs.

Breeding. Egg dates in Apr in Colombia (Valle), and fledglings in Jun–Jul in Cauca (Colombia) and NW Ecuador. One nest was a thick cup, placed near ground in rotten stump; contained 1 egg, white and densely spotted all over with dusky.

Movements. Resident.

Status and Conservation. Not globally threatened. Uncommon to fairly common; somewhat local. Has a reasonably wide global range, and no evidence of any widespread and/or significant population decline.

Bibliography. Armani (1985), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Hilty & Brown (1986), Paynter (1978), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

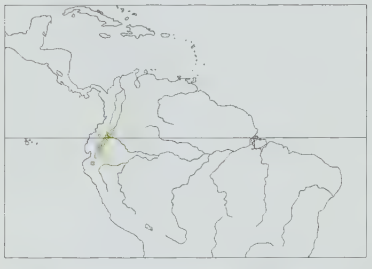
139. **White-rimmed Brush-finch**

Atlapetes leucopis

French: Tohi bridé **German**: Brillenbuschammer **Spanish**: Atlapetes de Anteojos

Taxonomy. *Buarremon leucopis* P. L. Sclater and Salvin, 1878, Yanayacu, Ecuador.

Race *crassus* of *A. tricolor* occasionally placed in present species. Monotypic.
Distribution. Colombian Andes from head of Magdalena Valley (S base of C Andes of SW Huila) and E slope of E Andes from W Caquetá S to W Putumayo and SE Nariño, and Ecuador on W slope (Imbabura) and E slope (at least Cordillera de Guacamayos, in Napo, also E Azuay and NW Morona-Santiago, also S Loja).



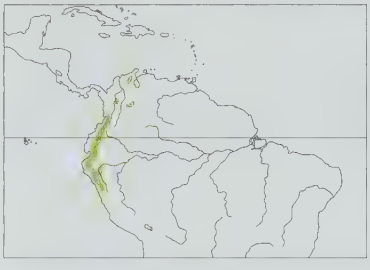
Descriptive notes. 18 cm. A very dark brush-finch with bold white "spectacles", bill rather thick at base with culmen evenly curved. Has dark rusty crown to hindcrown and upper nape, black face extending to malar region, contrasting bold white ring around eye and short white postocular stripe; upperparts, including wings and tail, blackish-grey, slight hint of olive on rump and uppertail-coverts; throat dark grey, underparts dark olive, slight darker scaling on breast (giving somewhat mottled appearance), flanks and undertail-coverts slightly darker olive than middle of belly and breast; iris dark brown; bill blackish; legs dull fleshy to dusky grey. Sexes alike. Immature has olive wash on crown, more noticeably barred appearance on throat and breast, and obscurely streaked belly. Voice. Song, heard in Mar, a slowly delivered series of 4–15 strident notes, either upslurred or downslurred whistles, varying from "swee twuu twuu twuu" to a longer "swee swee chewit chewit chewit tweew tweew chu chu"; also a rambling duet which includes many sweet whistles, trills and more complex notes. Contact call a high-pitched "zeee".
Habitat. Dense undergrowth of wet montane forest and forest edge; prefers a mix of forest with regenerating thickets and low montane woodland. At 2000–3100 m.
Food and Feeding. Little information on diet; observed to eat berries, particularly blue berries of Melastomataceae. Usually found on ground or low in understorey; foraging heights range up to 5 m above ground. Singly, in pairs and in groups of up to three individuals; may join mixed-species foraging flocks in some areas, but reported by some observers as not doing so.
Breeding. Recorded Oct–Dec in Colombia and Ecuador, and juveniles with adults seen in Dec in S Colombia (Nariño). Two nests described, one (under construction) a large ball of moss with large side entrance, 8 m above ground in fork of tree; the other was a bulky cup measuring 20 × 15 cm, made from twigs and grasses, placed c. 1·5 m above ground in a cavity 35 cm long, with entrance 25 × 18 cm, at base of a landslide. The cavity nest contained 1 egg, pale cream with greenish wash, and with chestnut-rufous blotches concentrated at wide end; egg being incubated. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Northern Central Andes EBA and Southern Central Andes EBA. Rare to uncommon. Until recently was considered Near-threatened, but distribution appears to be more extensive and populations larger than had previously been realized. Abundant landslides occur in areas occupied by this brush-finch, and these may create the habitat mosaic it prefers.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Restall *et al.* (2006), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Salaman *et al.* (1998).

140. **Yellow-breasted Brush-finch**

Atlapetes latinuchus

French: Tohi à miroir **German**: Gelbbrust-Buschammer **Spanish**: Atlapetes Pechiamarillo
Other common names: Cloud-forest Brush-finch; Rufous-naped Brush-finch (*latinuchus*); Perija Brush-finch (*nigrifrons*); Yariguies Brush-finch (*yariguierum*)

Taxonomy. *Buarremon latinuchus* du Bus de Gisignies, 1855, Colombia and Peru.
Traditionally treated as conspecific with *A. rufinucha*, but molecular-genetic studies indicate that the two are not even each other's closest relatives. It has been suggested that these two species, together with *A. terborghi* and *A. melanolaemus*, and *A. schistaceus*, are related in a complex manner, with yellow coloration lost or gained in a leap-frog pattern, such that taxa which do not look alike visually may in fact be closely related to each other. Vocal data and molecular studies suggest that race *nigrifrons* may not belong with present species, is perhaps not even closely related to it, and possibly merits elevation to species rank; it should be noted that, when *Arremon torquatus* is placed in present genus, name *nigrifrons* becomes preoccupied and must then be replaced by name *phelpsi*. Proposed race *simplex* (described from Bogotá, and probably originating from E Andes of Colombia), appears indistinguishable from *spodionotus* and is synonymized with it. Nine subspecies currently recognized.
Subspecies and Distribution.
A. l. nigrifrons Phelps, Sr & Gilliard, 1940 – Perijá Mts, on N Colombia–W Venezuela border.
A. l. elaeoprorus (P. L. Sclater & Salvin, 1879) – NC Andes of Colombia in Antioquia.
A. l. yariguierum Donegan & Huertas, 2006 – Serranía de los Yariguíes (Santander), in Colombia.
A. l. caucae Chapman, 1927 – W Andes and W slope at S end of C Andes in Valle and Cauca, in Colombia.
A. l. spodionotus (P. L. Sclater & Salvin, 1879) – Andes in S Colombia (Nariño) and Ecuador (S to Chimborazo).
A. l. comptus (P. L. Sclater & Salvin, 1879) – SW Ecuador (from Cañar S to W Loja) and adjacent NW Peru (Piura).
A. l. latinuchus (du Bus de Gisignies, 1855) – SE Ecuador (from E Azuay and E Loja) S to N Peru (Amazonas).
A. l. chugurensis Chapman, 1927 – Pacific slope of Cajamarca, in NW Peru.
A. l. baroni (Salvin, 1895) – upper Marañón Valley in Cajamarca and La Libertad, in N Peru.



Descriptive notes. 17 cm; 16–31 g. Nominate race has forehead to nape medium rufous to orange-rufous, superciliary area and side of face black; upperparts dark slate-grey, upperwing and tail slightly darker, prominent white patch at base of primaries; tail blackish, edged olive; malar region and throat to undertail-coverts yellow, very narrow and indistinct dark malar stripe, side of breast and flanks with slight olive wash, greyer on rear flanks; iris deep reddish-brown; bill black; legs brownish to dusky grey. Sexes alike. Juvenile is dull olive above and on head, including crown, pale yellow below, breast and flanks washed olive and also indistinctly streaked. Race *nigrifrons* has black forehead, more olive wash on sides, flanks and thighs, no white patch at base of primaries; *elaeoprorus* is greenish-olive above, and has small pale supraloral spot and large white primary patch; *yariguierum* has blacker grey back than nominate, no white patch at base of primaries, malar stripe very small or lacking, more olive wash on sides and flanks; *caucae* has largest white primary patch, crown deep dark rufous, pale supraloral spot and olive-washed malar stripe; *spodionotus* is duller than nominate on upperparts and underparts, upperparts dark olive-brown, little or no white at base of primaries, malar stripe reduced to some indistinct olive-brown marks; *comptus* has yellow supraloral spot, black malar stripe, thighs washed olive; *baroni* has yellowish crownband becoming slightly more russet towards forehead, pale greenish upperparts, lacks dark malar stripe; *chugurensis* is much like last, but upperparts more greyish. Voice. Song fast and complicated, lasting c. 2–3 seconds, usually with three or four distinct parts and a characteristic opening trill, "t't't't't't'ut,weet-weet-weet-weet-tu-tu-few-few-few"; songs in N Peru simple, an introductory note and a trill, "swee tititititit" or "weeo chichichichi". Race *yariguierum* sings short series of high-pitched rising and falling whistles, "wiu-wiu, wiu-weeu-weeu, wee-weeu-weeu" or "wee-wiu-weeu-weeeu". Call a high-pitched "ztzzt".
Habitat. Inhabits bushy borders of forest, second growth, roadside thickets and overgrown pastures; moderately tolerant of disturbed habitats. Generally occurs at elevations of 1600–2700 m; up to 3700 m in Nariño (S Colombia).
Food and Feeding. No details of diet. May forage on ground, but often quite arboreal. Tends to forage in pairs or small groups, working the understorey; seldom joins mixed-species foraging flocks.
Breeding. Nests found in Aug and Oct in SE Ecuador (nominate race), and birds in breeding condition in Jan–Jun and juveniles observed in Aug in Perijá Mts (*nigrifrons*). Following details from SE Ecuador. One nest an untidy open cup of dead and dry leaves and leaf strips from various grasses, sedges (*Cyperus*), bromeliads and *Chusquea* bamboo, neat lining of finer pale fibres, mostly thin grass stems, external diameter 15–18 cm, height 12 cm, internal diameter 6 cm, depth 6 cm, well concealed c. 35 cm above ground among foliage of supporting sedges, horsetails (*Equisetum*) and various ferns, on which it rested (but only slightly covered from above); another nest was of very similar construction, 14 cm across and 9 cm tall, with inner cup 6 cm in diameter and 5·5 cm deep, placed 20 cm above ground and supported by numerous stems and blades of various grasses and sedges; both nests in heavily disturbed areas with much human traffic, one only 3 m from well-used trail through second growth still occasionally grazed (by horses). Clutch 2 eggs, white with red-brown and, to lesser extent, pale lavender flecks and spots, markings heaviest at larger end; at one nest, incubation apparently by one adult (presumed female), period 16 days, chicks fed by two adults, nestling period 15 days.
Movements. Resident.
Status and Conservation. Not globally threatened. Locally common. Because of its large global range, moderate to high level of abundance, and adaptability to disturbed habitats, this species is considered not to be at any immediate risk.
Bibliography. Chapman (1927a), Donegan (2007), Donegan & Huertas (2006), García-Moreno & Fjeldså (1999), Greeney (2009), Hilty (2003), Hilty & Brown (1986), Phelps & Gilliard (1940), Restall *et al.* (2006), Schulenberg *et al.* (2007).

PLATE 53 ➤


PLATE 53
inches
3
cm
8
141
142
143
144
ssp *dresseri*
variants
ssp *leucopterus*
145
146
ssp *castaneifrons*
ssp *paynteri*
ssp *schistaceus*
149
ssp *simonsi*
147
148
ssp *seebohmi*
ssp *brunneiceps*
150
151
152
155
ssp *nationi*
ssp *rufinucha*
153
154
156
ssp *carrikeri*

141. Antioquia Brush-finch

Atlapetes blancae

French: Tohi de Blanca **German**: Antioquiabuschammer **Spanish**: Atlapetes Antioqueño

Taxonomy. *Atlapetes blancae* Donegan, 2007, San Pedro de los Milagros, Antioquia, Colombia. Monotypic.
Distribution. San Pedro de los Milagros (in C Andes of Antioquia), in Colombia.



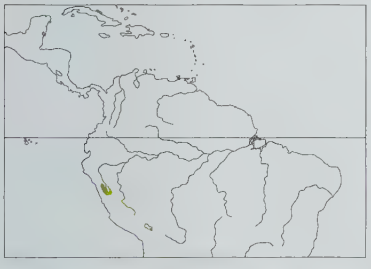
Descriptive notes. 17 cm. A largely pale greyish brush-finch, known only from museum specimens. Forehead to nape is rufous, with contrasting dark greyish face, blackish on lores and eyeline, very small pale grey supraloral spot; upperparts mid-grey, slightly darker wing and tail, very small white patch at base of primaries P4–P7; throat whitish-grey, narrow and short darker malar stripe; otherwise, pale greyish-white below, slightly darker on flanks; iris colour not known; bill and legs blackish. Sexes presumably similar. One of the specimens is a little browner and with smaller white primary patch, suggesting that it is younger in age. Voice. Unknown.
Habitat. No certain information; probably forest edge, 2400–2800 m.
Food and Feeding. No information.
Breeding. No information.
Movements. No information.
Status and Conservation. CRITICALLY ENDANGERED. Recently described on basis of museum specimens. Last record in 1971; currently known only from museum specimens. Possibly Extinct. Three specimens exist, all from type locality (San Pedro de los Milagros, in C Andes of Antioquia), two undated and the third dated 1971. Expeditions to type locality in 2007 and 2008 failed to find the species. All specimens were collected on a small plateau known as Llano de Ovejas, at 2400–2800 m. Likely that the species lived in forest, most of which in this region has been destroyed for cattle-ranching and commercial flower-growing. Further investigation of this species' potential distribution is required, followed by intensive targeted searches.
Bibliography. Anon. (2010c), Donegan (2007), Donegan *et al.* (2009).

142. Rufous-eared Brush-finch

Atlapetes rufigenis

French: Tohi rougeaud **German**: Rotohr-Buschammer **Spanish**: Atlapetes Orejirrufo

Taxonomy. *Buarremon rufigenis* Salvin, 1895, Huamachuca, 10,400 feet [c. 3170 m], La Libertad, and Cajabamba, 11,000 feet [c. 3350 m], Cajamarca, Peru.
Until recently usually treated as conspecific with *A. forbesi*. Monotypic.
Distribution. Upper Marañón Valley from Cajamarca S to Ancash and Huánuco, in Andes of W Peru.



Descriptive notes. 17·5–19 cm. A relatively large brush-finch with large-headed look and long, wide tail. Head is almost entirely rufous, including side of neck and nape, darker greyish immediately in front and below eye, white supraloral area invading lores, long white submoustachial area, narrower dusky grey malar stripe; upperparts grey with olive wash, upperwing and tail slightly darker; throat gleaming white, breast and flanks greyish, belly and undertail-coverts whitish; iris dark red; bill blackish; legs brownish. Sexes alike. Juvenile has grey-brown crown, and all grey areas of plumage washed brown, lores, supraloral area and throat as on adult, breast and sides dark brown, belly whitish. Voice. Song described as a variation on 4 different notes, repeated every 4–6 seconds, each phrase 1–2 seconds long, "chit let teeuit, chit teeuit, chi tui, chi tui teeuit..."; chatter-duet a pleasant set of liquid sounding trills, the whole lasting 3–5 seconds. Call "tzi".
Habitat. Dense undergrowth and shrubbery in patches of woodland, including *Polylepis* forest; also dense shrubby dry slopes, and undergrowth in both dry and humid *Podocarpus* or alder (*Alnus*) woodlands, as well as dense *Polylepis–Gynoxys* woodland, and tree-line shrubbery. At 2750–4100 m.
Food and Feeding. No information on diet. Tends to forage 0·5–1·5 m up, rarely to 5 m above ground; usually in undergrowth. Also forages while on thick, moss-covered branches in humid forest.
Breeding. Juveniles in Jun in La Libertad and in Feb–Mar in Ancash. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Peruvian high Andes EBA. Uncommon to locally fairly common. Has a relatively small, fragmented range, and is probably declining following habitat loss through deforestation. Main threats are reduction of mixed *Polylepis* woodland caused by cutting for firewood, and ensuing lack of regeneration because of burning and intensive grazing; also, changes in farming (from camelid stock to sheep and cattle), soil erosion and degradation caused by agricultural intensification, road-building, and inadequate planning of afforestation projects, especially the planting of eucalypts (*Eucalyptus*) and other exotic species. Occurs in Huascarán National Park (Ancash), where until recently habitat degradation was continuing, although a conservation scheme for *Polylepis* is now in place.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

143. Apurimac Brush-finch

Atlapetes forbesi

French: Tohi de Forbes **German**: Forbesbuschammer **Spanish**: Atlapetes de Apurímac
Other common names: Black-spectacled Brush-finch(!)

Taxonomy. *Atlapetes forbesi* Morrison, 1947, Pomayaco, 9100 feet [c. 2775 m], Pampas River valley, 80 miles [c. 130 km] south-east of Ayacucho, Apurímac, Peru.
Until recently usually treated as conspecific with *A. rufigenis*. Monotypic.
Distribution. Andes of S Peru (E Apurímac and adjacent Cuzco).



Descriptive notes. 18 cm. A dark-backed whitish bellied brush-finch with long bill only moderately deep at base. Has mostly rufous head, including nape and side of neck, but with black forehead, whitish supraloral area contrasting with black area on lores and around eye, long white submoustachial area, blackish malar stripe; upperparts grey, upperwing and tail slightly more blackish; white edge at bend of folded wing (created by protruding wing-lining); throat white, largely grey below, with whitish down central area of abdomen; iris brown; bill blackish; legs dark greyish. Sexes alike. Juvenile is brownish above, including crown and face, eye surrounded by black, throat whitish, breast and flanks brown and mottled in appearance, belly white; immature has underparts like adult, but acquires tawny-rufous on head slowly, first on nape and hindcrown. Voice. Song "tchip tséév! Tchi pi-pi", or sometimes only the "tchip tséév!" given and then a pause before this repeated; chatter-duet a series of nasal thin whistles and slow trills. Call a high "pi".
Habitat. Montane scrub and *Polylepis* forest, at 2700–4600 m.
Food and Feeding. Little known. Forages on or close to ground.
Breeding. Birds in breeding condition in Mar and fledglings seen in May in Apurímac. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Locally common. Despite its small global range, this species is thought not to be under any immediate pressure, and there are no problems evident concerning its habitat.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

144. Black-spectacled Brush-finch

Atlapetes melanopsis

French: Tohi à face noire **German**: Schwarzbrillen-Buschammer **Spanish**: Atlapetes de Anteojos

Taxonomy. *Atlapetes melanopsis* Valqui and Fjeldså, 2002, 4 km south-east of Huachocollpa, Tayacaja Province, Huancavelica, Peru.
Originally described under name *A. melanops*, but this name is preoccupied. Monotypic.
Distribution. S Junín and N Huancavelica (just N & S of R Mantaro), in SC Peru.



Descriptive notes. 19 cm. A dark-backed brush-finch with long bill only moderately deep at base. Has largely rufous head, including nape and side of neck, with lower forehead black, supraloral area whitish, contrasting with large black area around eye, long white submoustachial area bordered by narrow blackish malar stripe; upperparts grey, rump washed olive, upperwing and tail slightly more blackish; white edge at bend of folded wing (created by protruding wing-lining); throat white, largely grey below, with paler area on central flanks, and whitish down central part of abdomen; iris brownish-red; bill blackish; legs dark greyish. Sexes alike. Juvenile apparently undescribed. Voice. Song begins with accented pair of introductory notes and then chipping notes, these running together into a trill, "Tweew-sweet! chew-chew-twip-twip-twippipipipi"; chatter-duet similar, but longer and more complex, involving many more trills, chatters and nasal notes. Calls include liquid "twiit", repeated when bird agitated.
Habitat. Montane scrub and forest edge in seasonally humid regions (absent from humid E-slope areas); found in dry bushy areas (in a zone with fairly high seasonal rainfall) and adjacent ecotones between these and humid slopes. At 2500–3600 m.
Food and Feeding. Appears to feed on seeds and insects. Forages from ground level to 3 m above ground. Searches while moving along branches; sometimes hangs from an inflorescence, perhaps to eat seeds. Singly and in groups of up to three individuals.
Breeding. No information.
Movements. No information.
Status and Conservation. ENDANGERED. Locally uncommon. Total range, as currently known, is very small, and threat to its remaining habitat suggests a continuing reduction in range and numbers. Estimated total population in range 2500–9999 mature individuals. Since its initial discovery, in 1996, recorded at only few sites. Main threat is the burning of early regenerating natural vegetation in order to maintain and increase available pasture, a practice that is widespread (except in steep, rocky areas and ravines) in this species' range.
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), García-Moreno & Fjeldså (1999), Schulenberg *et al.* (2007), Stattersfield & Capper (2000), Valqui & Fjeldså (1999, 2002).

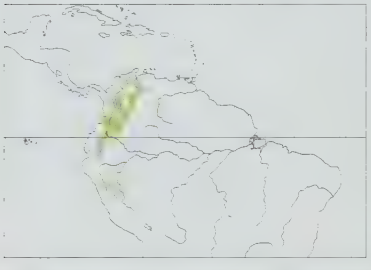
On following pages: 145. Slaty Brush-finch (*Atlapetes schistaceus*); 146. White-winged Brush-finch (*Atlapetes leucopterus*); 147. White-headed Brush-finch (*Atlapetes albiceps*); 148. Pale-headed Brush-finch (*Atlapetes pallidiceps*); 149. Bay-crowned Brush-finch (*Atlapetes seebohmi*); 150. Rusty-bellied Brush-finch (*Atlapetes nationi*); 151. Cuzco Brush-finch (*Atlapetes canigenis*); 152. Vilcabamba Brush-finch (*Atlapetes terborghi*); 153. Black-faced Brush-finch (*Atlapetes melanolaemus*); 154. Bolivian Brush-finch (*Atlapetes rufinucha*); 155. Fulvous-headed Brush-finch (*Atlapetes fulviceps*); 156. Yellow-striped Brush-finch (*Atlapetes citrinellus*).

145. Slaty Brush-finch

Atlapetes schistaceus

French: Tohi ardoisé **German**: Graubrust-Buschammer **Spanish**: Atlapetes Pizarroso
Other common names: Taczanowski's Brush-finch (*taczanowskii*)

Taxonomy. *Tanagra* (*Arremon*) *schistaceus* Boissonneau, 1840, Santa Fe de Bogotá, Colombia.
Until recently, generally treated as conspecific with *A. canigenis*. Sometimes thought to form a superspecies with *A. seebohmi* and *A. nationi*, and often considered conspecific with former. Has been suggested that this species and *A. terborghi*, *A. melanolaemus* and *A. rufinucha* are related in a complex manner, with yellow coloration lost or gained in a leap-frog pattern, such that taxa which do not look alike may in fact be closely related to each other. Race *taczanowskii* possibly represents a separate species; further study needed. Five subspecies recognized.
Subspecies and Distribution.
A. s. fumidus Wetmore & Phelps, Jr, 1953 – Sierra de Perijá, on N Colombia–W Venezuela border.
A. s. castaneifrons (P. L. Sclater & Salvin, 1875) – Andes of Venezuela (Trujillo, Mérida and C & E Táchira).
A. s. tamae Cory, 1913 – W Venezuela (SW Táchira) and adjacent Colombia (Norte de Santander).
A. s. schistaceus (Boissonneau, 1840) – W & C Colombian Andes (S from Antioquia and Norte de Santander) and N & C Ecuador.
A. s. taczanowskii (P. L. Sclater & Salvin, 1875) – Andes of C Peru (Huánuco S to Junin).



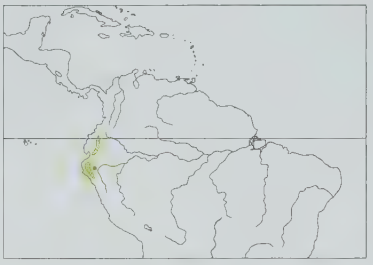
Descriptive notes. 18 cm; 22·6–43·9 g. A largely greyish brush-finch. Nominate race has crown to nape rusty, face down to lower edge of ear-coverts and back to side of neck black, usually a small whitish spot on lores, long white moustachial stripe bordered by narrow black malar stripe; upperparts dark grey, contrasting with blackish upperwing and tail, primaries with white bases (forming a noticeable white patch on folded wing), white edge at bend of folded wing (created by white marginal coverts); throat whitish with small dark spots, breast, flanks and undertail-coverts mid-grey, central belly whitish; iris dark reddish-brown; bill blackish; legs brown-grey. Sexes alike. Juvenile similar to adult, but rusty crown veiled with black, breast and flanks streaked blackish and white wing patch smaller. Race *taczanowskii* is similar to nominate, but top of head much paler, looking russet or pale orange, darker on crown, and paler on nape, lacks white primary patch, juvenile olive above and pale greyish below, with olive flanks and breast and noticeably streaked; *castaneifrons* is similar to nominate, but top of head paler (though not so pale as previous), upperparts darker, nearly blackish, and contrasting little, if at all, with blackish face and nape, lacks white primary patch, juvenile like adult but streaked on breast; *fumidus* is like last, but paler above and darker below, central belly only slightly paler than rest of underparts; *tamae* is dark, like *castaneifrons*, and with similarly coloured crown patch, but larger and with darker underparts, belly only slightly paler grey than breast, also lacks white primary patch. Voice. Song an energetic series of high-pitched trills and squeaks, ending in distinctive repeated "chewy-chewy-chewy" or "t'chew t'chew t'chew"; song of race *taczanowskii* variable, a pleasant series of rich introductory notes and then a trill or series of notes, "chew-chew-chew zéééééé"; chatter-duet includes mellow "du-du-dew-dew" mixed with trills and chatters. Contact call a fine "tzit-tzit-tzit".
Habitat. Shrubby forest borders and undergrowth of humid woodland, reaching to tree-line. Found in cloudforest, moist montane second-growth woodlands, *páramo* with frailejón (*Espeletia*), elfin forest, and in Venezuela also humid *Polylepis* forest; avoids continuous forest. At 2500–3800 m, sometimes down to 1800 m.
Food and Feeding. Diet includes insects and fruit. More arboreal, less terrestrial, than other brush-finches. Tends to forage from ground level to 5 m up; usually in undergrowth. Can be restless when foraging, and often climbs vines in search of food. Usually alone or in pairs; commonly joins mixed-species foraging flocks, often with various other species of brush-finch.
Breeding. In Colombia, fledglings observed in Apr–Aug in Cauca and Apr in Cundinamarca and birds in breeding condition in Apr–Sept in N and in Nov in Cundinamarca; in Venezuela, fledglings observed in Aug and birds in breeding condition in Nov. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Common in Venezuela and Colombia; uncommon in Ecuador; fairly common in Peru. No known threats. Because of its large range, generally good levels of abundance and lack of any clear and significant population declines, this species is considered not to be at any immediate risk.
Bibliography. Armani (1985), Donegan (2007), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Hilty (2003), Hilty & Brown (1986), Paynter (1972), Remsen & Graves (1995a), Restall *et al.* (2006), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stiles *et al.* (2000).

146. White-winged Brush-finch

Atlapetes leucopterus

French: Tohi leucoptère **German**: Spiegelbuschammer **Spanish**: Atlapetes Aliblanco
Other common names: White-cheeked Brush-finch (*dresseri*); Paynter's Brush-finch (*paynteri*)

Taxonomy. *Arremon leucopterus* Jardine, 1856, eastern cordillera of Ecuador ["eastern" probably a *lapsus* for "western", although the species may occasionally occur on E slope].
Has been suggested that race *paynteri* be elevated to species rank; further study needed. Three subspecies recognized.
Subspecies and Distribution.
A. l. leucopterus (Jardine, 1856) – W slope in Ecuador (S to Chumbo Valley).
A. l. dresseri (Taczanowski, 1883) – SW Ecuador (El Oro and Loja) and NW Peru (Tumbes S to Cajamarca).
A. l. paynteri Fitzpatrick, 1980 – extreme NE Piura and N Cajamarca (Cordillera del Condor), in NW Peru.
Descriptive notes. 15·5–16·5 cm; 19–26·5 g. The smallest brush-finch, dark-backed, whitish-bellied, with large white patch at base of primaries, long bill only moderately deep at base. Nominate race has top of head russet, darker on forecrown than on hindcrown and nape, blackish superciliary area and face extending to side of neck, contrasting whitish-buff supraloral area; upperparts dark grey, upperwing and tail similarly dark, white bases of primaries (creating large white primary patch), white edge at bend of folded wing (created by white marginal coverts); largely whitish below, some blackish speckling at edge of throat, buffy and greyish wash on sides and flanks; iris dark brownish-red; bill blackish; legs blackish-brown. Sexes alike. Juvenile has buffy crownstripe, upperparts olive, breast and flanks streaked. Race *dresseri* is smaller-billed than nominate, plumage variable, has black forehead of variable extent, and (except in N of range) some white on head varying from an area around eye to a large part of head; *paynteri* has white hindcrown and nape, but side of head black, is also more greyish on body, lacking slight olive wash of previous. Voice. Race *dresseri* song a two-part series of high-pitched thin notes, lacking many warbled phrases; call a high descending "tseeu". Song of *paynteri* a musical and pleasant "chew-chew tee-tee" or "chee-chee tewr tewr", call a high "ti".



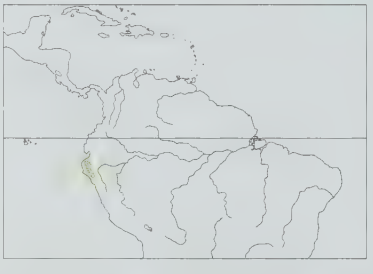
Habitat. Dry to fairly humid brushy areas and low woodlands. May occupy very dry shrubby hillsides with scattered *Bombax* trees in NW Ecuador; also gardens, villages, and shrubbery at edge of humid forest and even edge of cloudforest. Race *paynteri* prefers more humid forest undergrowth than other races. At 600–2900 m.
Food and Feeding. One stomach contained mostly ants (Formicidae), as well as grit. Forages on and near ground. Typically, observed to scratch in leaf litter on ground. In pairs and in small groups, possibly family parties; sometimes in flocks of as many as 20 or 30 individuals, which may associate with other brush-finches.
Breeding. Juveniles in Jun in S Ecuador (Loja). No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to common in Ecuador; fairly common in Peru, where race *paynteri* rare to locally fairly common. This species is reasonably widespread and relatively common, with no signs of any substantial population declines. If *paynteri* is accorded full species rank, it may require a full assessment of its status, as it has a very small range.
Bibliography. Armani (1985), Donegan (2007), Fitzpatrick (1980), Fjeldså & Krabbe (1990), McCarthy (2006), Paynter (1972), Restall *et al.* (2006), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

147. White-headed Brush-finch

Atlapetes albiceps

French: Tohi à tête blanche **German**: Weißkopf-Buschammer **Spanish**: Atlapetes Cabeciblanco

Taxonomy. *Buarremon albiceps* Taczanowski, 1884, Paucal, Cajamarca, Peru.
Monotypic.
Distribution. W slope of Andes in extreme S Ecuador (S Loja) and adjacent NW Peru (S to Lambeyeque).



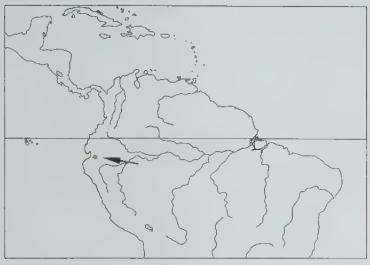
Descriptive notes. 16 cm. A typically shaped brush-finch with moderately sized bill showing relatively straight culmen. Has most of head white, with strongly contrasting blackish cap and nape, and sometimes some dark speckling on lores; dark orbital skin gives impression of large, dark eye; upperparts slate-grey, slightly more blackish on wing and tail, white bases of primaries (creating noticeable large white wing patch); very narrow blackish malar stripe, throat white, becoming greyish on breast and flanks, but with whitish belly and vent (rear underparts sometimes washed buffy); iris dark; bill black; legs greyish. Sexes alike. Juvenile undescribed. Voice. Song a series of squeaky whistled notes, "Pee-ti-ti séw-tew'tew'tew' see-see"; chatter-duet a liquid and descending chatter, with interspersed high-pitched twitters and screeches. Calls include high "ti" and "tseeip", as well as high-pitched rising and falling "tseeéée".
Habitat. Found in undergrowth of low dry scrubby woodland, particularly along streams in dry montane regions; 400–1400 m.
Food and Feeding. Stomach contents included small seeds, larger seeds (crushed), and insects. Forages on ground, as well as in low shrubbery. Sometimes forms relatively large flocks, and mixes with other brush-finches, such as *A. leucopterus*.
Breeding. Specimen from S Ecuador in breeding condition (and plumage quite worn) in late May; season estimated as Jan–Feb. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian region EBA. Locally common or fairly common. No evidence of any population declines, and considered not to be at any immediate risk.
Bibliography. Paynter (1972), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

148. Pale-headed Brush-finch

Atlapetes pallidiceps

French: Tohi grisonnant **German**: Blasskopf-Buschammer **Spanish**: Atlapetes Cabecipálido

Taxonomy. *Buarremon pallidiceps* Sharpe, 1900, Guishapa, Oña, Azuay, Ecuador.
Monotypic.
Distribution. S Azuay (upper Jubones Valley), in SW Ecuador.
Descriptive notes. 16 cm. A largely whitish brush-finch with darker back, dark wings and tail, and long, relatively pointed bill. Head is mostly whitish, with brownish forehead, lores and area around eye (variable whitish eyering), and grey-brown postocular stripe which becomes wider on back of head and bands sharply downwards to wrap around rear of ear-coverts; narrow ill-defined brownish malar stripe; nape to lower back greyish-brown, rump whitish; tail blackish-brown; upperwing blackish, white at base of primaries (noticeable white patch on folded wing); white below, washed pale brownish on side of breast, flanks and vent; iris dark brown; bill black; legs grey to blackish.



Sexes alike. Juvenile has brown crown, pale supraloral spot, slate-grey ear-coverts and blackish malar stripe, slaty colour of head continuing to chin, below which a buffy collar, and rest of underparts buffy grey, darker on breast and flanks, bill yellowish-horn with blackish culmen; immature darker brown ear-coverts and darker brownish wash on underparts. VOICE. Song a deshtcending short trilling chatter, "ch-chwewewewe". Call a high-pitched "teep"; sometimes partners give rapid series of calls in a flurry when in direct view of each other.

Habitat. Low arid scrubby woodland of composite and verbenaceous species on dry slopes, with acacias (*Acacia*) and lauraceous trees in damper parts, interspersed with old or newer grassland; retreats into shady thickets in ravines during heat of day. At 1650–2100 m.

Food and Feeding. Insects, also fruits and berries (*Rubus*, *Solanum*, *Morus*), as well as seeds such as those of *Polygonum*. Stomach contents have included small seeds, large seeds and insect material. Relatively arboreal for a brush-finch; forages both on the ground and within 4 m of ground. Furtive. Will sally for insects. Sometimes join mixed-species foraging flocks, and is attracted to army-ant (Formicidae) swarms.

Breeding. Breeds in Feb–Jun, in rainy season; some make up to two renesting attempts after failures early in season. Nest built by female, a bulky cup made from dry grass, twigs, stems and bamboo stems, a small amount of moss and lichen also present, lining of fine grass, bamboo leaves and leaf fibres, placed 0·84–3·02 m (average 1·84 m) above ground and often attached to thin twigs of shrub or vines, or placed in fork of branch or along main stem of upright bush. Clutch 2–3 eggs, buffy white, pale bluish or pale pinkish with small or large brownish or purplish spots and blotches throughout; incubation by female; no information on duration of incubation and nestling periods. Nests commonly parasitized by Shiny Cowbird (*Molothrus bonariensis*). In 2002, reproductive output only 0·74 young per breeding pair; at two sites, rates of brood parasitism were 15% and 61%, and predation rates also high (only slightly lower than parasitism rates).

Movements. Sedentary.

Status and Conservation. ENDANGERED. Restricted-range species: present in Tumbesian Region EBA. Rare. Formerly listed as Critically Endangered, but, in view of its increasing numbers, this species has recently been reassessed. Known only from one small area in Ecuador, in upper R Jubones Valley (S Azuay), particularly in vicinity of Girón and Oña. Global population, based on 2009 census data, thought to be c. 220 adults. Within its range, its habitat has historically been decreasing, although concerted conservation action in recent past has allowed its population to increase. Yunguilla Reserve was purchased especially for protection of this species. Particular problems are the grazing activity of goats and cattle, which seems to decrease quality of habitat for this brush-finch, fire, and also, especially, Shiny Cowbird parasitism (in 2002, 61% of pairs in Yunguilla Reserve were parasitized). Seven years after initiation of a programme of trapping and removal of cowbirds, the numbers of present species had increased markedly, from fewer than 40 pairs to more than 100 pairs, this small recovery aided also by habitat restoration. Yunguilla Reserve covers 150–200 ha and holds 98% of known brush-finch territories. Plans for further land purchases, mainly immediately N of the reserve, should, if they succeed, enable a second reserve to be set up; this would allow for translocation of a suitable number of birds once present population has reached 200 pairs.

Bibliography. Agreda *et al.* (1999), Anon. (2010c), Butchart & Stattersfield (2004), Hirschfeld (2007), Krabbe (2004), Krabbe *et al.* (2011), Oppel, Schaefer & Schmidt (2003), Oppel, Schaefer, Schmidt & Schroeder (2004a, 2004b, 2004c), Paynter (1972), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

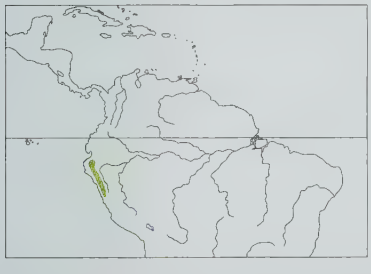
149. Bay-crowned Brush-finch

Atlapetes seebohmi

French: Tohi de Seebohm **German**: Rotscheitel-Buschammer **Spanish**: Atlapetes de Seebohm
Other common names: Celica Brush-finch (*celicae*); Simons's Brush-finch (*simonsi*)

Taxonomy. *Carenochrous seebohmi* Taczanowski, 1883, Cajacay, Cajatambo, Ancash, Peru.
Sometimes thought to form a superspecies with *A. schistaceus* and *A. nationi*, and often considered conspecific with one or the other. Race *celicae*, known from a single specimen, may be an aberrant individual of *simonsi*. Three subspecies recognized.

Subspecies and Distribution.
A. s. celicae Chapman, 1925 – W Loja (region of Celica), in SW Ecuador.
A. s. simonsi (Sharpe, 1900) – C & E Loja, in S Ecuador.
A. s. seebohmi (Taczanowski, 1883) – Pacific slope of Andes in NW Peru (S to Ancash).



Descriptive notes. 16–17 cm. A large-bodied brush-finch with deep-based, long and strong-looking bill. Nominate race has deep rufous crown to nape, contrasting with a entirely black face (extending to forehead); throat and moustachial region white, chin black and continuing as short black malar stripe (this stripe ends half-way down side of throat); upperparts olive-grey, upperwing and tail slightly darker, white edge at bend of folded wing (marginal coverts); light grey breastband, palest at centre, the grey extending down flanks and becoming olive-grey on rear flanks; lower breast and belly whitish, becoming buffy on crissum; iris dark red-brown; bill black; legs greyish. Sexes alike. Juvenile is browner above than adult, throat and belly buffy, breast and flanks indistinctly streaked. Race *simonsi* has rufous forehead, is darker grey than nominate, and has small whitish supraloral spot; *celicae* is like previous, but smaller, with small amount of black on forehead, throat washed buffy. VOICE. Song a quickly delivered "chew-chew wit-chew" or shorter "chew-chew'trrrrr". Call a high-pitched "tsiip"; also a sharp "piit" or "put", repeated quickly when alarmed.

Habitat. Undergrowth in low scrubby montane woodland, also shrubby hillsides with low vegetation (reaching only to chest height), in rather dry regions; 1150–2800 m.

Food and Feeding. Stomach contents have included large insects, as well as seeds and fruit. Forages close to ground; also drops to ground and scratches in leaf litter. Generally in pairs or small groups.

Breeding. Known to breed during rainy season, approximately Mar–May. No further information available.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Uncommon to locally fairly common. Because of its relatively extensive range, local abundance and lack of any specific threats to populations, this species is considered not to be at any immediate risk.

Bibliography. Armani (1985), Bond (1951a), Paynter (1972), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

150. Rusty-bellied Brush-finch

Atlapetes nationi

French: Tohi à ventre roux **German**: Rostbauch-Buschammer **Spanish**: Atlapetes Ventrirrufo

Taxonomy. *Buarremon nationi* P. L. Sclater, 1881, western Andes above Lima, 10,000–14,000 feet [c. 3050–4270 m], Peru.
Sometimes thought to form a superspecies with *A. schistaceus* and *A. seebohmi*, and often considered conspecific with one or the other. Two subspecies recognized.

Subspecies and Distribution.
A. n. nationi (P. L. Sclater, 1881) – Andes of W Peru (Lima).
A. n. brunneiceps (Berlepsch & Stolzmann, 1906) – Andes of SW Peru (Ica and Ayacucho S to Arequipa).



Descriptive notes. 17 cm; 40·5–43·4 g. A large-bodied brush-finch with deep-based, long and strong-looking bill. Nominate race has forehead and face entirely black, with dark olive-brown crown (in most field conditions looks blackish-capped), some individuals having a few random white feathers on crown; throat and moustachial region white, chin black and continuing as short black malar stripe (this stripe ends half-way down throat side); upperparts lead-grey, upperwing and tail slightly darker, white edge at bend of folded wing (marginal coverts); throat and foreneck white, broad grey breastband extending broadly down flanks, isolating cinnamon-buff belly to crissum; iris dark red-brown; bill blackish; legs grey to dusky brown. Sexes alike. Juvenile is similar to adult, but brown-washed above, throat to central belly buff, and brownish breast and flanks streaked with buff. Race *brunneiceps* is paler than nominate, paler greyish with slight olive tone above, white speckling on supercilium, side of face and sometimes crown, much paler below, breastband very pale and indistinct, also cinnamon of lower underparts paler, more tawny or dark buff, and extending higher up towards breastband, over much of flanks and even as a wash on throat (making throat look buffy). VOICE. Song apparently unrecorded. Calls include rich, hard "tchip", also high-pitched "ti"; another call, perhaps a begging call, is a repeated nasal "zzppp".

Habitat. Patches of woodland and shrubby Andean slopes, in relatively dry environments; 2000–4000 m.

Food and Feeding. Forages in pairs and in small groups, at or near ground. No other information available.

Breeding. Juveniles in Lima in Jun. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Restricted-range species: present in Peruvian High Andes EBA. Uncommon to fairly common; very local. Has a sufficiently broad range, and no evidence of any marked decline in its numbers or threats to the population.

Bibliography. Armani (1985), Bond (1951a), Fjeldså & Krabbe (1990), McCarthy (2006), Paynter (1972), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

151. Cuzco Brush-finch

Atlapetes canigenis

French: Tohi à joues grises **German**: Schieferbuschammer **Spanish**: Atlapetes de Cuzco
Other common names: Grey/Sooty Brush-finch

Taxonomy. *Atlapetes canigenis* Chapman, 1919, Torontoy, 9500 feet [c. 2900 m], Urubamba Canyon, Cuzco, Peru.
Until recently, generally treated as conspecific with *A. schistaceus*. Monotypic.

Distribution. Andes of Cuzco, in S Peru.



Descriptive notes. 18 cm. A dark brush-finch with little contrast in plumage. Has forehead to crown and entire nape tawny-orange, ear-coverts grey in centre, otherwise side of head and side of neck blackish; upperparts grey, rump and uppertail-coverts sometimes with slightly paler or warmer tone; upperwing and tail darker, slate-grey; below, medium-grey, throat and belly slightly paler grey, weakly defined and narrow blackish moustachial stripe and malar stripe; iris dark brown; bill and legs blackish. Sexes alike. Juvenile undescribed. VOICE. Chatter-duet includes cascading trill that descends in frequency, as well as nasal notes and buzzy sounds. Call a high "tip".

Habitat. Humid montane forest edge and scrub; 2500–3500 m.

Food and Feeding. Forages on or near ground. No other information.

Breeding. No information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common. Although restricted in range, this species is common where it lives, and there is no imminent threat to its habitat; considered currently not to be at any risk.

Bibliography. García-Moreno & Fjeldså (1999), Paynter (1972), Remsen & Graves (1995a), Schulenberg *et al.* (2007).

152. Vilcabamba Brush-finch

Atlapetes terborghi

French: Tohi de Terborgh **German**: Vilcabambabuschammer **Spanish**: Atlapetes de Vilcabamba

Taxonomy. *Atlapetes terborghi* Remsen, 1993, Cordillera Vilcabamba, Cuzco, Peru.
Often considered a race of *A. latinuchus*, and both were originally considered part of a wider complex that included also *A. melanolaemus* and *A. rufinucha*, although recent studies suggest that various components of this group may not be each other's closest relatives. Present species likely most closely related to *A. melanolaemus*. Monotypic.
Distribution. Cordillera Vilcabamba (W Cuzco), in S Peru.



Descriptive notes. 17 cm. A dark brush-finch with yellow underparts. Has rufous area from cap to nape, darkest on forehead; face, including lores, superciliary area and ear-coverts, blackish; upperparts blackish, olive wash from back to uppertail-coverts, more olive in rump area; upperwing and tail blackish, tail edged olive; below, yellow from throat to undertail-coverts, breast and flanks tinged greenish; iris dark brown; bill black; legs blackish. Sexes alike. Juvenile undescribed. Voice. No information.
Habitat. Humid montane cloudforest and elfin forest; 2520–3520 m.
Food and Feeding. No information.
Breeding. All of a series of specimens were in breeding condition in Jul, the dry season in this section of Andes. No other information.
Movements. No information.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. A poorly known species; appears to be uncommon. Has very small global range. Numbers apparently stable, and currently there are no large-scale threats to this species' habitat; few, if any human habitations within its range. Although populations apparently secure at present, this brush-finch could rapidly become threatened if human pressures within its range increase.
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), García-Moreno & Fjeldså (1999), Remsen (1993), Remsen & Graves (1995a), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

153. Black-faced Brush-finch

Atlapetes melanolaemus

French: Tohi mélanien **German**: Schwarzgesicht-Buschammer **Spanish**: Atlapetes Carinegro
Other common names: Dark-faced Brush-finch

Taxonomy. *Buarremon melanolaemus* P. L. Sclater and Salvin, 1879, Cchachupata, Cuzco, Peru.
Often considered a race of *A. latinuchus*, and both were originally considered part of a wider complex that included also *A. terborghi* and *A. rufinucha*, although recent studies suggest that various components of this group may not be each other's closest relatives. Present species likely closest to *A. terborghi*. One specimen of nominate race of *A. rufinucha* from La Paz (Bolivia) exhibits dark scalloping on breast, approaching present species; unclear if this is a variation in former species or due to gene flow between the two. Monotypic.
Distribution. SE Peru (E Cuzco and adjacent Puno) and adjacent W Bolivia (extreme N La Paz).



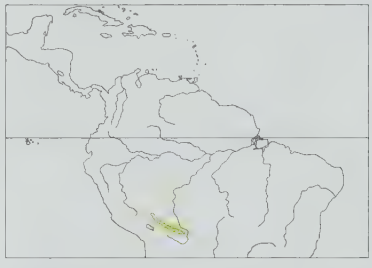
Descriptive notes. 17 cm; 27·5–30·3 g. A dark brush-finch with yellow underparts and dark scaling about breast. Has bright rufous forehead to crown and nape; face, including lores, superciliary area and ear-coverts, blackish, dusky coloration extending to malar region and throat; upperparts blackish, rump with slight olive wash; tail blackish, edged olive; upperwing wholly blackish; breast to undertail-coverts dull yellow, breast with dusky scaling and flanks washed dusky olive (underparts look very dull-coloured, not bright yellow); iris dark reddish; bill black; legs blackish. Sexes alike. Juvenile undescribed. Voice. Song short and explosive, "Cheoo Ch-Wha-Chee", as well as a pleasant "Chew-wi Tee-tee" or sometimes ending with trill, "Cheoo chup-tititititititi"; chatter-duet includes many nasal trills, stutters and chatters. Call a high-pitched "tiip".
Habitat. Humid montane forest and shrubby slopes; 1400–3200 m.
Food and Feeding. Forages on or near ground. No other information.
Breeding. Birds in breeding condition in Dec. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Locally common to fairly common. Has a small, but not tiny, global range, within which it is not uncommon. In addition, no imminent threat to stability of populations, and therefore considered not at any immediate risk.
Bibliography. Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Paynter (1978), Remsen (1993), Remsen & Graves (1995a), Schulenberg *et al.* (2007).

154. Bolivian Brush-finch

Atlapetes rufinucha

French: Tohi à nuque rousse **German**: Rotnacken-Buschammer **Spanish**: Atlapetes Nuquirrufo
Other common names: Rufous-naped Brush-finch

Taxonomy. *Embernagra rufi-nucha* d'Orbigny and Lafresnaye, 1837, Yungas, La Paz, Bolivia.
Often considered conspecific with *A. latinuchus*, and both were originally considered part of a wider complex that included also *A. terborghi* and *A. melanolaemus*, although recent studies suggest that various components of this group may not be each other's closest relatives. It has been suggested that all of these the species, and also *A. schistaceus*, are related in a complex manner, with yellow coloration lost or gained in a leap-frog pattern, such that taxa which do not look alike may in fact be closely related to each other. One specimen of present species from La Paz exhibits dark scalloping on breast, approaching *A. melanolaemus*; unclear if this is a variation in nominate race or due to gene flow between the two species. Name "*Buarremon melanops*" refers to specimens apparently assignable to nominate form of present species. Two subspecies recognized.
Subspecies and Distribution.
A. r. rufinucha (d'Orbigny & Lafresnaye, 1837) – subtropical zone of Andes of La Paz and Cochabamba, in WC Bolivia.
A. r. carrikeri J. Bond & Meyer de Schauensee, 1939 – Andes of Santa Cruz, in C Bolivia.



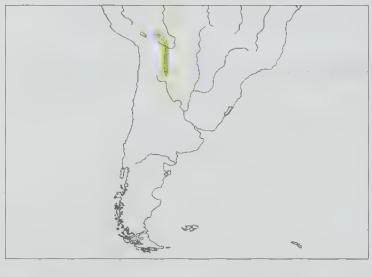
Descriptive notes. 17 cm; 20·9–22·2 g. Nominate race has blackish forehead, striking rufous crown to nape; face blackish, accented by bright yellow supraloral spot, yellow moustachial area contrasting strongly with blackish colour; upperparts blackish, rump with greenish wash; tail blackish, edged olive; upperwing blackish, flight-feathers edged olive; throat bright yellow, contrasting bold blackish malar stripe; otherwise yellow below, with side of breast and flanks washed greenish; iris dark reddish; bill black; legs blackish-grey. Sexes alike. Juvenile is browner above than adult, washed brown on breast and flanks, and obscurely streaked below. Race *carrikeri* is smaller than nominate, more olive-greenish above, and lacks yellow supraloral. Voice. Song relatively simple, loud and often includes inflected or modulated notes at end, each song c. 1 second in duration, songs separated by 4–7 seconds, "Tweew Chéééw!" or "cheuu tch-weéé". Calls include high "zziiip".
Habitat. Edge of montane forest, and in moist highland thickets, overgrown pastures and second growth, and edges of Yungas forest; at 1200–3600 m.
Food and Feeding. Insufficient information on diet. Forages on and near ground. Usually found in pairs or family groups.
Breeding. Birds in breeding condition in Dec–Feb. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Fairly common to common. Given its abundance, and adequately large range, this species is considered not to be at any immediate risk. As it prefers edge habitats, it may benefit from disturbance of montane forests.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), García-Moreno & Fjeldså (1999), Hennessey *et al.* (2003), Paynter (1978), Remsen (1993), Remsen & Graves (1995a).

155. Fulvous-headed Brush-finch

Atlapetes fulviceps

French: Tohi à tête rousse **German**: Braunbart-Buschammer **Spanish**: Atlapetes Cabecirrufo

Taxonomy. *Emberiza fulviceps* d'Orbigny and Lafresnaye, 1837, Tacora [= Totora], Cochabamba, Bolivia. Sometimes considered to form a superspecies with *A. semirufus* and *A. personatus*; while last two may be closely related, present species believed not close to them but, rather, merely visually similar. Monotypic.
Distribution. Andes of Bolivia (from La Paz S to Tarija) and adjacent NW Argentina (S to Jujuy and Salta).



Descriptive notes. 17 cm; one bird 28·2 g. Head down to cheek, ear-coverts, side of neck and nape cinnamon, contrasting yellow patch on lores and yellow submoustachial area, latter bordered below by cinnamon malar stripe (entirely isolating yellow submoustachial area); upperparts green, upperwing and tail slate-grey with green fringes, upperwing-coverts greenish; yellow chin and throat, contrasting with cinnamon malar; underparts with olive breastband, flanks and crissum, yellow belly, on some breastband somewhat broken (giving more yellowish appearance in centre of breast); iris medium-brown; bill black; legs brownish. Sexes alike. Juvenile undescribed. Voice. Song, from low vegetation, tends to be relatively uniform, is short and explosive, with introductory note and then a note repeated 3–5 times, e.g. "tii'Chew-Chew-Chew!" or faster "twi-tew'tew'tew", sometimes lengthened to "pit-twee pit' Chew-Chew-Chew". Call a thin "zit"; alarm "pi ziue".
Habitat. Edge of semi-humid Yungas forest, undergrowth in moist open woodland, especially where alders (*Alnus*) present, also wooded ravines and older second growth; often associated with streams. Can be found at edge of *Polylepis* forests. Generally at 1500–3600 m; in winter apparently sometimes lower, possibly down to 400 m.
Food and Feeding. Insects and seeds recorded as eaten. Forages from just above ground to 3 m up in shrubbery. Also searches along thick moss-laden branches. Occasionally sallies out to catch insects. Forages singly and in pairs.
Breeding. Eggs in Jan in N Argentina (Jujuy). No other information.
Movements. Resident; some evidence that some move downslope, to as low as 400 m in elevation, in winter.
Status and Conservation. Not globally threatened. Locally fairly common. Has reasonably extensive range and is reasonably abundant within it, and there is no evidence for any declines in its numbers; this species is therefore considered not to be at any immediate risk.
Bibliography. Armani (1985), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Remsen *et al.* (1988), Ridgely & Tudor (1989).

156. Yellow-striped Brush-finch

Atlapetes citrinellus

French: Tohi citrin **German**: Schwarzbart-Buschammer **Spanish**: Atlapetes Amarillo

Taxonomy. *Buarremon* (*Atlapetes*) *citrinellus* Cabanis, 1883, near Chaquevil and San Xavier, Tucumán, Argentina. Monotypic.
Distribution. NW Argentina from Jujuy and Salta S through Tucumán to Catamarca.



Descriptive notes. 17 cm; one male 28 g. Distinctive brush-finch, often appearing somewhat small-billed and with complex head pattern. Has blackish forehead, becoming dark brownish-olive on crown and nape, contrasting bold yellow supercilium, whitish lower half of eyering contrasting with blackish lores to anterior ear-coverts, grizzled yellow on lower ear-coverts, contrasting bright yellow submoustachial region bordered below by wide blackish malar stripes which meet on chin, and yellow throat; upperparts greenish, upperwing and tail more blackish, flight-feathers and tail feathers edged greenish-yellow; entirely olive below, yellowest on central belly and undertail-coverts, washed greenish on flanks; iris dark reddish; bill black; legs greyish-black to flesh-coloured. Sexes alike. Juvenile apparently undescribed. VOICE. Song a simple and explosive "chip-pip' chew-chew-chew". Call "tsip".

Habitat. Typically encountered in alder (*Alnus*) woodland, and in undergrowth and borders of Yungas forest; found in old mature forest, as well as second growth. Recorded at elevations of 700–3100 m.

Food and Feeding. In dry and wet seasons eats mostly invertebrates, including beetles (Coleoptera), ants (Formicidae) and some other Hymenoptera, spiders (Araneae), and various unidentified invertebrates. Forages on and near ground. Generally in pairs and family groups.

Breeding. Egg dates in Nov in Tucumán; season likely extends to austral summer, thus Nov–Jan/Feb. Nest placed in small shrub; clutch 2–3 eggs, white with pinkish wash and brown spots, latter concentrated mostly around wide end. No other information.

Movements. Largely resident; moves downslope in winter in Tucumán.

Status and Conservation. Not globally threatened. Restricted-range species: present in Argentine and South Bolivian Yungas EBA. Common; most numerous in Tucumán, less common farther N. Range is reasonably large, and populations within that range also large, in addition to which there is no evidence of any real threat to its habitat; this species is therefore considered not to be at any immediate risk.

Bibliography. Armani (1985), Biancucci & Martin (2008), Blake & Rougès (2001), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Ortiz *et al.* (2011), Paynter (1978), Ridgely & Tudor (1989).


PLATE 54
inches 3
cm 8
ssp nigrescens
ssp ocai
157
ssp socorroensis ♂
ssp maculatus ♂ ♀
159
ssp macronyx ♂
158
ssp arcticus ♂
ssp oregonus ♂
ssp clementae ♀
ssp occipitalis
162
ssp erythrophthalmus ♀ ♂
ssp biarcuata
ssp leucotis
160
ssp alleni ♂
161
ssp cabanisi
163
ssp senicula
164
ssp mesoleucum
ssp crissale
166
ssp fuscum
ssp albigula
165
167

Genus *PIPILO* Vieillot, 1816

157. **Collared Towhee**

Pipilo ocai

French: Tohi à collier **German**: Halsband-Grundammer **Spanish**: Toquí Acollarado

Taxonomy. *Buarremon ocai* Lawrence, 1865, no locality = Las Vigas, west of Jalapa, Veracruz, Mexico.
Relationships of genus not clear, although generally placed close to several other, similarly proportioned tropical American genera (e.g. some *Aimophila*, *Atlapetes*, *Pyrgisoma* and *Melozone*). Commonly hybridizes with *P. maculatus* in N & E of range (mainly races *alticola* and *nigrescens*, *alticola* forming a hybrid swarm with adjacent populations of that species), but in Oaxaca *brunnescens* apparently sympatric with *P. maculatus* without interbreeding. Five subspecies recognized.
Subspecies and Distribution.
P. o. alticola (Salvin & Godman, 1889) – W Jalisco and extreme NE Colima, in W Mexico.
P. o. nigrescens (Salvin & Godman, 1889) – NC Michoacán (E to near Morelia), in C Mexico.
P. o. guerrerensis van Rossem, 1938 – Sierra Madre del Sur (in Guerrero), in SW Mexico.
P. o. ocai (Lawrence, 1865) – mountains of E Puebla and WC Veracruz, in EC Mexico.
P. o. brunnescens van Rossem, 1938 – C Oaxaca, in S Mexico.



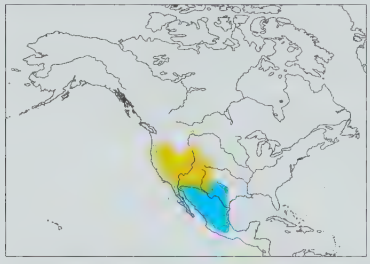
Descriptive notes. 19·5–23 cm; 54·5–68 g. Large, long-tailed sparrow, adult with unstreaked underparts. Nominate race has black forehead with narrow white median line, rufous crown, long white supercilium from bill base back to side of nape, black lores and ear-coverts; nape, side of neck and upperparts, including upperwing and tail, olive-green, bend of wing bright yellow; throat and submoustachial region white, breast grey except for black pectoral band, broadest at centre, with flanks and undertail-coverts brownish, central abdomen paler; iris reddish-brown; bill black; legs pale horn-colour to flesh-coloured. Sexes similar in coloration. Juvenile has crown to upperparts brown, streaked darker, face blackish with dull yellow supercilium, throat and underparts yellowish, necklace of dark brown streaks, indistinct dusky streaks on belly, plain dusky-cinnamon flanks and undertail-coverts, iris brown. Race *alticola* has supercilium very narrow, broader black breastband than nominate, lacks median frontal stripe; *nigrescens* lacks white supercilium and frontal line, has very black face, white areas of head much reduced, giving hooded appearance, flanks tinged rusty; *guerrerensis* has narrow black breastband, pale undertail-coverts, brownish flanks; *brunnescens* is very like last, but greyer on flanks. Voice. Song variable, "clee-o-weet-ship-trrr" or "wheer-tseet-tseet-trrr, treee-chit-chit-chit", or "chree-tsit-tsit-trrr". Call note "zhree" or "jor-ee". Vocalizations rather similar to those of *P. maculatus*.
Habitat. Dense brush, including brushy fence rows and woodland edges, at 1500–3500 m; also coniferous forests above 2400 m.
Food and Feeding. Diet little known; probably mostly plant items (seeds, fruit) and small invertebrates, e.g. insects, spiders (Araneae) and millipedes (Diplopoda). Forages principally on ground and low in vegetation. Scratches in leaf litter. Generally singly and in pairs or family parties.
Breeding. Season early Mar (Michoacán) to late Mar through Jul, and in Sept (Guerrero). Nest a cup of dry grass, pine (*Pinus*) needles and twigs, lined with finer grasses, rootlets and hair, placed near ground usually in dense shrub. Clutch often 4 eggs, pale bluish with dark markings. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. No information on any changes in status.
Bibliography. Armani (1985), Binford (1989), Dawson (1950), Howell & Webb (1995), McCarthy (2006), Miller *et al.* (1957), Murray & Hardy (1981), Oberholser (1974), Ridgway (1901), Sibley (1950, 1954), Sibley & West (1958).

158. **Green-tailed Towhee**

Pipilo chlorurus

French: Tohi à queue verte **German**: Grünschwanz-Grundammer **Spanish**: Toquí Coliverde

Taxonomy. *Fringilla chlorura* Audubon, 1839, no locality = Ross's Creek, about 20 miles [c. 32 km] south-west of Blackfoot, Bingham County, Idaho, USA.
Relationships of genus not clear, although generally placed close to several other, similarly proportioned tropical American genera (e.g. some *Aimophila*, *Atlapetes*, *Pyrgisoma* and *Melozone*). Monotypic.
Distribution. Breeds in W USA from SC & C Oregon, SE Washington, S Idaho, SC & SW Montana and Wyoming, possibly also WC South Dakota, S to SW & E California (principally E of Sierras), N & C Arizona, WC & NE New Mexico, and C Colorado, W Oklahoma and SW Texas, and in extreme NW Mexico (N Baja California); non-breeding S California E to W Texas, S in Mexico to S Baja California, Jalisco, Morelos, Hidalgo and Tamaulipas.
Descriptive notes. 15·7–18 cm; 21·5–39·4 g. Large, long-tailed sparrow, adult with unstreaked underparts. Has blackish forehead, rusty cap and white supraloral stripe, rest of head grey, contrasting white submoustachial stripe, black malar stripe, contrasting white throat; nape olive-green, upperparts, including upperwing and tail, olive-grey with some olive-green tinges, especially on fringes of wing and tail feathers, lesser upperwing-coverts more yellowish; underparts grey, becoming whitish on belly, buff wash on rear flanks and undertail-coverts; iris dark reddish-brown; bill blue-grey; legs dull brown to greyish. Sexes similar in plumage. Juvenile has crown, back, breast and flanks heavily streaked with dark brown, throat whitish, contrasting dark brown malar stripe, wings and tail with greenish cast. Voice. Song consists of lively clear, whistled notes, "wheeet clurr cheeeweee-churrr", or rapid wheezy "eet-ter-te-te-te-te-te-ti-si-si-seur". Call a sharp "keek", or a high-pitched "tseee"; also characteristic cat-like "meeoow".



Habitat. Diverse shrub communities (often following fire), including dry shrubby hillsides and second growth; dry shrubby desert locust (*Robinia neomexicana*) and small conifers, such as white fir (*Abies concolor*), Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*); at high elevations in New Mexico also Douglas-fir, locust, Gambel oak (*Quercus gambellii*), raspberry (*Rubus*), serviceberry (*Amelanchier*), aspen (*Populus*), pinyon pine (*Pinus*), juniper (*Juniperus*), and pine–oak. In shrub-steppe environments found in mixed-species shrub communities with common chokecherry (*Prunus virginiana*), big sagebrush (*Artemisia tridentata*), mountain mahogany (*Cercocarpus montanus*), juniper, snowberry (*Symphoricarpus*), manzanita (*Arctostaphylos*) and snowbush (*Ceanothus*). In non-breeding quarters found in dense mesquite (*Prosopis*) along desert washes.
Food and Feeding. Feeds primarily on insects and other small animal items, probably augmented with seeds, and some fruit when available. In winter, probably takes variety of fruits, seeds and buds, and insects; visits feeders. Forages principally on ground and low in vegetation. Especially in winter, uses double-scratch technique in which the bird remains stationary while scratching backwards with both feet simultaneously. Generally alone or in pairs; small groups outside breeding season.
Breeding. Season May to early Jul In Utah, from Apr in S of range, and sometimes not until Jun in high-elevation sites; probably double-brooded. Monogamous. Territorial. Nest built in 2–5 days, a large and deep, thickset cup made from stems, bark, twigs and grass, lined with finer materials such as rootlets and animal hair, placed on ground or up to 1 m above it in small bush or tree, most in sagebrush. Clutch 2–5 eggs, usually 3 or 4, pale blue with reddish speckling concentrated about wide end; incubation by female, period 12 days; chicks fed by both parents, nestling period 11–14 days. Nests parasitized very rarely by Brown-headed Cowbird (*Molothrus ater*).
Movements. Migratory; migrates at night. Spring migration Feb–May. Arrival in S breeding areas begins in mid-Mar, in N part of range in first half May; passage in SE Arizona heaviest during last two weeks of Apr. Strong evidence of a short post-breeding moult migration to other habitats in order to moult and gain fat; in SW parts of range moves up to mountain meadows, which are quite productive during late-summer period; such upslope movements may begin by late Jun, usually Jul and into Aug. Departure from N breeding grounds mainly in Aug and Sept, some lingering to Oct; peak S-bound movements generally from Sept to early Oct, and arrival in Mexico by early Sept, at wintering sites farther S by Oct. Casual in spring N to NW Washington, British Columbia and Saskatchewan. Vagrant E of range throughout most US states, also Canadian provinces, mainly in autumn and winter. Winter vagrant in Cuba.
Status and Conservation. Not globally threatened. Fairly common. Populations evidently stable. Adversely affected by habitat degradation, such as destruction of sagebrush and reseeding with grasses for livestock. In contrast, logging at higher elevations can create suitable habitat.
Bibliography. Armani (1985), Beadle & Rising (2002), Bent & Austin (1968), Dobbs *et al.* (1999), Jehle *et al.* (2006), LeGrand (2005), Leukering (2000), McCarthy (2006), Miller *et al.* (1957), Morton (1991), Oberholser (1974), Phillips *et al.* (1964), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Sibley (1955a), Urban (1959), Zink (1988), Zwartjes & Farley (1998).

159. **Spotted Towhee**

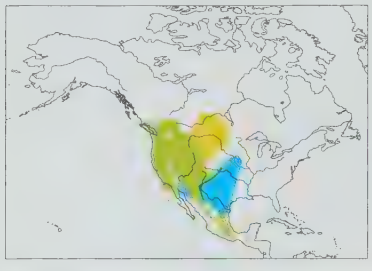
Pipilo maculatus

French: Tohi tacheté **German**: Fleckengrundammer **Spanish**: Toquí Moteado
Other common names: Rufous-sided Towhee (when treated as conspecific with *P. erythrophthalmus*); Socorro Towhee (*socorroensis*); Olive-backed Towhee ("*macronyx* group"); San Clemente Spotted Towhee (*clementae*)

Taxonomy. *Pipilo maculata* Swainson, 1827, Real del Monte, Hidalgo, Mexico.
Relationships of genus not clear, although generally placed close to several other, similarly proportioned tropical American genera (e.g. some *Aimophila*, *Atlapetes*, *Pyrgisoma* and *Melozone*). Present species sometimes considered conspecific with *P. erythrophthalmus*, with which it hybridizes in Great Plains of USA; commonly hybridizes also with *P. ocai* in Mexico. S races *macronyx*, *vulcanorum* and *oaxacae* ("*macronyx* group") sometimes treated together as a separate species, and island race *socorroensis* sometimes treated as a further full species. Race *griseipygius* intergrades with *montanus*, and *vulcanorum* intergrades with nominate. Geographical variation partially clinal, amount/extent of white dorsal spots and amount of white in tail decreasing from N to S in C Rocky Mts (also from E to W in plains of USA), and, conversely, dorsal spotting increasing from British Columbia S along Pacific coast to NW Baja California. Race *oaxacae* poorly differentiated, perhaps better merged in *chiapensis*. Twenty extant subspecies recognized.
Subspecies and Distribution.
P. m. oregonus Bell, 1849 – extreme SE Canada (SW British Columbia) S in W USA to SW Oregon; non-breeding S to S California.
P. m. falcinellus Swarth, 1913 – interior & SW Oregon S to California (W & SE slopes of Sierra Nevada).
P. m. falcifer McGregor, 1900 – coastal N California (S to Santa Cruz and San Benito Counties).
P. m. megalonyx S. F. Baird, 1858 – coastal S California from Monterey and Kern Counties S, including Santa Cruz I, to extreme NW Mexico (NW Baja California S to 32° N).
P. m. clementae Grinnell, 1897 – Santa Rosa, Santa Catalina and San Clemente Is, off SW California.
P. m. umbraticola Grinnell & Swarth, 1926 – N Baja California (32° N S to 30° N).
P. m. magnirostris Brewster, 1891 – Sierra de la Laguna, S Baja California Sur, Mexico.
P. m. socorroensis Grayson, 1867 – Socorro I, off W Mexico.
P. m. arcticus (Swainson, 1832) – breeds in SW Canada (C Alberta and C Saskatchewan) S in USA (E of Rocky Mts) to SE Wyoming, NE Colorado, C Nebraska and NW Kansas; non-breeding mainly S USA from C Arizona (rare) and SW New Mexico E to C Iowa, W Missouri and S Texas, S in Mexico to C Chihuahua and C Nuevo León.

On following pages: 160. Eastern Towhee (*Pipilo erythrophthalmus*); 161. Prevost's Ground-sparrow (*Melozone biarcuata*); 162. White-eared Ground-sparrow (*Melozone leucotis*); 163. Rusty-crowned Ground-sparrow (*Pyrgisoma kieneri*); 164. Canyon Towhee (*Pyrgisoma fuscum*); 165. White-throated Towhee (*Pyrgisoma albicolle*); 166. California Towhee (*Pyrgisoma crissale*); 167. Abert's Towhee (*Pyrgisoma aberti*).

P. m. curtatus Grinnell, 1911 – N Great Basin in SW Canada (interior S British Columbia) and NW USA (N Idaho S to NE California, C Nevada and SE Idaho); non-breeding S to SE California and SE Arizona.
P. m. montanus Swarth, 1905 – breeds in S Great Basin and Rocky Mts region from SE California E to SE Nevada, N Utah, NC Colorado, NE New Mexico and W Oklahoma, S to SC Arizona and N Mexico (NE Sonora and NW Chihuahua); non-breeding S to N Sonora, C Chihuahua and CS Texas.
P. m. gaigei Van Tyne & Sutton, 1937 – S USA (E & SE New Mexico and W Texas) and adjacent N Mexico (N Coahuila).
P. m. griseipygius van Rossem, 1934 – Sierra Madre Occidental from SW Chihuahua (29° N) S through E Sinaloa and W Durango to NE Nayarit and W Zacatecas (W Mexico).
P. m. orientalis Sibley, 1950 – Sierra Madre Oriental of Mexico from SE Coahuila, C Nuevo León and SW Tamaulipas S to NE Guanajuato, Querétaro and N Hidalgo (E Mexico).
P. m. maculatus Swainson, 1827 – highlands of SE Tlaxcala, WC Veracruz and E Puebla, in E Mexico.
P. m. macronyx Swainson, 1827 – mountains on W & SW sides of Valley of Mexico (in E Michoacán, México, NW Morelos and Distrito Federal).
P. m. vulcanorum Sibley, 1950 – mountains on SE side of Valley of Mexico (in México, NE Morelos, SW Tlaxcala and W Puebla).
P. m. oaxacae Sibley, 1950 – highlands of N & C Oaxaca, in S Mexico.
P. m. chiapensis van Rossem, 1938 – mountains of C Chiapas, in SE Mexico.
P. m. repetens Griscom, 1930 – SE Chiapas (Volcán Tacaná) and Pacific cordillera of Guatemala.

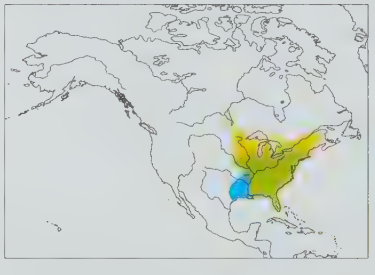


Descriptive notes. 17·7–21·3 cm; 30·6–49 g. Large, long-tailed sparrow with white spots on upperwing-coverts. Male nominate race has head and chest black, upperparts dark brownish-olive to grey-tinged olive-brown, mantle and scapulars with white spots; upperwing and tail similar to back in colour, wing-coverts tipped white (forming two broken wingbars), tertials edged white, outer tail feathers tipped white, outermost also edged white; lowermost breast and belly white, flanks tawny-rufous, becoming somewhat paler cinnamon-rufous on undertail-coverts; iris red; bill blackish; legs flesh-coloured. Female is similar to male, but hood browner, upperparts duller and greyer. Juvenile has head and upperparts dark brown, feathers edged and tipped brighter brown, wing-coverts prominently tipped buff, underparts whitish with dark brown streaks, streaking heaviest on lower throat and breast, with cinnamon wash on flanks and vent, brownish eyes; rufous flank feathers emerge in early moults. Races differ mainly in plumage tones and markings, also in degree of sexual dichromatism, which is most extreme in NE (*arcticus*), least marked in coastal populations (particularly *oregonus*): *macronyx* is paler and more greenish above than nominate, spots on upperparts and tail yellow (not white), bend of wing yellow; *vulcanorum* is like previous, but upperparts duller olive and clearly streaked blackish, with spots larger and paler yellow; *oaxacae* is like nominate, but upperparts paler and browner, white spots larger, tertials with more extensive white on edges; *chiapensis* is very like last, perhaps slightly darker above, and spots tending to be slightly buff-tinged (less white); *repetans* is like preceding two, but upperparts more blackish-olive (less buff-brown) and spots whiter; *oregonus* has blackest upperparts, with relatively small white spots more restricted in extent (not extending far on to mantle); *megalonyx* is very like previous, but spots slightly smaller; *falcinellus* resembles previous, but white spots on average larger, rump slightly paler and greyer, hind claw on average shorter; *falcifer* is similar to last, but white spots smaller; *clementae* is similar to *megalonyx*, but bill generally a little larger, upperparts (especially female) slightly paler; *umbraticola* also is similar to *megalonyx*, but bill generally slightly smaller, upperparts (especially female) slightly darker; *magnirostris* likewise resembles *megalonyx*, but flanks paler, more tawny-buff, has more white in tail, also slightly shorter wing and tail, on average slightly longer bill and hind claw; *socorroensis* is smaller than other races, both sexes with head to breast and upperparts dark olivaceous grey, spots relatively small; *arcticus* has upperparts dull olive-tinged black, spots on mantle and scapulars large and extensive, female greyish-brown where male black; *montanus* is like previous, but upperparts purer black, with little olive tint; *curtatus* is like last, but upperparts generally still blacker, with even less olivaceous tinge; *gaigei* is similar to *montanus*, but white spots on upperparts slightly smaller, rump greyer (less black); *griseipygius* is similar to previous, but upperparts more greyish-black, rump slightly more olivaceous (less grey), flanks slightly darker; *orientalis* also resembles *gaigei*, but upperparts more blackish, rump with more black admixed, flanks darker. Voice. Song variable, but typically 2 "chip" notes followed by a trill, "chup chup zeeeeeeee"; in Mexico "chip-chip-trrrr"; on US Pacific coast a dry buzz, often lacking introductory notes. Call note a nasal "pshew" or "meeew", or quiet "tseep"; in Mexico "jor-eee".
Habitat. Dense deciduous or mixed thickets; high-altitude mixed forest and pine–oak–fir (*Quercus–Pinus–Abies*) forest with brushy understorey; shrubs such as junipers (*Juniperus*) and *Baccharis*, brushy gulleys with madrones (*Arbutus*), *Rubus*, *Rosa*, ceanothus (*Ceanothus*), hawthorn (*Crataegus*), shrubby composites and ferns, also slopes with ceanothus and young pines. In N Great Plains found also in riparian deciduous thickets. From near sea-level to 3355 m.
Food and Feeding. Diet in breeding season primarily insects, including beetles (Coleoptera), crickets (Orthoptera), bugs (Hemiptera, including homopterans), Hymenoptera, flies (Diptera), caterpillars and moths (Lepidoptera); also spiders (Araneae), millipedes (Diplopoda) and sowbugs (Isopoda); also plant seeds, especially of *Polygonum*, *Stellaris*, *Rubus* and *Cirsium*, also of oats (*Avena*), wheat (*Triticum*) and nightshade (*Solanum*). Details of diet vary geographically. In non-breeding season takes more plant material, mainly seeds, acorns and fruits. Forages principally on ground and low in vegetation, under cover, searching beneath litter; occasionally higher. Scratches among litter; also gleans items from vegetation. Generally singly and in pairs; outside breeding season also in small groups.
Breeding. Season mid-Apr to late Jul in most of USA, although song and territorial behaviour by early Mar in coastal California, and breeding activity from early Jan in Mexico; double-brooded. Monogamous. Territorial. Nest built by female, a bulky cup of dry grass, dead leaves, bark and stems, soft lining of fine grass, rootlets and animal hair, usually (90% of nests) placed on ground, often in depression under bush, fallen branch or log, occasionally up to 2 m (rarely 5·5 m) above ground in shrub, vine or small tree. Clutch 2–5 eggs, normally 3 or 4, white to pinkish or pale blue with darker reddish, brownish or purplish speckling; incubation by female, period 12–14 days; chicks fed by both parents, nestling period 9–11 days. Nests parasitized by both Brown-headed (*Molothrus ater*) and Bronzed Cowbirds (*Molothrus aeneus*).
Movements. NE interior populations (race *arcticus*) migratory, and coastal, insular and Mexican populations resident; those in Great Basin and S Rocky Mts move short distances or perform altitudinal movements. N-bound movements through C California between late Mar and early May; spring migration peak from last week Apr to mid-May in interior W and into Canadian Prairies. Autumn migration late Aug to early Dec, peak early Oct, in C California; arrival in wintering areas by early to middle Sept, continuing into Dec. Race *arcticus* recorded as vagrant E to Atlantic coast of North America (Quebec S to Florida); one record from Britain considered not to have involved a wild individual.
Status and Conservation. Not globally threatened. Generally common to fairly common. Race *consobrinus*, confined to Guadalupe I, off Baja California, extinct. Race *clementae* considered a "California Species of Special Concern" in highest degree of priority; threatened by habitat loss, caused partially by introduced feral pigs. Habitat loss through overgrazing can lead to rapid extirpation of local populations, especially on islands. In contrast, this species has recently extended its US breeding range E to Oklahoma.
Bibliography. Armani (1985), Beadle & Rising (2002), Bent & Austin (1968), Byers, Curson & Olsson (1995), Davis (1957a, 1957b, 1958, 1960b, 1961), Dinzl (1990), Ellison (1999), Gardali & Nur (2006), Greenlaw (1996b), Greenlaw & Engstrom (2001), Haiiser (1960), Irwin (1989), Jackson (1955), Kroodsma (1971), McCarthy (2006), McKay *et al.* (2009), Murray & Hardy (1981), Palmer-Ball & Cassell (1990), Pyle (1997), Pyle & Henderson (1991), Ridgway (1901), Rising & Beadle (1996), Roberts (1969), Rowley (1962), Shuford & Gardali (2008), Sibley (1950, 1954), Sibley & West (1958, 1959), Small (2005), Stubblefield & Rising (2002), Urban (1959), Wiggins *et al.* (2004).

160. Eastern Towhee
Pipilo erythrophthalmus

French: Tohi à flancs roux **German**: Rötelgrundammer **Spanish**: Toquí Flanquirrufo
Other common names: Rufous-sided Towhee (when treated as conspecific with *P. maculatus*); White-eyed Towhee (Florida)

Taxonomy. *Fringilla erythrophthalma* Linnaeus, 1758, South Carolina, USA.
Relationships of genus not clear, although generally placed close to several other, similarly proportioned tropical American genera (e.g. some *Aimophila*, *Atlapetes*, *Pyrgisoma* and *Melozone*). Present species sometimes considered conspecific with *P. maculatus erythrophthalmus*, with which it hybridizes in Great Plains of USA. Races intergrade, making delimitation difficult. Geographical variation in biometrics, plumage colour and iris colour largely clinal: average wing length decreases slightly from NW to SE, and lengths of middle toe, tarsus and bill increase from N to SE; individuals N of a line joining C Alabama, N Georgia, NW South Carolina and SE North Carolina are red-eyed, whereas those S of it have white or pale straw-coloured eyes (a narrow cline in eye colour from S Alabama NE to SE North Carolina, with populations in Georgia and S South Carolina variable). Four subspecies recognized.
Subspecies and Distribution.
P. e. erythrophthalmus (Linnaeus, 1758) – breeds in S Canada (S Manitoba, S Ontario and extreme S Quebec) and E USA (N Minnesota E to N Vermont, C New Hampshire and SW Maine, S to NE Oklahoma, N Arkansas, S Tennessee, NE Georgia, NW South Carolina, C North Carolina and Virginia); non-breeding mainly from Nebraska, Wisconsin, S Michigan, extreme S Ontario, Pennsylvania, S New York and Massachusetts S to Oklahoma, CS & SE Texas, Gulf Coast and SC Florida.
P. e. canaster A. H. Howell, 1913 – NE Louisiana, NW Mississippi, SW Tennessee, N Alabama, N Georgia, C South Carolina and W North Carolina S to Gulf Coast (CS Louisiana E to NW Florida), EC Alabama, SE Georgia and coastal South Carolina.
P. e. rileyi Koelz, 1939 – SE Virginia, coastal North Carolina and coastal South Carolina S to SE Alabama, SE Georgia and N Florida; non-breeding also W & C Florida.
P. e. alleni Coues, 1871 – Florida.



Descriptive notes. 17·3–20·6 cm; 32·1–52·3 g. Large, long-tailed sparrow, adult with unstreaked underparts, rufous flanks, and white at base of primaries. Male nominate race has black head to breast and upperparts, including upperwing and tail; white at base of primaries, white on leading edges of middle primaries, white edges of tertials; outer three rectrices with large white area at tip, outermost also with white edge; lowermost breast and belly white, flanks orange-rufous, undertail-coverts buff; iris bright red; bill black; legs pinkish. Female is like male, but rich brown where male black. Juvenile has head and upperparts dark brown, feathers edged and tipped brighter brown, throat off-white, underparts pale buffish, breast and flanks streaked dark brown, vent warm buff, eyes brown; rufous flank feathers emerge in early moults. Race *alleni* is small, with intermediate bill size, pale eyes, and little white in tail; *rileyi* is medium-sized, large-billed, with variable eye colour, and less white in tail than nominate; *canaster* is large, large-billed, pale-eyed (not so pale as *alleni*), and has intermediate amount of white in tail. Voice. Song a distinctive loud, ringing "drink your teeeee", or "drink teeeee", the "teeeee" part usually louder than the other elements, and the "your" lower; variable. Call an emphatic "chee-wink, joreee" or simply "wink".
Habitat. Dense deciduous or mixed thickets, often second-growth thickets, young jack pines (*Pinus banksiana*), and edges of oak (*Quercus*) forest; scrub palmetto (*Sabal palmetto*) in S. In mountains, found in oldfields, oak–hickory (*Quercus–Carya*), white oak (*Quercus alba*) savanna, and in brushy clearings in spruce–fir (*Picea–Abies*) habitat. Breeds from sea-level to 1980 m. In non-breeding season found also in dense thickets with well-developed understorey; sometimes at feeders in residential areas.
Food and Feeding. During breeding season feeds primarily on insects and other small animal items, probably augmented with seeds and berries when available. In winter probably a variety of fruits, seeds and buds, and also, when available, insects. Forages principally on ground or low in vegetation. Especially in winter, uses a double-scratch technique, in which the bird remains stationary while scratching backwards with both feet simultaneously.
Breeding. Season early Apr to late May, and again to early Aug; double-brooded. Monogamous. Territorial. Nest built by female, is a bulky cup composed of stems, dry grass, bark and twigs, and lined with finer material such as rootlets, fine grasses and animal hair, placed on ground, usually in depression beneath a bush, a fallen branch or a log, occasionally in a shrub, vine or small tree, rarely to 5·5 m up. Clutch 2–6 eggs, most commonly 3 or 4, quite variable, whitish, pale blue or pinkish with darker spots in brown, blackish or rusty; incubation by female, period 12 days; chicks fed by both parents, nestling period 10–11 days. Common host of Brown-headed Cowbird (*Molothrus ater*).
Movements. N populations migratory, far S ones resident, others partially migratory. Spring migration late Apr through early May, although active migration noted into late May in NE. Post-

breeding departure from N begins Sept, with arrival in wintering areas as early as mid-Sept; throughout much of N part of range, however, S-bound migrants seen late Sept to mid-Oct, and arrivals in wintering areas continue into Nov. Nominate race recorded casually in winter NE to Quebec, New Brunswick, Nova Scotia and Newfoundland and W to Montana and Colorado; vagrant W to Idaho and Arizona. One record of vagrant in W Europe (Lundy, in SW England), probably ship-assisted. Race *alleni* wanders casually S to Florida Keys.
Status and Conservation. Not globally threatened. Fairly common to locally common. Probably influenced by human activities even in pre-colonial times. Following clearance of forests, early successional vegetation provides good habitat for this species. In some regions, habitat destruction following development has depressed numbers, and populations in SE declined in 20th century. Commonly nests behind coastal dunes; as these areas are developed for cottages and recreation, towhee habitat is destroyed.
Bibliography. Armani (1985), Baumgartner (1988, 1990), Beadle & Rising (2002), Bell & Whitmore (1997), Bent & Austin (1968), Borror (1959, 1975), Burrit & Hailman (1979), Dickinson (1952), Ewert (1979, 1980), Ewert & Kroodsma (1994), Gates & Gates (1975), Greenlaw (1973, 1978, 1996a), Greenlaw *et al.* (1998), Hagan (1993), Johnston (1993), Krementz & Powell (2000), Lewington *et al.* (1991), Lewis & Yahner (1999), McCarthy (2006), Morimoto & Wasserman (1991), Nelson (2002, 2004), Pyle (1997), Raynor (1976), Richards (1979, 1981), Ridgway (1901), Rising & Beadle (1996), Ritchison (1985c), Scharf (2005), Sibley & West (1959), Stubblefield & Rising (2002), Wasserman (1984).

Genus *MELOZONE* Reichenbach, 1850

161. **Prevost's Ground-sparrow**

Melozone biarcuata

French: Tohi à face blanche **German**: Weißwangen-Grundammer **Spanish**: Toquí Cuatro-ojos
Other common names: White-faced Ground-sparrow; Chiapas Ground-sparrow (*hartwegi*); Cabanis's Ground-sparrow (*cabanisi*)

Taxonomy. *Pyrgita biarcuata* Prévost and Des Murs, 1846, no locality = "California" and Guatemala.
Formerly considered close to, and has been considered conspecific with, *Pyrgisoma kieneri*, but differs in both adult and juvenile plumages. Race *cabanisi* sometimes considered to represent a separate species. Race *hartwegi* often treated as a synonym of nominate. Three subspecies recognized.
Subspecies and Distribution.
M. b. hartwegi Brodkorb, 1938 – SE Mexico (Chiapas).
M. b. biarcuata (Prévost & Des Murs, 1846) – highlands of Guatemala, W Honduras and El Salvador.
M. b. cabanisi (P. L. Sclater & Salvin, 1868) – highlands of C Costa Rica.



Descriptive notes. 15–17·5 cm; 24·8–32 g. A fairly large sparrow, adult with distinctive head pattern. Nominate race has blackish forehead, rusty crown to hindneck, white side of face with rusty to blackish posterior edge of ear-coverts; upperparts, including upperwing and tail, olive-brown, flight-feathers darker brown, all wing feathers with inconspicuous narrow paler edges; whitish below, throat to upper breast washed light buff, side of breast grey, flanks greyish-buff, undertail-coverts cinnamon-buff; iris dark red-brown; bill black; legs greyish-brown to pinkish. Sexes similar in coloration. Juvenile lacks distinctive head pattern, has head and upperparts buffish-brown, ear-coverts darker, throat creamy buff, underparts whitish, breast and flanks streaked dark brown, lower flanks and undertail-coverts cinnamon-buff (similar to adult), bill horn-coloured. Race *hartwegi* is very like nominate, but upperparts more greyish-olive; *cabanisi* has brighter rufous crown and nape, this colour extending over central and rear ear-coverts, edges of ear-coverts black, large white spot between eye and bill, broad white eyering (also extending slightly behind eye), black moustachial stripe, white submoustachial and thin black malar stripe, blackish patch on central breast. Voice. Song consists of a high, thin, staccato sputter of buzzy notes and a slow trill, followed by 3–4 clear whistles. Call a weak, high, staccato "tsiting" or a high, thin "pseeer".
Habitat. Edges of tropical deciduous montane evergreen forest, also secondary forest, and in undergrowth and thickets of tall shrubby second growth, coffee plantations, blackberry (*Rubus*), bracken (*Pteridium*) and hedgerows. From near sea-level to 2900 m, usually below 1850 m.
Food and Feeding. Diet mainly small arthropods and seeds. Forages usually on or near ground. Scratches on ground among leaf litter in search of arthropods. Singly and in pairs.
Breeding. Nests in late Apr in El Salvador and May–Sept in Costa Rica. Nest a cup of dead leaves and grasses, lined with finer grasses, generally placed low down (0·25–2 m above ground) in bush or grass tussock, sometimes in small tree. Clutch 2–3 eggs, whitish, with reddish-brown to lilac spotting concentrated around wider end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Generally fairly common. Common on Pacific slope of Guatemala and in Valle Central of Costa Rica, and fairly common in Caribbean subtropics; uncommon to locally fairly common in interior highlands of Honduras.
Bibliography. Armani (1985), Danner *et al.* (2008), David & Gosselin (2002b), Dickey & van Rossem (1938), Dunning (2008), Griscom (1932), Howell & Webb (1995), Land (1970), Miller *et al.* (1957), Monroe (1968), Ridgway (1901), Stiles & Skutch (1989).

162. **White-eared Ground-sparrow**

Melozone leucotis

French: Tohi oreillard **German**: Weißohr-Grundammer **Spanish**: Toquí Orejiblanco
Other common names: Salvin's Ground-sparrow (*occipitalis*)

Taxonomy. *Melozone leucotis* Cabanis, 1861, Costa Rica.
Three subspecies recognized.
Subspecies and Distribution.
M. l. occipitalis (Salvin, 1878) – Pacific coast of S Mexico (Chiapas), Guatemala and El Salvador (Volcán de San Salvador).
M. l. nigrior W. deW. Miller & Griscom, 1925 – NC highlands of Nicaragua.
M. l. leucotis Cabanis, 1861 – highlands of Costa Rica.



Descriptive notes. 17–19 cm; 39·9–43 g. A large, chunky sparrow with large feet, and much black on fore parts. Nominate race has head mostly black, large bright whitish spot on lores, broken white eyering, white patch on ear-coverts, thin yellow eyestripe behind eye, broader yellow line below ear-coverts; upperparts, including upperwing and tail, dark olive-green, wing feathers edged brighter olive; throat and broad central part of upper breast black, side of breast grey, belly whitish, flanks to undertail-coverts cinnamon-tinged buffish-brown; iris reddish-brown; bill black; legs horn-coloured. Sexes similar in coloration. Juvenile has black of head less extensive, facial markings indistinct, upperparts scaled with sooty grey, upperwing-coverts with cinnamon-buff edges, belly yellowish-white, breast to flanks streaked dark, bill yellowish. Race *nigrior* resembles nominate, but pale collar on lower throat even thinner and inconspicuous, black on breast more extensive; *occipitalis* is distinctive, has grey median crownstripe, broader yellow postocular stripe curving down to side of neck, white breast with bold black central spot on lower part. Voice. Song consists of explosive staccato notes and loud hoarse whistles. Call a weak, high, piercing "tsip".
Habitat. Found in montane evergreen forest, dark thickets, moist ravines, low scrubby growth, at edges of corn fields and other clearings, and forest edge; prefers thickets on edge of open land. At 500–2000 m.
Food and Feeding. Insects, spiders (Araneae) and other arthropods, also seeds. Forages on and near ground. Hops on ground, frequently flicking its tail. Gleans arthropods from vegetation, and seeds from leaf litter; often uses two-foot scratching technique to expose items on ground. Usually in pairs or family parties.
Breeding. Season Apr–Jul in Costa Rica. Nest a large bulky bowl of dead leaves, stems and thin twigs, lined with finer grasses and other material, placed on ground or up to 0·7 m above it, well hidden among plants. Clutch 2–4 eggs, most commonly 2, white to pale blue with cinnamon or brownish spotting. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally fairly common. Uncommon in El Salvador, where much of its habitat has been destroyed.
Bibliography. Anderson *et al.* (1998), Armani (1985), Dickey & van Rossem (1938), Dunning (2008), Griscom (1932), Howell & Webb (1995), Land (1970), Miller *et al.* (1957), Ridgway (1901), Sassi (1939), Stiles & Skutch (1989), Winnett-Murray (1985).

Genus *PYRGISOMA* Bonaparte, 1850

163. **Rusty-crowned Ground-sparrow**

Pyrgisoma kieneri

French: Tohi de Kiener **German**: Rostnacken-Grundammer **Spanish**: Toquí Nuquirrufo
Other common names: Ground Sparrow, Bonaparte's Ground-sparrow, Rusty-crowned Sparrow

Taxonomy. *Pyrgisoma kieneri* Bonaparte, 1850, Am[erica] occ[identale] = San Blas, Nayarit, Mexico. Sometimes placed in genus *Melozone*. Formerly considered close to, and has been considered conspecific with, *Melozone biarcuata*, but differs in both adult and juvenile plumages. Geographical variation appears to be slight, but poorly documented; race *grisius* often considered synonymous with nominate. Proposed race *obscurius* (described on basis of a single specimen from SW of Sola de Vega, in SW Oaxaca) appears to differ little from *rubricatum*, with which it is synonymized. Three subspecies provisionally recognized.
Subspecies and Distribution.
P. k. grisius (van Rossem, 1933) – extreme SE Sonora and N Sinaloa, in W Mexico.
P. k. kieneri Bonaparte, 1850 – extreme S Sonora, Sinaloa, W Durango, Nayarit, W Jalisco and Colima, in W Mexico.
P. k. rubricatum (Cabanis, 1851) – C & SW Mexico from S Guanajuato and Michoacán E to Morelos, SW Puebla, Guerrero and W Oaxaca.



Descriptive notes. 15–17·5 cm; 31·9–41·3 g. A fairly large sparrow with dark breast spot. Nominate race has blackish lower forehead, greyish forecrown and rusty hindcrown, nape and side of neck; side of face dull brownish with white supraloral and eyering; upperparts, including upperwing and tail, brownish-grey; throat white, underparts whitish, black central breast spot, olive-grey flanks, rusty undertail-coverts; iris dark drown; bill blackish; legs flesh-coloured. Sexes similar in coloration. Juvenile lacks head pattern of adult, has head and upperparts dusky brown, wing feathers with buffish edges, dusky malar streak, similar to adult below, but throat and breast with dark brown streaks. Races differ mainly in size and in plumage tone: *grisius* is greyer above than nominate, with rufous on head and undertail-coverts paler; *rubricatum* is smaller than nominate, with smaller bill and weaker feet and tarsi, often somewhat brighter rufous hindcrown and nape. Voice. Song a few doubled notes running into accelerating series of chipping notes, "tsi tsi sssit s'weet sweet chi-chi-chi-chi-chi". Call a thin "dzzzzzziu".
Habitat. Arid to semi-arid brushy woods, thorn-forests, and arid subtropical oak (*Quercus*) and juniper (*Juniperus*), also sometimes in brushy hedges. Sea-level to 2000 m.
Food and Feeding. Seeds and arthropods. Forages on and near ground, sometimes also in low shrubbery. Can be difficult to see. Often scratches at ground with both feet together. Singly and in pairs.

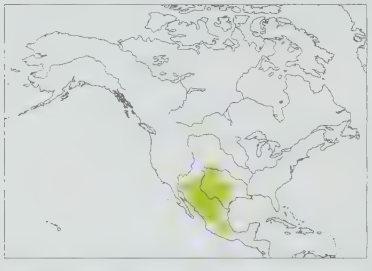
Breeding. Breeding recorded in Jun and early Jul. Nest a large bulky cup, usually with base of dried leaves, supplemented with dried grasses, lined with finer grasses and cattle hair, generally placed 1–2 m up (Morelos) or placed on or near ground. Clutch usually 2–3 eggs, rarely 4 (of eleven nests in Morelos, ten had 2 eggs), pale blue with reddish markings. Commonly parasitized by cowbirds (*Molothrus*).
Movements. Sedentary.
Status and Conservation. Not globally threatened. Status uncertain, apparently uncommon; race *rubricatum* very uncommon in Guerrero and Oaxaca, but in Morelos said to be the most abundant of the resident sparrows. Species perhaps merely difficult to find.
Bibliography. Armani (1985), Binford (1989), Dunning (2008), Howell & Webb (1995), Miller *et al.* (1957), Ridgway (1901), Rowley (1962), Russell & Monson (1998).

164. Canyon Towhee

Pyrgisoma fuscum

French: Tohi des canyons **German**: Braunrücken-Grundammer **Spanish**: Toquí Pardo
Other common names: Brown Towhee (when treated as conspecific with *P. crissale*)

Taxonomy. *Pipilo fusca* Swainson, 1827, Temascaltepec, México, Mexico.
Formerly placed in genus *Pipilo* and sometimes in *Melozone*. Molecular analysis indicates that present species and *P. albicolle* are sister-taxa. Previously treated as conspecific with *P. crissale*. Geographical variation rather weak, and largely clinal, with much intergradation. Proposed race *aimophilum* (described from Fort Davis, Texas) treated as a synonym of *texanum*. Ten subspecies recognized.
Subspecies and Distribution.
P. f. mesoleucum (S. F. Baird, 1854) – S USA from Arizona E through New Mexico and W Texas, and N Mexico S to N Sonora (except NW coast) S to 30° N and NW Chihuahua S to 31° N.
P. f. mesatum (Oberholser, 1937) – SE Colorado, NE New Mexico and NW Oklahoma.
P. f. texanum (van Rossem, 1934) – W & C Texas S to N Mexico (NW Coahuila).
P. f. intermedium (Nelson, 1899) – C & S Sonora S to N Sinaloa (El Fuerte and Yecorato).
P. f. jamesi (C. H. Townsend, 1923) – Tiburón I, off CW Sonora, Mexico.
P. f. perpallidum (van Rossem, 1934) – WC Mexico in Sierra Madre Occidental and E foothills (from Chihuahua S through Durango to Nayarit, N Jalisco and SW Zacatecas).
P. f. potosinum (Ridgway, 1899) – C Mexico from N Coahuila, W Nuevo León and SW Tamaulipas S to E Zacatecas, W & C San Luis Potosí, NE Jalisco, Guanajuato and C & S Querétaro.
P. f. fuscum (Swainson, 1827) – Nayarit S to Colima, E through Jalisco and Michoacán, to Morelos, Mexico City, W Veracruz and NC Guerrero.
P. f. campoi (R. T. Moore, 1949) – Hidalgo, Puebla and W Veracruz, in E Mexico.
P. f. toroi (R. T. Moore, 1942) – Tlaxcala E to W Veracruz, S to Puebla and N Oaxaca.



Descriptive notes. 18·5–22 cm; 36·6–52·5 g. Large, long-tailed sparrow with mostly grey-ish-brown plumage. Nominate race is grey-brown above, very slightly rufous-tinged crown contrasting with somewhat darker brownish-grey upperparts; foreface tinged buffish, ear-coverts spotted and streaked dark brown; throat light orange-buff, outlined with thin brown spots or streaks; underparts pale greyish, breast with dark brown central spot, flanks tinged buff-brown, crissum dull dark cinnamon; iris brown; bill horn-coloured, lower mandible paler; legs light brown. Sexes similar in plumage. Juveniles is like adult, but crown lacks rusty tone, upperwing-coverts tipped pinkish-buff (forming one or two indistinct wingbars), and throat, breast and flanks are spotted brown. Races differ mainly in crown colour and in general plumage tone: *toroi* is paler in coloration than nominate; *campoi* is similar to previous, but greyer; *mesoleucum* has rufous wash on crown, and is paler than nominate, especially on foreface and underparts; *mesatum* has crown brown with dull rufous wash, upperparts pale greyish-brown; *texanum* has little rufous in crown, and upperparts are greyish-brown with tawny tinge; *intermedium* has crown dark reddish-brown, back greyish brown, sides and flanks greyish-brown, throat pale buff, crissum pale cinnamon; *jamesi* is smaller and paler than previous, has crown pale reddish-brown, back pale brownish-grey, sides and flanks pale grey, and throat white with pale buff tinge; *perpallidum* has crown bright rusty brown, back greyish-brown, sides and flanks greyish-brown and crissum cinnamon; *potosinum* crown is cinnamon-rufous, upperparts pale brownish-grey, throat pale buffy, flanks tinged with brown. Voice. Song a musical tinkling, typically a series of 6 or 7 evenly spaced double syllables, "chilli-chilli-chilli-chilli-chilli, chur chee-chee-chee eh". Call a disyllabic "tscheddap" or "sheddap"; location call a thin high-pitched "see" or a soft "tic".
Habitat. Rocky semi-arid montane shrubland; found in scrub oak (*Quercus*), pinyon pine (*Pinus*), oak savanna, pinyon–juniper (*Pinus–Juniperus*), manzanita (*Arctostaphylos patula*), mesquite (*Prosopis*), mixed cacti (especially *Opuntia*), streambed shrubbery, and pine–oak forest. Sea-level to 1500 m.
Food and Feeding. Diet principally seeds; also takes small animal items, including insects, millipedes (Diplopoda), spiders (Araneae) and snails (Gastropoda), and fruit when available. Forages mainly on ground or low in vegetation. Searches on ground by using technique of two-footed scratch; hops or runs on ground.
Breeding. Season Mar to early Jul (rarely Sept); often double-brooded. Partners remain together all year and defend territory throughout year. Nest built by female, a bulky cup composed largely of dry grasses and plant stems, even flowers at times, lining of fine grasses, rootlets, hair or wool, generally placed 0·5–4 m above ground, often against main trunk of small tree such as mesquite, hackberry (*Celtis*), pinyon pine or juniper, or cholla cactus (*Opuntia*). Clutch 2–5 eggs, most commonly 3, ground colour ranging from white to pale blue and markings from blackish to dark brown or rusty, two patterns, one with dark and contrasting blotching and scrawls, other with finer and less dark speckles; incubation by female, both parents feed young at nest; no information on duration of incubation and nestling periods. Nests parasitized by Brown-headed (*Molothrus ater*) and Bronzed Cowbirds (*Molothrus aeneus*), but at low rates.
Movements. Sedentary; some slight elevational movements in winter.
Status and Conservation. Not globally threatened. Fairly common to locally common. Some local populations extirpated through development, especially along rivers in SW USA.
Bibliography. Armani (1985), Austin & Smith (1974), Beadle & Rising (2002), Davis (1951), Dawson (1954), Howell & Webb (1995), Hubbard & Crossin (1974), Johnson & Haight (1996), Marshall (1960), Marshall & Johnson (1968), Miller *et al.* (1957), Parkes (1957), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Russell & Monson (1998), Stahlecker (2002), Zink (1988), Zink & Dittmann (1991), Zink *et al.* (2001).

165. White-throated Towhee

Pyrgisoma albicolle

French: Tohi à gorge blanche **German**: Weißkehl-Grundammer **Spanish**: Toquí Oaxaqueño

Taxonomy. *Pipilo albicollis* P. L. Sclater, 1858, San Miguel de las Peras, Oaxaca, Mexico.
Formerly placed in genus *Pipilo* and sometimes in *Melozone*. Molecular analysis indicates that present species and *P. fuscum* are sister-taxa. Proposed race *parvirostre* (described from NC Oaxaca) was based on seasonal differences in plumage and bill length; synonymized with nominate. Two subspecies currently recognized.
Subspecies and Distribution.
P. a. marshalli (Parkes, 1974) – S Puebla (possibly also E Guerrero), in S Mexico.
P. a. albicolle (P. L. Sclater, 1858) – E Guerrero E to C Oaxaca, in S Mexico.



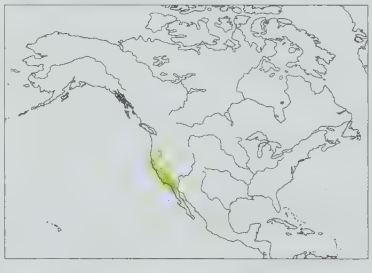
Descriptive notes. 18·5–22·5 cm; 42–50 g. Large, long-tailed sparrow. Has crown, nape, upperparts and tail brown; upperwing brown, two narrow pale wingbars, that of median coverts whiter and more contrasting; side of head brown, white supercilium from supraloral area to above eye, some whitish below eye, especially on submoustachial area, which becomes cinnamon on lower half, blackish malar stripe; chin and foreneck white contrasting with rusty-cinnamon throat, side of breast grey, becoming cinnamon on flanks and undertail-coverts, central abdomen whitish with grey mottling; iris reddish; upper mandible dusky brown, lower mandible paler; legs horn-coloured. Sexes similar in plumage. Juvenile is similar to adult, but with chest brownish-mottled, wingbars pale cinnamon. Race *marshalli* duller and greyer. Voice. Song a series of chipping notes with one or more introductory notes, "chik chik tchu-chu-chu-chu chi-i-ir". Call a slurred metallic "churenk".
Habitat. Broken semi-arid montane shrubland, also pine–oak (*Pinus–Quercus*) forest, at 1000–2800 m.
Food and Feeding. Diet probably seeds, augmented with insects and fruit when available. Forages principally on ground or low in vegetation. Often scratches on ground.
Breeding. Season Feb–May. Nest a bulky cup of dry grasses, lined with finer grasses, rootlets and hair, placed on or near ground, sometimes beneath thick bush. Clutch 4 eggs, pale blue to whitish-blue and spotted dark brown or reddish. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Balsas region and interior Oaxaca EBA. Little information available; common within its limited range.
Bibliography. Armani (1985), Davis (1951), Howell & Webb (1995), Marshall (1960), Miller *et al.* (1957), Parkes (1957, 1974b), Ridgway (1901), Zink (1988), Zink & Dittmann (1991).

166. California Towhee

Pyrgisoma crissale

French: Tohi de Californie **German**: Kaliforniengrundammer **Spanish**: Toquí Californiano
Other common names: Brown Towhee (when treated as conspecific with *P. fuscum*); Inyo California Towhee (*eremophilum*)

Taxonomy. *Fringilla crissalis* Vigors, 1839, no locality = Monterey, Monterey County, California, USA.
Formerly placed in genus *Pipilo* and sometimes in *Melozone*. Molecular analysis indicates that present species and *P. aberti* are sister-taxa. Previously treated as conspecific with *P. fuscum*. Geographical variation slight, and to some extent clinal; in California, *petulans* intergrades with nominate in Santa Cruz County and nominate intergrades with *senicula* in interior and SE, while specimens of *carolae* from C California show tendency towards *senicula*. Also, *bullatum*, *carolae* and *eremophilum* all similar to nominate and perhaps better subsumed in it; further, *bullatum* possibly not valid, purported characters being possibly due to comparison of reddish "foxed" specimens with newer "unfoxed" ones, and, similarly, *carolae* doubtfully valid and difficult to characterize. Proposed race *kernense* (described from Kelso valley, in Kern County, in California) is treated as a synonym of *carolae*. Eight subspecies tentatively recognized.
Subspecies and Distribution.
P. c. bullatum (Grinnell & Swarth, 1926) – SW Oregon S to extreme NC California, in W USA.
P. c. petulans (Grinnell & Swarth, 1926) – N California in coastal zone from Humboldt County S to Marin County.
P. c. crissale (Vigors, 1839) – C coastal California from N Monterey County E to W edge of San Joaquin Valley, S to W Kern County and Ventura County.
P. c. carolae (McGregor, 1899) – interior California from Humboldt County S to Napa County and E to foothills of Cascades and Sierra Nevada, S on E side of San Joaquin Valley to Kern County.
P. c. eremophilum (van Rossem, 1935) – Argus Mts, in Inyo County (California).
P. c. senicula (Anthony, 1895) – C coastal California (San Luis Obispo County), and San Joaquin Valley, S to extreme NW Mexico (NW Baja California).
P. c. aripolium (Oberholser, 1919) – C Baja California from 28°55' N S to Guajademi (26°35' N).
P. c. albigula (S. F. Baird, 1860) – S Baja California S from c. 26°35' S.



Descriptive notes. 21–24 cm; 46·3–61·2 g (male average 53·9 g, female average 51·8 g). Large, long-tailed, nearly uniformly brown sparrow. Nominate race has crown to hindneck and upperparts greyish-brown, crown often tinged richer brown, face rusty brown; upperwing dark grey-brown, darker than back, feathers narrowly edged paler, tail blackish-brown; throat rich buff, distinct gorget of darker streaks; underparts pale greyish-buff, paler on belly, lower flanks more buff, undertail-coverts rusty cinnamon; iris orang-ish-brown; bill horn-coloured, lower mandi-ble paler; legs pale brownish. Sexes similar in plumage. Juvenile is similar to adult, but somewhat duller in colour, greater and median upperwing-

coverts with pale buff tips (two wingbars), underparts faintly streaked dark. Races differ mainly in plumage tone: *bullatum* is supposedly more rufous than others, but this possibly due to "foxing" of specimens; *petulans* is medium greyish-brown, tinged with buffy; *carolae* is said to be similar to nominate, but darker above and a little paler on throat; *eremophilum* is said to be more greyish than nominate, but poorly differentiated; *senicula* has a rather small bill, and is darker and more richly coloured than nominate; *aripolium* is paler and longer-billed than previous; *albigula* is most distinctive and palest race, has obvious rufous crown patch, pale buff chin and throat, and whitish belly, grading to cinnamon-buff on undertail-coverts, some having dark chest spot (characteristic of *P. fuscum*). Voice. Song a series of staccato notes, accelerating in speed, "tss tss tss tsurr tsurr" or "chip chip chip chip chip"; male gives chatter-duet with female, "tss tss it tss, shi chi chi chi chi, shuchu shee, tsee tsee", on different pitches, first falling and then rising. Call a high-pitched "tsip" or "chip", or emphatic "chink"; location call a thin high-pitched "seep".

Habitat. Brushy hillsides, shrubby thickets, streamside thickets, chaparral, especially chamise (*Adenostoma fasciulatum*) and wedgeleaf ceanothus (*Ceanothus cuneatus*), also manzanita (*Arctostaphylos*), and dry upland chaparral; also dense thickets of willow (*Salix*) and desert olive (*Forestiera pubescens*) beside streams in Argus Mts (race *eremophilus*); commonly in parks and gardens having suitable cover. Away from coast, prefers dense vegetation of usually dry canyon bottoms, and desert slopes. Sea-level to c. 1500 m, less commonly to 2375 m.

Food and Feeding. Diet principally seeds; also small animal items, including insects, millipedes (Diplopoda), spiders (Araneae) and snails (Gastropoda), and fruit when available. Forages mostly on ground or low in vegetation. Searches on ground by using technique of two-footed scratch; hops or runs on ground.

Breeding. Season mid-Mar to end Jun; double-brooded. Maintains pair-bond and is territorial throughout year. Nest constructed by female, a loosely built open cup of dry grasses and twigs, lined with hair, seed down, horsehair and soft bark, generally placed 1–4 m up (rarely on ground) in densest part of shrub or small tree, usually supported by several branches; sometimes on artificial structure near house, and reported as nesting even inside hollowed hanging gourd. Clutch 2–5 eggs, most commonly 4; incubation by female, period usually 11 days, sometimes up to 14 days; chicks fed by both parents, nestling period 8–11 days. Frequent host of Brown-headed Cowbird (*Molothrus ater*); much productivity often much lowered, largely through clutch reduction.

Movements. Mainly resident. Some post-breeding upslope movements detected in some areas of California; similarly, downslope movements locally after major snowfalls.

Status and Conservation. Not globally threatened. Race *eremophilus* designated as "Threatened" and protected under the Endangered Species Act in the USA since 1987. Otherwise, generally common to very common throughout most of range; a very common species of suburban backyards throughout California (USA). Common to fairly common in Baja California (Mexico). Appears to be generally insensitive to natural habitat loss, in part because it readily adapts to exotic vegetation. Race *eremophilus*, restricted to W & E slopes of S Argus Mts, in E California, is at risk from various factors; between 1992 and 1995 its population was believed relatively stable at c. 200 individuals; in comprehensive survey in 1998, 640 adults found (72% of these within the China Lake Naval Air Weapons Station), and survey in 2004 estimated range-wide population of 725 adults. Main threat to *eremophilus* was destruction of riparian habitat by cattle, feral horses and burros (donkeys), and off-road vehicles, as well as campers; since the towhee was placed on federal endangered-species list in 1987, these threats have been greatly reduced. In recent years fire has become a threat locally, but magnitude of impact not known. Removal of invasive exotic vegetation, e.g. salt cedar (*Tamarix*), also recommended for conservation purposes.

Bibliography. Beadle & Rising (2002), Benedict (2007), Byers, Curson & Olsson (1995), Davis (1951, 1957b), Dodge *et al.* (1995), Ellison (1999), Grinnell (1915), Gustafson *et al.* (1994), Howell & Webb (1995), Kunzmann *et al.* (2002), Laabs *et al.* (1995), Marshall (1960), Miller *et al.* (1957), Parkes (1957), Purcell & Verner (1998), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), Zink & Dittmann (1991).

167. Abert's Towhee

Pyrgisoma aberti

French: Tohi d'Abert **German**: Schwarzkinn-Grundammer **Spanish**: Toquí de Abert

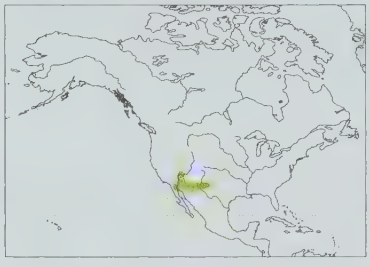
Taxonomy. *Pipilo aberti* S. F. Baird, 1852, "New Mexico" = vicinity of Gila Bend, Maricopa County, Arizona, USA.

Formerly placed in genus *Pipilo* and sometimes in *Melozone*. Molecular analysis indicates that present species and *P. crissale* are sister-taxa. Geographical variation clinal; species perhaps better treated as monotypic. Proposed race *voorhiesi* (described from c. 15 km S of Tucson, in Arizona) treated as synonym of *dumeticolus*. Two subspecies tentatively recognized.

Subspecies and Distribution.

P. a. dumeticolus (van Rossem, 1946) – SW USA from SW Utah S through Colorado Valley in SE Nevada to SE California, and E along Gila R in S Arizona, also extreme NW Mexico (extreme N Baja California and NW Sonora).

P. a. aberti (S. F. Baird, 1852) – SW USA in S Arizona and SW New Mexico.



Descriptive notes. 20–23 cm; 38·9–55·6 g. Large, long-tailed sparrow with relatively uniform appearance. Nominate race has lower forehead, lores and chin black, rest of head and upperparts buff-tinged greyish-brown, flight-feathers and tail dark brown with pale buff edges; below mostly pinkish-brown, undertail-coverts rusty cinnamon; iris mahogany-red; bill pale, brownish to greyish; legs grey to pale yellowish-flesh. Sexes similar in plumage. Juvenile is similar to adult, but somewhat duller in colour, with greater upperwing-coverts tipped cinnamon-brown, and thin streaks on flanks and belly. Race *dumeticolus* is very like nominate, but slightly greyer above and slightly darker below. Voice. Song a rather sharp series of notes, "peep peep chee-chee-chee", " sleep cleep cha cha cha" or "chi chi chi chur chur chur chz"; unmated male may sing throughout day; mated males sing little (song apparently little used in territorial defence), although male may give staccato "peep" at dawn to mark territorial boundaries. Mated partners may duet. Call a sharp "peep" or "huit huit", or loud "cut"; location call a loud "seep".

Habitat. Riparian cottonwood–willow (*Populus fremontii–Salix gooddingii*) woodlands with dense understorey, dense mesquite (*Prosopis*) thickets, exotic vegetation such as salt cedar (*Tamarix*), and quailbush (*Atriplex*) at edge of agricultural fields. Generally found along perennial watercourses.

Food and Feeding. Diet on lower Colorado R principally insects: in winter 73% of diet was insects, and in summer 96%. Beetles (Coleoptera) especially taken, but also ants (Formicidae), caterpillars (Lepidoptera), grasshoppers (Orthoptera) and cicadas (Cicadidae); seeds, especially those of Chenopodiaceae, also taken. Forages mostly on ground or low in vegetation. Searches on ground by using technique of two-footed scratch; hops or runs on ground.

Breeding. Season Mar–Sept; usually double-brooded. Pair-bond maintained retained throughout year. Nest built by female, taking c. 1 week, a bulky cup of twigs, dry leaves and bark strips, lined with materials such as soft inner bark of cottonwood species (*Populus*), hair and soft grasses, generally placed 1–4 m above ground (rarely on ground) in small tree or shrub such as Mexican elderberry (*Sambucus mexicanus*) or in mistletoe (*Phoradendron californicum*). Clutch 1–4 eggs, almost always 3, whitish, with dark brownish or blackish splotches around wide end; incubation by female, period 14 days; chicks fed by both parents, nestling period 12–13 days. Nests parasitized relatively frequently by Brown-headed Cowbird (*Molothrus ater*).

Movements. Sedentary.

Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Much of this species' preferred streamside habitat has been cleared and modified by humans, primarily for agricultural land, a process started before colonization by European settlers; habitat degraded also through overgrazing by cattle, construction of dams, channelization, and abstraction of water for drinking supplies and cattle-ranching. Although it has to some extent adapted to some urban habitats, and occupies exotic vegetation e.g. along ditches in S Arizona, as well as invasive salt cedar, these habitats are not optimal and do not compensate for habitat destroyed. Vulnerable also to brood parasitism by Brown-headed Cowbirds.

Bibliography. Armani (1985), Bassett (1980), Beadle & Rising (2002), Cardiff & Cardiff (1950), Davis (1951), Dawson (1954), Dodge *et al.* (1995), Finch (1981, 1983a, 1983b, 1984, 1985a, 1985b, 1985c), Howell & Webb (1995), Hubbard (1972b), Kunzmann *et al.* (2002), Lebbin *et al.* (2010), Marshall (1960), Meents *et al.* (1981), Miller *et al.* (1957), Parkes (1957), Pyle (1997), Ridgway (1901), Rising & Beadle (1996), van Rossem (1946), Tweit & Finch (1994), Zink (1988), Zink & Dittmann (1991).



Genus *AIMOPHILA* Swainson, 1837

168. **Rufous-crowned Sparrow**

Aimophila ruficeps

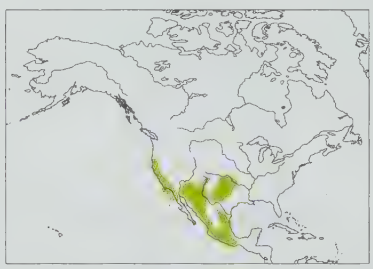
French: Tohi à calotte fauve **German**: Rostscheitelammer **Spanish**: Chingolo Coronirrufo

Taxonomy. *Ammodromus ruficeps* Cassin, 1852, Calaveras River [east of Stockton], California, USA. Genus closely related to *Melozone* and *Pyrgisoma*. Geographical variation rather poorly marked. For convenience, races sometimes divided into "Pacific-coast group" (nominate, *canescens* and *obscura*), "SW-desert group" (*eremoeca* and *scottii*), and "Mexican group" (remaining races); most races in last group are very poorly differentiated. Race *eremoeca* intergrades with *scottii* in W Texas and with *pallidissima* in N Mexico (Coahuila), and last two may be synonyms of *eremoeca*; likewise, *boucardi* intergrades with *eremoeca* in E Mexico; in W Mexico *suttoni* intergrades with (and may be better subsumed in) *extima* and may intergrade also with *fusca*, and latter intergrades in SW Guanajuato with *simulans*, from which *rupicola* is possibly inseparable. Taxonomic review required. Eighteen subspecies currently recognized.

Subspecies and Distribution.

A. r. ruficeps (Cassin, 1852) – C California (coast ranges and W slopes of Sierra Nevada), in SW USA.
A. r. canescens Todd, 1922 – SW California and extreme NW Mexico (NW Baja California E to base of Sierra San Pedro Mártir, S to c. 30°30' N).
A. r. obscura Dickey & van Rossem, 1923 – islands of Santa Cruz, Anacapa and Santa Catalina, off SW California.
A. r. sanctorum van Rossem, 1947 – Todos Santos Is, off NW Baja California (NW Mexico).
A. r. scottii (Sennett, 1888) – SW USA (N & E Arizona and SW New Mexico) S to N Mexico (NE Sonora and NW Coahuila).
A. r. rupicola van Rossem, 1946 – mountains of SW Arizona.
A. r. eremoeca (N. C. Brown, 1882) – S USA from SE Colorado, SW Kansas and W & C Oklahoma S through E New Mexico and W Texas to N Mexico (N Chihuahua and C Coahuila).
A. r. sororia Ridgway, 1898 – extreme S Baja California, in W Mexico.
A. r. simulans van Rossem, 1934 – NW Mexico from SE Sonora and SW Chihuahua S to N Nayarit, SW Zacatecas, N Jalisco and W Guanajuato.
A. r. phillipsi Hubbard & Crossin, 1974 – SE Sinaloa (Palmito area).
A. r. suttoni Hubbard, 1975 – E Nayarit and N & W Jalisco, possibly also in Colima.
A. r. fusca (Nelson, 1897) – S Nayarit, SW Jalisco, N Colima and Michoacán.
A. r. extima A. R. Phillips, 1966 – E Jalisco and N Michoacán.
A. r. pallidissima A. R. Phillips, 1966 – NE Mexico from S Coahuila S to N San Luis Potosí and E to SE Tamaulipas.
A. r. boucardi (P. L. Sclater, 1867) – E Mexico from C Coahuila, C Nuevo León and S Tamaulipas S through San Luís Potosí to Distrito Federal, Tlaxcala, N Puebla and CW Veracruz.
A. r. duponti Hubbard, 1975 – Valley of Mexico.
A. r. australis (Nelson, 1897) – S Mexico (Guerrero, S Puebla and Oaxaca).
A. r. laybournae Hubbard, 1975 – WC Veracruz S to SE Puebla and NC Oaxaca.

Descriptive notes. 13·5–15 cm; 15·2–23·3 g. A medium-sized sparrow with large bill and long, rounded tail. Nominate race has crown rusty, thinly outlined with black above bill, sometimes with indistinct grey median crownstripe; grey supercilium becoming white above lores, narrow white eyering, blackish eyestripe becoming rusty behind eye, brownish-grey ear-coverts; pale buffish-white submoustachial stripe, thin black malar stripe; upperparts greyish with broad rusty streaks, rump unstreaked; upperwing and tail brown, wing feathers with pale edges, tertials with some rufous in edges, rectrices edged paler; throat whitish-buff, becoming greyer on breast and brownish-grey on rest of underparts, paler on belly and with buffy tinge on undertail-coverts; iris dark brown; bill dark grey, paler below; legs flesh-coloured. Sexes similar. Juvenile is like adult, but with indistinct grey streaks below. Races differ mainly in plumage tone and in size, nominate being small, with small bill, and relatively dark above: *canescens* is similar to nominate, but with longer tail, smaller bill, and slightly more greyish tone; *obscura* is similar to nominate, but larger, and darker and colder in tone, pale brownish below; *scottii* is larger than nominate, with medium-sized bill, greyish above, pale brown with grey tinge below; *eremoeca* is like previous in size, but with shorter tail and longer bill, upperparts more olive and less well streaked, greyer below; *sanctorum* is darkest of all, darker than *obscura*; *rupicola* is like *scottii*, but slightly darker and greyer above; *sororia* is palest of coastal Mexican races, paler than nominate; *simulans* is more rufous above and paler below than *scottii*, smaller-billed than preceding race; *suttoni* buffier above than previous, with dorsal streaking redder; *fusca* is darker and more extensively rufous above, has darker crown lacking grey median stripe; *phillipsi* is dark and rather brown; *pallidissima* is large, very grey and generally rather pale, darker crown contrasting with grey back, somewhat like *eremoeca*, but darker on crown, with more extensive dorsal streaking; *boucardi* is like previous, but darker and browner, with browner, often broader dorsal streaking; *duponti* is darkest and greyest race; *australis* is similar to *scottii*, but smaller, with shorter bill; *extima* greyer above than previous, with chestnut-brown crown, and broader dorsal streaking; *laybournae* is pale, with greyish upperparts and dusky streaking. Voice. Variable, but generally 6–9 jumbled or staccato "chip" notes, or "tchee-dle tchee-dle tchee-dle tchee-dle tchee-dle tchee-dle". Call a distinctive nasal "dear" or a series of "dear dear" notes; alarm call an upward-slurred "tzit".



Habitat. Dry hillsides and canyons with low cover of grass, forbs and bare ground. In California often found in California sage (*Artemisia californica*) on open grassy hillsides with scattered brush and rocks; in S California in moist coastal scrub. Elsewhere, found in chaparral, oak (*Quercus*) woodland, pine–oak (*Pinus–Quercus*) woodland, sometimes in pinyon–oak–juniper (*Pinus–Quercus–Juniperus*). In Texas also in dwarf oak in hilly country with scattered boulders. In Zacatacas (Mexico), has been found apparently breeding in mesquite–prickly pear (*Prosopis–Opuntia*) vegetation. Sea-level to low hills, occasionally to 1350 m.

Food and Feeding. Little information. In autumn and winter eats mostly seeds; some insects taken, also small lizards and berries. Forages on ground and low in bushes; gleans items. Difficult to observe. Usually in small groups outside breeding season.

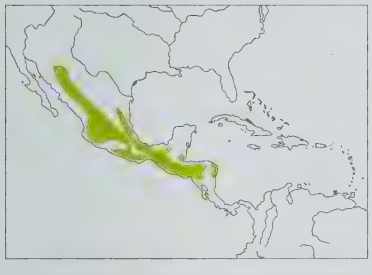
Breeding. Breeds in late winter and spring (Feb–Jun) in California, but in summer (Jul–Sept) in SW deserts, and recorded in Jun and Jul in S Mexico (Oaxaca); nests after rain, nest-building beginning once appropriate humidity and grass conditions present. Monogamous; pair-bond maintained during winter. Nest built by female, a bulky cup made largely from dry grass, lining including finer

grass and animal hair, placed on ground and well hidden, often by overhanging grass, at base of bush, or on rocky slope; rarely up to 45 cm above ground in shrub. Clutch 2–5 eggs, usually 3 or 4, pale bluish-white or whitish and unmarked; incubation by female, period 11–13 days; chicks fed by both parents, nestling period 8–9 days. Rare host of Brown-headed Cowbird (*Molothrus ater*).
Movements. Essentially sedentary; some move downslope in winter, and some may make post-breeding shift upslope in California. Seldom found outside known range; few records of wandering individuals in coastal Texas, S & E Kansas and W Arkansas.
Status and Conservation. Not globally threatened. Often common or very common in appropriate habitat. In California insular race *obscura* listed as being "of Special Concern" owing partly to habitat changes caused by fire suppression.
Bibliography. Anon. (1998), Armani (1985), Binford (1989), Busy *et al.* (1999), Collins (1999), DaCosta *et al.* (2009), Ellison (1999), Fredrickson (1951), Hellmayr (1938), Howell & Webb (1995), Hubbard (1975), Hubbard & Crossin (1974), Janzen (2002), Miles (1986), Miller *et al.* (1957), Morrison & Bolger (2002a, 2002b), Morrison *et al.* (2004), Myers (1909), Pemberton (1910), Remsen & Cardiff (1979), Schram (2009), Shuford & Gardali (2008), Storer (1955), Wauer (1965, 1967), Willard (1912), Wolf (1977), Yuri & Mindell (2002).

169. **Rusty Sparrow**
Aimophila rufescens

French: Tohi roussâtre **German**: Rostrückenammer **Spanish**: Chingolo Rojizo
Other common names: Mexican Rusty Sparrow

Taxonomy. *Pipilo rufescens* Swainson, 1827, Temascaltepec, México, Mexico.
Genus closely related to *Melozone* and *Pyrgisoma*. Race *pyrgitoides* intergrades with *pectoralis* in area from S Mexico (C Chiapas), NC Guatemala and W Belize E to interior highlands of Honduras (possibly also of Nicaragua). In Mexico, proposed races *sinaloa* (described from S Sinaloa), *pallida* (from Etzatlán, in Jalisco), *disjuncta* (from San Gabriel Mixtepec, in S Oaxaca) and *cinerea* (from Cerro de la Gineta, in SW Chiapas) are all treated as synonyms of nominate, and *newmani* (from E of Ciudad del Maiz, in San Luis Potosí) is considered synonymous with *pyrgitoides*; *gigas* (from Nebaj, 80 km N of Quiche, in SW Guatemala) is synonymized with *pectoralis*. Seven subspecies recognized.
Subspecies and Distribution.
A. r. antonensis van Rossem, 1942 – Sierra de San Antonio, in NC Sonora, in NW Mexico.
A. r. mcleodii Brewster, 1888 – NW Mexico from E Sonora and W Chihuahua S to N Sinaloa and NW Durango.
A. r. rufescens (Swainson, 1827) – W & S Mexico from S Sinaloa S to Jalisco, Colima, Guerrero, S Oaxaca and SW Chiapas, and E to Guanajuato, México and S Puebla.
A. r. pyrgitoides (Lafresnaye, 1839) – E & SE Mexico from S Tamaulipas and E San Luis Potosí S through E Puebla and Veracruz to N Oaxaca and N & C Chiapas, and S to Honduras, N & C El Salvador and NW Nicaragua.
A. r. pectoralis Dickey & van Rossem, 1927 – S Mexico (Chiapas) and C & S Guatemala S to Honduras and El Salvador.
A. r. discolor Ridgway, 1888 – N Honduras and NE Nicaragua.
A. r. hypaethra Bangs, 1909 – Pacific slope of Guanacaste Cordillera, in NW Costa Rica.



Descriptive notes. 16·5–20 cm; 28·2–49·7 g. A large sparrow, larger in N than in S, with large bill and long, rounded tail. Nominate race has rusty crown with grey median stripe, often a thin black lateral line above supercilium, white supercilium becoming grey behind eye, broken white eyering, thin black eyestripe becoming dark chestnut behind eye; ear-coverts greyish, pale buff-grey to whitish submoustachial stripe, contrasting black malar stripe; upperparts rufous-brown with dark grey-brown streaks and spots, rump plainer rufous; upperwing and tail mostly rusty; throat whitish, underparts pale buffy brown to greyish-buff, deeper brown on flanks and paler on belly; iris dark brown; bill mostly blackish above, paler below; legs light brown to pinkish-flesh. Sexes similar. Juvenile has crown, nape and upperparts rufous-brown with dark brown to blackish streaks, broad buffy supercilium and submoustachial stripe, and underparts washed pale yellowish and streaked brown, lower mandible bluish-flesh. Race *mcleodii* is larger than nominate, also duller brown and less streaked, lacking pale median crownstripe and black line above supercilium; *antonensis* resembles previous, but paler and greyer; *pyrgitoides* is buffy above and has distinct dark streaks on back, also more buffish below than nominate; *pectoralis* is like nominate, but underparts greyish, and throat whiter, thus appearing to have breastband; *discolor* is smaller than nominate, greyish on side of head, rufous on upperparts and more richly coloured buff-brown on flanks; *hypaethra* is like nominate, but darker and more streaked above, with dusky lateral crownstripe. Voice. Song a varied, usually short series of clear chipping notes, e.g. "cheeu shik-chik". Call a fast dry chatter; also a scolding "chrrr-rrr-rrr".
Habitat. In Sonora and Chihuahua inhabits logged pine (*Pinus*) forests and pine–oak (*Pinus–Quercus*) woodlands with patches of *Ceanothus* and bracken (*Pteridium*) understorey; in Zacatecas found in bunch-grass beneath oaks; in Jalisco grassy hillsides dominated by open legume–oak vegetation. In lowlands of E Mexico (from S Tamaulipas) S to Honduras and Nicaragua occurs in pinelands with extensive grassland areas. From near sea-level to 2400 m.
Food and Feeding. Little information. Diet probably seeds, small insects, spiders (Araneae) and fruits; sometimes takes nectar. Forages principally on or near ground or low in vegetation. Often in pairs or small groups.
Breeding. Records mostly mid-May to Sept; nest with eggs on 7th Jun in Guatemala (at Volcán de Agua, 2000 m), and a female laying in Oct in El Salvador, where breeding season may be Jul–Nov; perhaps little synchrony among pairs. Probably monogamous. Nest a well-woven structure of grass, lined with finer fibres, well hidden on ground or up to 2·4 m above it in vegetation; of eight nests found in Morelos (E of Cuarnavaca, above 1800 m), in Mexico, during May to early Jul, five were placed on ground. Clutch commonly 2–3 eggs, sometimes 4, whitish-blue with dark spotting. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common to common throughout range. Often common or very common in optimum habitat.
Bibliography. Anon. (1998), Armani (1985), Binford (1989), DaCosta *et al.* (2009), Dickey & van Rossem (1938), Griscom (1932), Hellmayr (1938), Howell & Webb (1995), Marshall (1957), Miller *et al.* (1957), Rowley (1962), Storer (1955), Wolf (1977).

170. **Oaxaca Sparrow**
Aimophila notosticta

French: Tohi d'Oaxaca **German**: Oaxacaammer **Spanish**: Chingolo Oaxaqueño

Taxonomy. *Peucaea notosticta* P. L. Sclater and Salvin, 1868, central Mexico, probably Puebla.
Genus closely related to *Melozone* and *Pyrgisoma*. Monotypic.
Distribution. NW & C Oaxaca (E to Santiago Matatlán) and probably adjacent SE Puebla, in S Mexico.



Descriptive notes. 15–16·5 cm; 26·4–30 g. A medium-sized sparrow with large bill and rounded tail. Has crown chestnut, grey median stripe above bill, narrow black edging above supercilium; lores black, supercilium white above lores, becoming greyer posteriorly, narrow white eyering, brown postocular stripe; ear-coverts grey, light buffish-white submoustachial stripe, contrasting black malar stripe; upperparts warm brown, mantle, scapulars and back with narrowly rusty-edged black streaks; upperwing dark brown, most feathers edged greyish-buff, inner secondaries and tertials more broadly edged rufous; tail dark grey-brown, feathers narrowly edged paler; throat whitish; side of neck and breast grey, becoming buff-grey on flanks and belly, and paler ochre-brown on undertail-coverts; iris dark brown; bill black, sometimes pale grey below; legs dull flesh-coloured. Sexes similar. Juvenile is duller and more buffish than adult, crown and nape finely streaked black, upperparts narrowly but heavily streaked dark brown, lower throat to breast and flanks washed pale yellowish and narrowly streaked dark brown, bill paler. Voice. Song a single note, sometimes 2, followed by varied chipping notes, e.g. "swi, chi-chi-chi-chi-chi-chi". Call a dry chatter, or high-pitched "tik"; also gives nasal scolding chatter like that of a wren (Troglodytidae), e.g. "shashashasha..." or "chehchehcheh", also a protracted, harsher chatter.
Habitat. Arid montane scrub with scattered oaks (*Quercus*) and manzanita (*Arctostaphylos*), and thorn-scrub; at 1500–1900 m.
Food and Feeding. Little information. Diet probably seeds, small insects, spiders (Araneae) and fruits. Forages principally on or near ground or low in vegetation. May be seen in small flocks in winter.
Breeding. Breeding records in May, Jun and Jul. Probably monogamous. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Balsas Region and Interior Oaxaca EBA. Rare to locally fairly common within its limited range; habitat being destroyed by farming activities. Has moderately small range, within which estimated population fewer than 50,000 individuals; range probably decreasing owing to loss and degradation of habitat. Although significant areas of suitable habitat remain, these are under pressure from cutting for timber and firewood-gathering, and face threat of clearance for cattle-ranching; nevertheless, apparently no direct evidence of population decline. Recommended actions include the undertaking of surveys to determine the species' population size, and monitoring of trends through regular surveys; also, monitoring of rates of habitat loss and degradation within its range, and protection of suitable habitat.
Bibliography. Anon. (1998, 2010c), Armani (1985), Binford (1989), Butchart & Stattersfield (2004), DaCosta *et al.* (2009), Hardy (1980), Hellmayr (1938), Howell & Webb (1995), Miller *et al.* (1957), Stattersfield & Capper (2000), Storer (1955), Wolf (1977).

Genus *TORREORNIS* Barbour & J. L. Peters, 1927

171. **Zapata Sparrow**
Torreornis inexpectata

French: Bruant de Zapata **German**: Zapataammer **Spanish**: Chingolo de la Ciénaga
Other common names: Cuban Sparrow

Taxonomy. *Torreornis inexpectata* Barbour and J. L. Peters, 1927, Santo Tomás, Zapata Peninsula, Cuba.
Relationships of this species unclear; thought to be close to *Aimophila* or possibly to *Peucaea* (latter previously subsumed in *Aimophila*) because of general structure and skeletal data, but differs clearly in plumage. Three subspecies recognized.
Subspecies and Distribution.
T. i. inexpectata Barbour & J. L. Peters, 1927 – Zapata Swamp, in W Cuba.
T. i. varonai Regalado Ruiz, 1981 – Cayo Coco, off NC Cuba.
T. i. sigmani Spence & B. L. Smith, 1961 – coastal regions of province of Guantánamo, in SE Cuba.
Descriptive notes. 16·5 cm; 19·7–29·3 g. A large-headed, moderately long-tailed sparrow with medium-sized conical bill and short, rounded wings. Nominate race has chestnut crown with indistinct grey median crownstripe, grey supercilium becoming paler and whitish in supraloral area; face grey, narrow brown eyestripe, narrow dusky moustachial stripe from bill continuing around lower edge of ear-coverts, contrasting white submoustachial stripe bordered below by dark malar stripe, malar broadening towards breast; nape grey, upperparts contrastingly olive, mantle to upper back and scapulars streaked brown; tail dark brown, feathers narrowly edged grey-buff; upperwing brownish, edges of median and greater coverts warmer brown, tertials edged rusty brown (creating

On following page: 172. Striped Sparrow (*Oriturus superciliosus*).



warm brown panel on folded wing); throat clean white; upper breast greyish, side of breast olive-yellow, lower breast and belly dull yellow, flanks more olive-yellow; iris dark chestnut; bill black, often with blue-grey on lower mandible; legs dull flesh-coloured. Sexes similar. Juvenile is similar to adult, but duller and more muted in coloration. Race *varonai* is like nominate, but crown darker rufous, bolder face pattern; *sigmani* is smaller, with relatively small bill, also paler, crown less intensely rufous, little greyish-olive on chest and flanks, yellow below paler and more extensive, and dorsally less noticeably streaked. Voice. Songs tend to be duets, initiated by male. Typical duet a highly synchronized series of high-pitched buzzes which become louder as song progresses, and slow and decrease in amplitude and frequency as they end in a chatter, "tzi-tzi-tzi...tiiitziii...tik-tik-thk"; total duration from less than 2 seconds to nearly 5 seconds. Another common type is the chatter-duet, with song comprised not of buzzes, but of shorter chatter notes given by both pair-members; another duet exists in which male sings buzz notes and female chatter notes. Songs of nominate race and *sigmani* are not significantly different. Contact call a buzz centred at 8 kHz, "zeea", female a single buzz, male often 2–4 in a series, buzz call of nominate race lower-pitched than that of *sigmani*; other calls include high thin "chip" and softer "pit" and a metallic "oing".

Habitat. Seasonally flooded sawgrass prairies in Zapata Swamp (nominate race); dry to semi-wet open forest in Cayo Coco (*varonai*); and coastal thorn-scrub, dry forest and cactus stands in Guantánamo (*sigmani*).

Food and Feeding. In Zapata Swamp feeds on eggs of apple snails (*Pomacea*) during wet season, and may take small lizards (*Anolis*); in dry season shifts to seeds and invertebrates. In Cayo Coco takes insects, as well as seeds and fruits found on ground. Guantánamo population known to eat cactus fruit (*Opuntia*), as well as seeds of coastal incense (*Tournefortia gnaphalodes*). Forages on ground, in manner of *Zonotrichia*, scratching in leaf litter with both feet together. In Cayo Coco can be observed while foraging in open trails, as well as on open ground within forest; in Zapata it keeps to dense grass and is difficult to see. Generally in twos or threes; occasionally in larger flocks.

Breeding. Season Mar–Jun. Appears to be territorial throughout year. Few nests known, all from the Zapata region, a grassy well-formed cup placed in grass tussock, surrounded by sawgrass; clutch 2 eggs, pale green with brown spots. No other information.

Movements. Sedentary.

Status and Conservation. ENDANGERED. Restricted-range species: present in Cuba EBA. Has small range, within which estimated total population 1000–2499 mature individuals, and thought to be decreasing. Three distinct populations: nominate race occupies small area of Zapata Swamp and numbers more than 250 individuals; *varonai* considered numerous within its very restricted range on Cayo Coco, in Camagüey Archipelago; and *sigmani* is restricted to small section of coast in S Guantánamo, where population perhaps 600–700 individuals (until recently, range of *sigmani* thought to be even smaller and population only 110–200 individuals). Although no new information on trends, this species is believed to be declining at slow rate owing to habitat loss and degradation; population of nominate race, however, apparently stable. Drainage and dry-season burning have adverse effects on habitat in Zapata Swamp; Cayo Coco is being further developed for tourism; and habitat on Guantánamo coast threatened by burning and subsequent colonization by grasses, followed by fencing for sheep-rearing. Although none of the three races is officially protected, each has been recorded in a protected area.

Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Garrido & Kirkconnell (2000), González Alonso, González Bermudez & Quesada (1986), González Alonso, de las Pozas & González Bermudez (1982), Morton & González Alonso (1982), Raffaele *et al.* (1998), Spence & Smith (1961), Stattersfield & Capper (2000), Webster & Webster (1999).

Genus *ORITURUS* Bonaparte, 1850

172. Striped Sparrow

Oriturus superciliosus

French: Bruant rayé **German**: Streifenammer **Spanish**: Chingolo Rayado

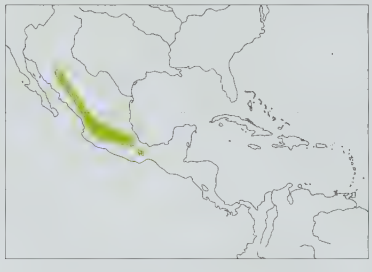
Taxonomy. *Aimophila superciliosa* Swainson, 1838, Mexico.

Relationships of this species unclear; generally placed close to *Aimophila*, but molecular studies suggest that it is part of a group that also contains *Melospiza*, *Passerculus*, *Xenospiza*, *Pooecetes*, and *Ammodramus henslowi* and *Ammodramus bairdii*. Races poorly differentiated; specimens from Nayarit, Jalisco, Zacatecas, Aguascalientes and Michoacán reported as being intermediate. Two subspecies recognized.

Subspecies and Distribution.

O. s. palliatus (van Rossem, 1938) – W Mexico in Sierra Madre Occidental from E Sonora and SW Chihuahua S through E Sinaloa and W Durango to Nayarit and W Zacatecas.

O. s. superciliosus (Swainson, 1838) – S part of C plateau of Mexico in Jalisco, Aguascalientes and Guanajuato E to Tlaxcala and WC Veracruz, S to Michoacán, Morelos, Puebla and C Oaxaca.



Descriptive notes. 16·5–18 cm; 36·9–53·7 g. A large, flat-headed sparrow with long, rounded tail. Nominate race has crown rusty, thinly streaked with black, and with a more or less distinct pale buffy median crownstripe; long broad supercilium creamy white, side of face black; nape grey, streaked with black; upperparts buffish-brown, heavily streaked black (black feather centres), streaks heaviest on mantle (which also washed rufous); tail brown, feathers edged buffy brown; upperwing blackish, median and greater coverts with broad light buffish edges and whitish tips (forming two indistinct wingbars), primaries narrowly edged light greyish, secondaries thinly edged buffish-brown, tertials edged buff-brown and tipped white; throat white, underparts greyish-white, belly paler, flanks and undertail-coverts washed buffish; iris dark brown; bill black; legs pinkish. Sexes alike in coloration. Juvenile is similar to adult, but greyer, with lower throat, breast, belly and flanks thinly streaked with black. Race *palliatus* is paler overall and warmer brown above than nominate, but more greyish below, with whiter belly. Voice. Song 1–3 nasal chipping notes followed by rattling trill, "tiuk tiuk tiuk beeh beeh drrrrrrrrrr". Call a sharp "tik".

Habitat. Found in bunch-grass and probably other scrubby and grassy openings in or near humid pine–oak (*Pinus–Quercus*) forest, and in wet meadows. At 1500–3500 m.

Food and Feeding. Little information. Recorded as eating seeds and insects; adults seen to feed green plant material and insects to fledged young. Forages principally on or near ground and low in vegetation.

Breeding. Season May–Sept. Seemingly monogamous; may be loosely colonial. Nest a cup of dry grasses, lined with finer vegetation and sometimes hair, placed close to ground, often in thick bush. Clutch 3–4 eggs, white with greyish or brownish markings; incubation by female, period 13–14 days; no information on nestling period.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Locally common to fairly common. Suitable habitat for this species often destroyed by agricultural activities.

Bibliography. Anon. (1998), Armani (1985), Binford (1989), Dunning (2008), Hellmayr (1938), Howell & Webb (1995), Klicka & Spellman (2007), Miller *et al.* (1957), Russell & Monson (1998), Storer (1955).

PLATE 56 ➤


inches 2
cm 5
PLATE 56
173
ssp excelsus
ssp alaudinus
174
ssp bracki
175
176
ssp punensis
ssp chloronotus
ssp gayi
177
ssp caniceps
178
ssp fruticeti
179
ssp coracinus
180
ssp ocularis
182
ssp plebejus
ssp nivarius
181
184
183
ssp unicolor

Genus *PORPHYROSPIZA*

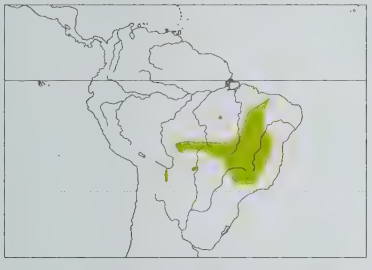
P. L. Sclater & Salvin, 1873

173. **Blue Finch**

Porphyrospiza caerulescens

French: Porphyrin à bec jaune **German**: Kobaltämmerling **Spanish**: Yal Azul
Other common names: Yellow-billed Blue Finch

Taxonomy. *Tanagra caerulescens* Wied, 1830, interior of Bahia, Brazil.
Often placed in family Cardinalidae because of resemblance to *Passerina*, and has sometimes been included in that genus. Molecular data suggest that its closest relative may be *Phrygilus alaudinus* and that both belong with the tanagers (Thraupidae); these two species are united by structure, bill shape, some aspects of coloration, and song, and both should probably be shifted to a new genus, for which the name *Corydospiza* is available (and which has priority over present genus). Monotypic.
Distribution. C & E Brazil from S Mato Grosso, SE Pará and C Maranhão S to Goiás, Piauí, W Bahia and W & C Minas Gerais, and E & S Bolivia (E Beni and SE Santa Cruz, probably also Chuquisaca).



Descriptive notes. 12·5 cm; 13 g. A slim finch with relatively long tail, and long bill with only slightly curved culmen. Male is bright indigo-blue throughout, becoming blackish on lores; wing and tail blackish, widely edged blue, centres of tertials broadly black; when freshly moulted, upperpart feathers tipped rufous (tips wear off by breeding season); iris dark brown; bill yellow, contrasting strongly with blue of head and body; legs dull pink. Female has head pale brownish with pale eye-crescents and slightly paler supercilium, upperparts warm brown, thinly streaked on back, with rump and uppertail-coverts greyish; wing and tail dark greyish, flight-feathers edged warm brown, upperwing-coverts warm brown with slightly paler tips (creating very narrow and poorly defined wingbars); buffy white below, narrowly streaked darker on throat, breast and flanks and more heavily streaked on undertail-coverts; bare parts similar to those of male, but bill duller yellow and with dark culmen and tip. Juvenile is like female, but richer brown, and more coarsely and densely streaked on breast and flanks. Voice. Sibilant 3-note song a repetitive "swee-sweeet-zhweew, swee-sweeet-zhweew, ...". Male gives a trill when close to nest.
Habitat. Open savanna and *cerrado*, and associated strongly with grassland. In particular a specialist of *campo rupestre* habitat, of rocky grassland interspersed with bushes and short trees; *campo rupestre* is often at higher elevations, on top of plateaux, and therefore patchy, occurring as islands in lower-elevation *cerrado* habitats.
Food and Feeding. Feeds on invertebrates and seeds. Gizzard samples contained 80% dry seeds (45 seeds of grasses and two unidentified) and 20% arthropods, latter comprising twelve Lepidoptera larvae, five beetles (Coleoptera), one ant (Formicidae) and one spider (Araneae). Adults provisioning a nest brought in caterpillars, walking-sticks (Phasmatodea) and grasshoppers (Orthoptera). Forages on ground. Generally singly and in pairs; in non-breeding season may form small foraging flocks.
Breeding. Very little information. Males begin to sing at end of dry season and beginning of wet season, suggesting breeding mainly or strictly at start of rainy season; nests (with eggs) found in Sept and another (with nestlings) in Nov. One nest made from dry grasses, placed low down, near ground, in a canelas-de-ema (*Vellozia squamata*) plant; another was constructed from grasses, and placed low down in grassy area. Clutch 2–3 eggs, white with sparse small brown and rusty speckles, these denser near wide end; incubation period 14 days; male helps female in feeding chicks, each parent roughly feeding young about twice per hour, no information on duration of nestling period.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to rare, and patchily distributed. Now rare and local in many formerly occupied areas in Brazil, and likely declining moderately rapidly owing to habitat loss; populations in E Bolivia appear to be faring better and are under less pressure. Main threats include conversion of *cerrado* to agriculture, especially for eucalypt (*Eucalyptus*) plantations, soybeans and exportable crops, and for pasture; by mid-1990s two-thirds of *cerrado* habitat had been extensively or significantly modified, most of this having occurred since middle of 20th century, and habitat losses continue. Occurs in several protected areas in Brazil, including Chapada dos Guimarães, Chapada dos Veadeiros, Serra do Cipó and Serra da Canastra National Parks; present in Noel Kempff Mercado National Park, in Bolivia.
Bibliography. Anon. (2010c), Buzzetti & Silva (2005), Klicka *et al.* (2007), Lima & Buzzetti (2006), Maillard & Catari (2004), Parker & Rocha (1991), Ridgely & Tudor (1989), da Silva & Bates (2002), Stattersfield & Capper (2000).

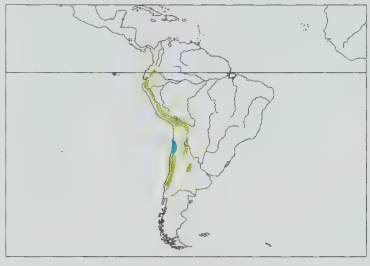
Genus *PHRYGILUS* Cabanis, 1844

174. **Band-tailed Sierra-finch**

Phrygilus alaudinus

French: Phrygile à queue barrée **German**: Schwanzfleckenämmerling **Spanish**: Yal Platero

Taxonomy. *Fringilla alaudina* Kittlitz, 1833, Valparaíso, Chile.
Molecular data suggest that this species' closest relative may be *Porphyrospiza caerulescens* and that both belong with the tanagers (Thraupidae); these two species are united by structure, bill shape, some aspects of coloration, and song, and both should probably be shifted to a new genus, for which the name *Corydospiza* is available (and has priority over *Porphyrospiza*). Races form two groups, a N group of smaller and darker races (*humboldti*, *bipartitus*, *bracki* and *excelsus*) and S group of two larger and paler ones (nominate and *venturii*). Six subspecies recognized.
Subspecies and Distribution.
P. a. humboldti Koepcke, 1963 – SW Ecuador and NW Peru.
P. a. bipartitus J. T. Zimmer, 1924 – highlands of Ecuador S through coastal slope in Peru to extreme N Chile (Putre, in Arica–Parinacota region).
P. a. bracki O'Neill & T. A. Parker, 1997 – Huallaga Valley, in C Peru.
P. a. excelsus Berlepsch, 1906 – S Peru (highlands of Arequipa and Puno) and W Bolivia.
P. a. venturii E. J. O. Hartert, 1909 – NW Argentina Jujuy S to Catamarca; also Córdoba and San Luis).
P. a. alaudinus (Kittlitz, 1833) – C Chile from Antofagasta S to region of Los Ríos.



Descriptive notes. 13·5–14·5 cm; 17–30 g. A medium-sized, slim-shaped sierra-finch with long pointed bill and relatively long tail. Male nominate race has head to breast grey, slightly darker on lores, crown narrowly streaked; upperparts lead-grey with wide blackish streaks, rump plain grey; upperwing blackish with grey feather edging, and grey shoulder; tail blackish, bold white band midway on each feather except central pair (in flight, white band very obvious on underside); grey breast, whitish belly and vent, flanks with buffy-grey tinge; iris dark brown; bill and legs bright orange-yellow. Female is brown and strongly streaked on face, crown and entire upperparts; whitish-buff throat and breast, streaked on lower throat and breast, giving way to off-white belly and vent, flanks buff and streaked darker; wings brownish, edged buffy, tertials edged cinnamon; tail as on male, but white band slightly less extensive; bill and legs yellowish, duller than on male. Juvenile resembles female, but young male has grey wash on breast and reduced streaking on breast and flanks. Race *venturii* is like nominate, but larger and slightly darker; *excelsus* is smaller than nominate, darker above and with darker breast; *bipartitus* is darker grey on breast than previous, approaching blackish on chin, and dark colour of breast is sharply demarcated from white belly; *bracki* is smaller than last two, but has relatively long bill and legs, also has richer brown markings above (when fresh) and is paler grey, abdomen more extensively whitish; *humboldti* is small like previous, and pale, but lacks rich coloration of fresh upperparts. Voice. Song, from top of bush or rock, sometimes in flight, geographically variable. In Chile, a 2-note buzzy sneeze, "tzii-chew", repeated in a series three or more times; on coastal slope of Peru song similar, although often repeated in series of two; in Bolivia song simpler, more musical and less buzzy, "twee-twew", and given singly or in multiples of up to four.
Habitat. In C Chile, open grassy slopes, often with exposed rocks and moderate shrub growth; in coastal Peru, open, flat, sandy and sparsely covered areas with isolated shrubs in highland areas, and Lomas vegetation. Coastal semi-desert in SW Ecuador and NW Peru (race *humboldti*). Sea-level to 4000 m, usually below 2500 m.
Food and Feeding. Seeds and invertebrates; studies in winter months in C Chile determined that diet consisted entirely of seeds. On basis of diversity of food items in stomachs, niche breadth of this species appears to be much narrower than that of *P. fruticeti* and *P. gayi*, suggesting that it is much more of a food specialist. Forages on ground. Generally in pairs or family groups; forms mixed flocks with *P. fruticeti* during winter in C Chile.
Breeding. Season Sept–Feb (egg dates Sept–Nov) in C Chile; fledglings observed late May in S Peru (Puno), Jun in Bolivia (La Paz) and Mar in Argentina (Tucumán); flight display in Lomas region of coastal Peru in Sept–Nov, presumably breeding in that period. In aerial display, rises to 20 m above ground and sings during descent. Nest made from grass, placed on ground at base of thicker grass tussock. Clutch 3–5 eggs, pale pinkish-white to pale greenish with blackish and purplish spotting, this denser at wide pole. No other information.
Movements. Sedentary in most of range. In Chile, nominate race at least partially migratory, e.g. a breeding visitor through Las Chinchillas National Reserve (in Region IV), leaving the area during winter months; some breeding areas in Chile are under snow in winter, and downslope migration appears to occur; records in austral winter from as far N in Chile as Paposo (Antofagasta), where no breeding records, indicating general distributional shift to N during non-breeding season.
Status and Conservation. Not globally threatened. Locally common to uncommon throughout its large range. Occurs in few protected sites, perhaps one of the largest being La Campana National Park, in C Chile. No known threats.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Housse (1945), Jaksic (1997), Jaksic & Lazo (1999), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), O'Neill & Parker (1997), de la Peña (1987), Ridgely & Tudor (1989), Skinner (1935), Wetmore (1926), Zimmer (1924).

175. **Black-hooded Sierra-finch**

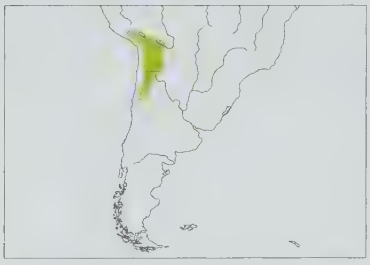
Phrygilus atriceps

French: Phrygile à tête noire **German**: Kapuzenämmerling **Spanish**: Yal Cabecinegro
Other common names: Northern Hooded Sierra-finch

Taxonomy. *Emberiza atriceps* d'Orbigny and Lafresnaye, 1837, "Tacora" (= Tarapacá), Chile (formerly in Peru).
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species may form a superspecies with *P. punensis*, *P. gayi* and *P. patagonicus* (the "hooded" group), and molecular data suggest that this group may be closely related to *Sicalis*. Has been considered conspecific with *P. gayi*, but the two rarely hybridize in area of NC Chile (between Atacama and Coquimbo) where they are sympatric (only one hybrid specimen known, from Guatín, in Antofagasta). Geographical variation minimal; individuals from C Bolivia S to NW Argentina slightly longer-billed than others, but difference likely clinal variation, also males from NW Bolivian Altiplano (Sajama) said to be particularly black-winged. Treated as monotypic.

On following pages: 176. Peruvian Sierra-finch (*Phrygilus punensis*); 177. Grey-hooded Sierra-finch (*Phrygilus gayi*); 178. Patagonian Sierra-finch (*Phrygilus patagonicus*); 179. Mourning Sierra-finch (*Phrygilus fruticeti*); 180. Carbonated Sierra-finch (*Phrygilus carbonarius*); 181. Plumbeous Sierra-finch (*Phrygilus unicolor*); 182. Ash-breasted Sierra-finch (*Phrygilus plebejus*); 183. Red-backed Sierra-finch (*Phrygilus dorsalis*); 184. White-throated Sierra-finch (*Phrygilus erythronotus*).

Distribution. S Peru (highlands of Arequipa, Moquegua and Tacna) S through highlands of SW Bolivia to N Chile (from highlands of E Arica–Parinacota S to Baños de Toro, in N Coquimbo) and NW Argentina (S to Catamarca).



Descriptive notes. 15·5–16 cm; average 24·3 g. A well-proportioned sierra-finch with relatively pointed bill. Male has solid black hood, contrasting strongly with russet upperparts and yellowish-russet underparts; wings and tail blue-grey, blackish with narrow pale edges on primaries and central tail feathers; underparts purest yellow on lower breast and belly, darker and more russet on breast, with vent and undertail-coverts white; iris chestnut; bill grey to black, often paler grey on lower mandible; legs greyish or blackish. Female is similar to male, but duller, with greyish cast to hood, and less intense coloration on body, but still with obvious russet tone; could be mistaken for male *P. punensis*, but hood blackish-grey (rather than blue-grey) and back warmer in tone. Juvenile is still duller than female, retains hooded pattern though throat whitish and streaked down to breast, body plumage more olive above, lacking yellower rump, and duller peachy yellow below, wings brownish with cinnamon wingbars; lacks marked supercilium and dark malar stripe of otherwise similar juvenile of *P. punensis*. Voice. Song a musical but repetitive series of notes given in alternating pairs, "tweep-tseep, tweep-tseep, tweep-tseep, tweep-tseep", or slightly more complex with one note doubled and then third given and this pattern then repeated; tends to sing more slowly, with notes shorter and more strident, than other members of "hooded group", which otherwise similar. Call a high-pitched and thin "ziip".

Habitat. Open highland scrub and shrubby areas, even where cacti dominant, also areas adjacent to grassy sites or *bofedal* areas (natural wetlands with spongy vegetation, or "cushion bogs"), also open *Polylepis* forests and edge; prefers some slope, not flat sites. Commonly found in highland villages, where it adapts well and becomes commensal and very tame. At 2400–4000 m.

Food and Feeding. Seeds and invertebrates. In highland villages will also take food scraps discarded by humans. Forages on ground. Generally in pairs, often with species of *Sicalis*, or with *P. unicolor* or *P. plebejus*. Exhibits less tendency to flock in non-breeding season than do *P. gayi* and *P. patagonicus*.

Breeding. Season mainly Nov–Jan, but nesting can occur at any time in year. Nest a grass cup, sometimes lined with camelid wool, placed in grass tussock, in bush, or even in hole in cliff or in man-made structure (30 cm deep) such as eaves of adobe house, or rock wall. Clutch 3–4 eggs, pale blue with fine brown spots, these concentrated at larger pole. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Common throughout its range. Benefits from its ability to live alongside humans. Occurs in several protected areas, including Reserva Nacional de Fauna Andina Eduardo Avaroa (Bolivia), Lauca and Volcán Isluga National Parks and Las Vicuñas National Reserve (Chile), and Los Cardones National Park and Pozuelos National Reserve (Argentina).

Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hellmayr (1932), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Marín *et al.* (1989), McCarthy (2006), Ridgely & Tudor (1989), Rocha & Quiroga (1996), Schulenberg *et al.* (2007).

176. Peruvian Sierra-finch

Phrygilus punensis

French: Phrygile du Pérou **German**: Punaämmerling **Spanish**: Yal Peruano
Other common names: Peruvian Hooded Sierra-finch

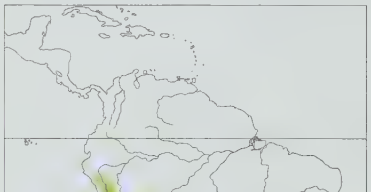
Taxonomy. *Phrygilus punensis* Ridgway, 1887, Lake Titicaca basin, Peru and Bolivia.

Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species may form a superspecies with *P. atriceps*, *P. gayi* and *P. patagonicus* (the "hooded" group), and molecular data suggest that this group may be closely related to *Sicalis*. Sometimes considered conspecific with *P. gayi*, which it resembles in appearance, but may be more closely related to *P. atriceps*. Two subspecies recognized.

Subspecies and Distribution.

P. p. chloronotus Berlepsch & Stolzmann, 1896 – N & C Peru (from Cajamarca S to Cuzco).

P. p. punensis Ridgway, 1887 – S Peru (Puno) and NW Bolivia (La Paz).



Descriptive notes. 15·5–16 cm; 35·9–38·5 g. Male nominate race has grey hood extending down to upper chest, lores blackish; upperparts dull russet with olive tone, tail feathers blackish with bold blue-grey edging; upperwing-coverts blue-grey and flight-feathers broadly edged blue-grey (making wing appear largely blue-grey); breast and flanks bright russet, belly more yellowish, vent and undertail-coverts white; iris dark brown; bill pinkish-grey, dark culmen and tip; legs dull pinkish. Female is similar in pattern to male, but hood paler in coloration, body plumage duller, more greenish above, and colour tones below more muted. Juvenile is streaked throughout, with slightly hooded appearance, has pale buff supercilium, and buffy throat bordered by wide brownish lateral stripes (which disrupt the generally hooded look), upperparts dull olive with obscure darker streaking, wings brownish with crisp buffy edgings (creating two narrow wingbars), tail brownish, underparts dull russet, becoming more yellowish on belly, off-white to pale buff on vent and undertail-coverts, most densely streaked on breast, more loosely on belly and flanks, and streaked brown on undertail-coverts. Race *chloronotus* is paler-headed and greener on upperparts and underparts than nominate. Voice. Song a musical but repetitive series of notes given in alternating pairs, "tweep-tseep, tweep-tseep, tweep-tseep, tweep-tseep"; has a more musical quality, and perhaps is generally lower-pitched, than song of *P. atriceps*. Call a high-pitched and thin "ziip".

Habitat. Shrubby and rocky highland slopes, also edge of villages in agricultural zones where ample shrub cover retained; also edge of *Polylepis* woodland. Both slope and shrub cover important. Usually not found in open grassy Altiplano plains. At 2500–4800 m.

Food and Feeding. Seeds and arthropods. Forages on ground. Generally singly or in pairs; in small foraging flocks in non-breeding season, and may form mixed flocks with various yellow-finches (*Sicalis*), other members of genus such as *P. unicolor*, or *Catamenia analis*.

Breeding. Breeds Jan–Jun. No other information available.

Movements. May descend to lower elevations in dry season.

Status and Conservation. Not globally threatened. Common to fairly common throughout its range. No known threats.

Bibliography. Armani (1985), Estrada & Rondan (2009), Fjeldså & Krabbe (1990), Hellmayr (1932), Johnson & Goodall (1967), Klicka *et al.* (2007), McCarthy (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

177. Grey-hooded Sierra-finch

Phrygilus gayi

French: Phrygile à tête grise **German**: Kordillerenämmerling **Spanish**: Yal Cabecigrís
Other common names: Southern Hooded Sierra-finch

Taxonomy. *Fringilla gayi* Gervais, 1834, Chile.

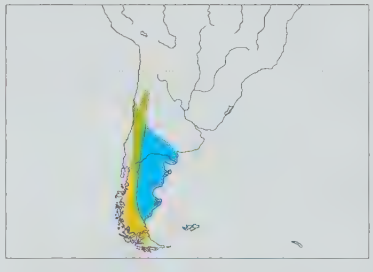
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species may form a superspecies with *P. atriceps*, *P. punensis* and *P. patagonicus* (the "hooded" group), and molecular data suggest that this group may be closely related to *Sicalis*. Has been considered conspecific with *P. atriceps*, but the two rarely hybridize in area of NC Chile (between Atacama and Coquimbo) where they are sympatric (only one hybrid specimen known, from Guatín, in Antofagasta); sometimes thought conspecific with *P. punensis*, which it resembles in appearance. Range overlaps with that of *P. patagonicus* in various sites in Andes and NW Tierra del Fuego; some evidence of hybridization in latter, but the two species generally remain separate, and occupy different habitats. Small coastal race *minor* exhibits some plumage features intermediate between present species and *P. patagonicus*, and may be better included in latter on basis of its preference for forest or forest-edge habitat. Nominate race in extreme N of range has particularly large bill, suggesting clinal variation in bill size. Three subspecies recognized.

Subspecies and Distribution.

P. g. gayi (Gervais, 1834) – N & C Chile from Antofagasta S to Ñuble.

P. g. minor R. A. Philippi [Bañados] & Goodall, 1957 – coastal range in NC Chile from Atacama S to Valparaíso.

P. g. caniceps Burmeister, 1860 – W Argentina (S from W Salta) and S Chile (S from Aysen) S to Tierra del Fuego.



Descriptive notes. 15·5–16·5 cm; 21·9–30·7 g. Male nominate race has head to upper nape and upper chest bluish-grey, lores blackish; upperparts greenish-yellow; tail feathers blackish with bold blue-grey edging; upperwing-coverts blue-grey and flight-feathers dusky grey, broadly edged blue-grey (making wing appear extensively blue-grey); underparts yellowish, darker on breast, more clearly yellow on lower breast, with central belly to undertail-coverts white; iris dark reddish-brown; upper mandible blackish to grey, lower mandible pinkish-grey; legs dull flesh-coloured. Female has greyish head, streaked on crown and ear-coverts, slightly paler greyish supercilium, whitish submoustachial stripe that curls up behind ear-coverts, well-marked brown malar stripe broadening towards breast; upperparts dull grey with olive tone, very indistinctly streaked; wings and tail brownish, lacking blue-grey colours of male, wing-coverts fringed buffy grey; throat whitish, collar of streaks on upper breast, rest of underparts apricot-yellow, buffy on belly and vent, approaching whitish on undertail-coverts; bare parts as on male. Juvenile is like female, but duller in overall colour, and with buffy or cinnamon wingbars and wing edgings. Race *caniceps* is larger than nominate, with larger and thicker bill, less yellow than nominate, female with whiter throat and submoustachial stripe; *minor* is significantly smaller than nominate, male slightly warmer in tone on upperparts, female tending to have full hood extending to throat. Voice. Song a musical but repetitive series of notes, often in alternating pairs, e.g. "tweep-tseep, tweep-tseep, tweep-tseep, tweep-tseep"; less musical than song of *P. patagonicus*, and often deviating from alternating-pair pattern, doubling or even tripling one note before changing to other note type. Call a smacking "tack".

Habitat. Wide variety of open, shrubby areas. Rocky and shrubby slopes in Andean range; flatter sites dominated by shrubs such as *Berberis* in Patagonia. Where sympatric with *P. patagonicus*, as in Maule region of C Chile, present species found in shrub habitats and thickets, at higher elevations and ranging to rocky Andean slopes above tree-line, while its congener is strictly tied to forest and forest edge; similarly, in NW Tierra del Fuego, latter occupies sheltered areas where tree growth high enough to form forest patches, with present species in steppe habitats adjacent to these forest patches. On Chilean coast, race *minor* found in habitats with short trees, and thicker and more humid *matorral* in ravines immediately along coast, this habitat tending towards that of *P. patagonicus*. Sea-level to 3000 m.

Food and Feeding. Diet primarily seeds and invertebrates; may take fruit at times, especially calafate (*Berberis*) in late summer in Patagonian part of its range. In winter, seeds comprise 100% of food in C Chile. Forages on the ground. Generally in pairs or in small flocks; flocks form largely in non-breeding season, groups in summer tending to be family units.

Breeding. Season Oct–Feb. Solitary, but in certain situations neighbouring females may nest in very close proximity to each other. Nest placed in thick grassy vegetation, often beside stream, or low in thick bush, but in drier areas may be built on ledge or in crevice of rock outcrop. No data on clutch size; eggs pale blue with fine brown spots, these concentrated largely at wider pole. No other information.

Movements. Patagonian race *caniceps* moves N after breeding, sometimes reaching S Buenos Aires province of E Argentina. In C Chilean Andes, nominate race makes post-breeding shift downslope to foothills, or even into C valley.

Status and Conservation. Not globally threatened. Common throughout its extensive range. Occurs in various protected sites, including several national parks and national reserves. No known threats.

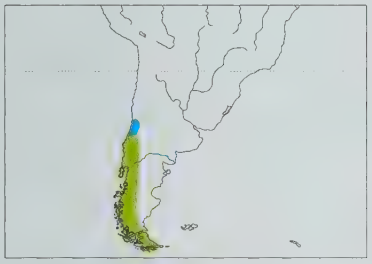
Bibliography. Armani (1985), Blendinger & Ojeda (2001), Estades (1997), Fjeldså & Krabbe (1990), Hellmayr (1932), Jaksic (1997), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Marín *et al.* (1989), McCarthy (2006), Ridgely & Tudor (1989), Vuilleumier (1991).

178. Patagonian Sierra-finch

Phrygilus patagonicus

French: Phrygile de Patagonie **German**: Magellanämmerling **Spanish**: Yal Patagón
Other common names: Patagonian Hooded Sierra-finch

Taxonomy. *Phrygilus gayi patagonicus* P. R. Lowe, 1923, Good Success Bay, Tierra del Fuego, Argentina.
Originally described as *Fringilla formosa*, but that name invalid, as preoccupied. Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species may form a superspecies with *P. atriceps*, *P. punensis* and *P. gayi* (the "hooded" group), and molecular data suggest that this group may be closely related to *Sicalis*. Range overlaps with that of *P. gayi* in various sites in Andes and NW Tierra del Fuego; some evidence of hybridization in latter, but the two species generally remain separate, and occupy different habitats. Small coastal race *minor* of *P. gayi* exhibits some plumage features intermediate between the two species, and may be better included in present species on basis of its preference for forest or forest-edge habitat. Monotypic.
Distribution. Breeds from Maule region of Chile S and from forested areas of adjacent Argentina (S from Neuquén) S to Tierra del Fuego. In winter also N to Valparaíso and Metropolitan Santiago regions.

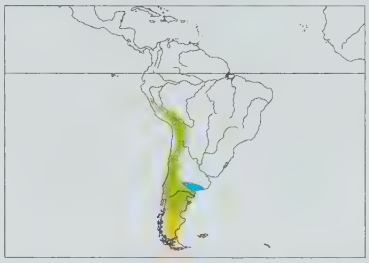


Descriptive notes. 14·5–15 cm; 19·1–27·4 g. Male has head to upper nape and upper breast blue-grey, lores blackish; upperparts russet, slightly more greenish near grey hood and contrastingly more yellowish on rump, uppertail-coverts blue-grey; tail feathers blackish with bold blue-grey edgings; upperwing-coverts blue-grey and flight-feathers dusky grey, broadly edged blue-grey (making wing appear largely blue-grey); underparts yellow, darker and with russet wash on breast and flanks, purer yellow on belly and vent, with undertail-coverts mostly white; iris chestnut; bill blue-grey, sometimes darker on culmen; legs dull pinkish. Differs from *P. gayi* in having much richer russet colour on back, warmer yellow tone on underparts, and white of undertail-coverts extending farther forwards (reaching to legs). Female is similar to male, with complete hood, but body coloration less intense, hood paler, and throat slightly paler, often with slightly darker malar stripe; also has darker upper mandible, bill not fully blue-grey. Juvenile is similar to female, but with darker malar stripe and paler greyish-white throat, underparts dull buffy yellow, upperparts more dull buffy olive; distinguished from extremely similar juvenile of *P. gayi* by less striking face pattern lacking pale supercilium and bold submoustachial and malar stripes. Voice. Song a musical but repetitive series of notes given in alternating pairs, "tweep-twop, tweep-twop, tweep-twop, tweep-twop"; more musical than song of *P. gayi*, and less likely to deviate from alternating-pair pattern. Call a smacking "tack".
Habitat. Various types of forest, including those dominated by southern beech (*Nothofagus*) and *Araucaria araucana*, as well as non-native forests such as eucalypt (*Eucalyptus*) and pine (*Pinus*) where some native understorey or middle storey remains. Frequent in interior of Patagonian forests, but most common at ecotones, roadsides, edges of clearings, near dwellings or in other openings adjacent to forest. Where sympatric with *P. gayi*, as in Maule region of C Chile, present species strictly tied to forest and forest edge, whereas its congener is found in shrub habitats and thickets, at higher elevations and ranging to rocky Andean slopes above tree-line; similarly, in NW Tierra del Fuego, found in sheltered areas where tree growth tall enough to form forest patches, while *P. gayi* occupies steppe habitats adjacent to these forest patches. Sea-level to 1500 m.
Food and Feeding. Seeds of grasses, also arthropods; also small forest fruits such as *Fuchsia magellanica*, *Berberis* and maqui (*Aristotelia chilensis*). Known to be a nectar robber of *Fuchsia magellanica*, reducing by 20% the seed production of plants pierced. Also feeds at sap holes produced by Magellanic Woodpeckers (*Campephilus magellanicus*). Widely observed to eat meat (jerky and bacon) left out to dry in the sun. Forages on ground, as well as in vegetation and trees. Usually in pairs; outside breeding season also in small flocks, sometimes mixed with other species.
Breeding. Season Nov–Feb. Nest a cup made from grasses, lined with softer material, usually placed in dense grasses or other vegetation on ground, or low down, but sometimes high up in *Nothofagus* tree, or in crevice in rock wall. Clutch 2–5 eggs, pale blue with fine brown spots, these concentrated at larger pole. No other information.
Movements. Mostly sedentary. Some move N after breeding, e.g. specimens from Metropolitan Region of Santiago, well N of breeding range, during winter months; similarly, some may retreat from higher elevations of Patagonian forest in winter, particularly during years with deep snow cover.
Status and Conservation. Not globally threatened. Common throughout its range. Present in various protected sites, such as national parks or national reserves, in both Chile and Argentina. As the forested habitats that this species prefers are well represented in the park systems of Chile and Argentina, a sizeable amount of habitat where it occurs is protected.
Bibliography. Armani (1985), Estades (1997), Fjeldså & Krabbe (1990), Hellmayr (1932), Housse (1945), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), McCarthy (2006), Ojeda & Trejo (2002), Ridgely & Tudor (1989), Schlatter & Vergara (2005), Traveset *et al.* (1998), Vuilleumier (1991).

179. Mourning Sierra-finch
Phrygilus fruticeti

French: Phrygile petit-deuil **German**: Strauchämmerling **Spanish**: Yal Pechinegro

Taxonomy. *Fringilla fruticeti* Kittlitz, 1833, Valparaíso, Chile.
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species appears to be sister to *P. carbonarius*, and studies suggest that the two should be placed together in a separate genus, for which the name *Rhopospina* is available. Three subspecies recognized.
Subspecies and Distribution.
P. f. peruvianus J. T. Zimmer, 1924 – Peru (S Cajamarca S to Puno) and W Bolivia (La Paz).
P. f. coracinus P. L. Sclater, 1891 – Altiplano of SW Bolivia (in Oruro and Potosí) and adjacent N Chile in regions of Arica–Parinacota (Visviri) and Tarapacá (Isluga).
P. f. fruticeti (Kittlitz, 1833) – Chile from (Arica–Parinacota S to Magallanes) and W Argentina (Salta S to Santa Cruz), largely in foothills of Andes.
Descriptive notes. 18 cm; 35·1–41·8 g. A stocky and rather large-bodied finch with long tail and medium-sized bill. Male nominate race has head grey, blackish lores, crown densely streaked blackish; upperparts grey, streaked from mantle to back (lower back and rump unstreaked); tail blackish, upperwing blackish, two well-formed white wingbars; chin to lower breast blackish, flanks greyish, upper flanks streaked, belly whitish, undertail-coverts white; appearance changes considerably with wear, in fresh plumage (after breeding season) pale brownish-buff above with dark streaks (brownish-buff feather tips gradually wearing away to reveal grey bases), black of throat and breast veiled with white, lesser coverts tipped grey, median and greater coverts edged brownish-buff, as are flight-feathers and tail feathers; iris brown; bill orange-yellow; legs dull orange. Female has

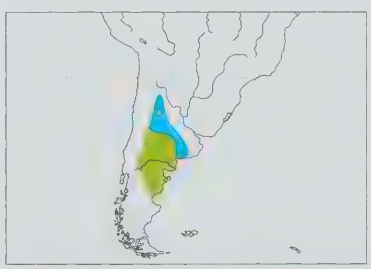


crown olive-grey with brownish streaking, pale grey supercilium, well-marked warm brownish ear-coverts bordered by white submoustachial stripe that extends backwards, side of neck greyish and often largely unstreaked (contrasting with ear-coverts); upperparts brownish-grey with darker streaking, lower back and rump unstreaked; tail brownish, upperwing brownish with two well-marked white wingbars, otherwise greater coverts and flight-feathers edged buff; throat whitish and narrowly streaked, bordered by well-defined blackish malar stripe and then whitish submoustachial area, underparts whitish, buffy on flanks, finely streaked on breast and flanks, belly white and unstreaked, undertail-coverts pale buff with very narrow streaks; bill and legs dull pinkish. Immature male is similar to female, but has darker face, and blackish throat and breast, broadly tipped white. Race *peruvianus* is smaller than nominate, with heavier streaking on upperparts, and in fresh plumage brighter and more rufous above; male *coracinus* is almost entirely blackish during breeding season. Voice. Song, from bush or in flight, very odd-sounding, loud, mechanical and buzzy, with rasping quality reminiscent of some marsh-nesting New World blackbirds (Icteridae), the buzz often preceded by short "chip" and followed by ringing note, "pik-chzzzzzéééééé chwip"; songs in C Chile higher-pitched and buzzier than those in N Chile, NW Argentina, Peru and Bolivia, and songs in Peru and N Chile lack introductory "chip" note. Call a nasal, wheezy "shweaaa".
Habitat. Variety of open and semi-open arid habitats. In Andean part of range inhabits shrubby slopes, including *Polylepis* forest edge, as well as cultivated areas, and in Patagonian steppes occupies flat shrub-steppe, often dominated by calafate (*Berberis*). In C Chile descends to agricultural areas, as well as open *matorral* habitats. Sea-level (Patagonian steppe, and in winter in C Chile) to 4000 m.
Food and Feeding. Diet a mix of seeds and invertebrates, and will take small fruit when available. In winter studies in C Chile, 98% of food was seeds and only 2% invertebrates. Forages on ground. In pairs or small flocks; almost exclusively in flocks during non-breeding season, but also in groups during breeding period.
Breeding. Breeds in spring and summer in much of range, Oct–Jan in C Chile, slightly later in Patagonia; fledglings in Dec in Bolivia (La Paz) and eggs hatch Apr–May in Peru. Breeding behaviour not studied; appears to be semi-colonial and lacks strong territoriality during breeding season, yet displays constantly almost as if in exploded lek; further study needed. In aerial display flies up to height of 4–10 m, and sings as it glides slowly downwards, with broadly spread wings and tail, wings being held below horizontal. Nest loose and untidy, made from grasses and lined with soft material, placed in dense low bush. Clutch 2–3 eggs, light green with olive-brown spots. No other information.
Movements. Populations in Peru, Bolivia, NW Argentina and N Chile presumed resident. Those in C Chile move to lower elevations in winter, and breeding population in far S retreats N into Argentina in winter. Vagrant in Falkland Is, with several records during Apr–Sept; vagrant reported also in SE Brazil (Rio Grande do Sul).
Status and Conservation. Not globally threatened. Common throughout its very extensive range. Occurs in various protected sites, such as national parks or national reserves, in much of range. No known threats.
Bibliography. Armani (1985), Fjeldså (1993), Fjeldså & Krabbe (1990), Grantsau (2002), Hellmayr (1932), Jaksic (1997), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Vuilleumier (1994), Woods (1988), Zimmer (1924).

180. Carbonated Sierra-finch
Phrygilus carbonarius

French: Phrygile charbonnier **German**: Schwarzbrustämmerling **Spanish**: Yal Carbonero

Taxonomy. *Emberiza carbonaria* d'Orbigny and Lafresnaye, 1837, Patagonia.
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Present species appears to be sister to *P. fruticeti*, and studies suggest that the two should be placed together in a separate genus, for which the name *Rhopospina* is available. Monotypic.
Distribution. Breeds in C Argentina from Córdoba, Mendoza, San Luis and W & SW Buenos Aires S to C & E Chubut. In non-breeding season ranges N to S Salta.



Descriptive notes. 14·5 cm; 16·1–18 g. A relatively small, long-tailed sierra-finch with thick-based, long conical bill. Male has face blackish, crown to back dark cold grey, streaked blackish, becoming washed with brown on unstreaked lower back to rump; upperwing and tail blackish with narrow dark grey edging, two inconspicuous narrow white wingbars; chin to undertail-coverts blackish, more greyish on flanks; in fresh plumage (autumn and into winter) has more extensive brownish coloration above and bolder wingbars; iris dark brown; bill bright yellow; legs flesh-coloured. Differs from similar *P. fruticeti* in smaller size, more extensive black below, less noticeable wingbars. Female is brownish-grey and streaked above; paler below, off-white with darker streaking; bill duller than in male. Immature male is similar to female, but with blackish throat to breast, and belly feathers tipped with buff, becoming increasingly blackish on underparts with wear. Voice. Song, in flight display, a high-pitched buzzy trill 2 seconds long, "tz-tz-tz-tz-tzee-tzee-tzee". Call a high "tiip".
Habitat. Shrubby Patagonian steppe during breeding; at other times various open shrubby habitats, sometimes at edge of agricultural areas or grasslands. In Mendoza, found during spring at roughly equal densities in open forest of *Prosopis flexuosa* and shrub habitat of *Larrea cuneifolia*, while in winter densities slightly higher in *Prosopis* forest.
Food and Feeding. Diet a mix of seeds and arthropods, proportion of latter increasing during breeding season. In Mendoza, 96% of seeds eaten were those of grasses (*Trichloris crinita* and *Sporobolus cryptandrus* together accounting for 49·2%), the rest being seeds of various forbs. Forages on ground. In pairs during breeding season; in small flocks during non-breeding period.
Breeding. Breeds during austral spring to summer, about Oct to Feb. In song flight male ascends as high as 15 m, and descends in gliding flight while giving buzzy trill. Nest semi-spherical, made

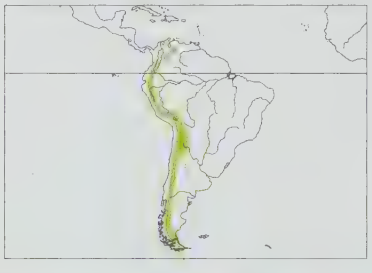
from dried grasses, placed on or near ground. Clutch 3 eggs, greyish-white with chestnut spotting. No other information.
Movements. Partially migratory, but details of movements unclear. Some of S populations, at least, move N between Apr and Sept; present in N part of range (San Juan and La Rioja N to Tucumán, Santiago del Estero and N Córdoba) only in winter months. In E Mendoza much more common in winter to early spring than during breeding season; further, it essentially disappeared between 1987 and 1988 during a period of drought, suggesting that some movements related to local rainfall.
Status and Conservation. Not globally threatened. Reasonably common throughout its large breeding range. Populations of this species probably under increased pressure owing to more industrialized agricultural practices, and removal of shrub habitats for agriculture. Its range is extensive, however, and no evidence that it is at any immediate risk. Its range includes at least two national parks, those of Sierra de las Quijadas and Lihué Calel.
Bibliography. Armani (1985), Couve & Vidal (2003), Harris (1998), Klicka *et al.* (2007), Marone (1992a, 1992b), Marone, de Casenave & Cueto (1997), Marone, de Casenave, Milesi & Cueto (2008), de la Peña (1989, 1996b), Ridgely & Tudor (1989).

181. **Plumbeous Sierra-finch**

Phrygilus unicolor

French: Phrygile gris-de-plomb **German**: Bleiämmerling **Spanish**: Yal Plomizo

Taxonomy. *Emberiza unicolor* d'Orbigny and Lafresnaye, 1837, Cordillera de Tacora, Tacna, Peru. Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Recent molecular data suggest a sister relationship between this species and *P. plebejus*, but distant relationship to other members of genus. Further, the two appear to be part of a clade that includes also *Haplospiza* and *Catamenia* (relationship with *Haplospiza* suggested by early authors on basis of similarities in plumage, as well as structure). Present species and *P. plebejus* should probably be placed together in separate genus, and *Geospizopsis* can be resurrected for them. Geographical variation complex. Races fall into three main groups, differing primarily in plumage tones: N group (*nivarius* and *geospizopsis*), males of which generally paler, females darker, boldly streaked and with strong buff wash below; single-species C group (*inca*), male with darkest plumage, female grey and male-like; and S group (*tucumanus*, nominate, *cyaneus* and *ultimus*), males intermediate in plumage, females duller brown and more obscurely streaked than N females. Proposed race *grandis* (described from Páramo de Santa Isabel, in C Andes of Colombia) supposedly larger than *geospizopsis*, but much overlap in measurements; treated as a synonym of latter. Seven subspecies recognized.
Subspecies and Distribution.
P. u. nivarius (Bangs, 1899) – N Colombia (Santa Marta Mts) and NW Venezuela (Mérida Andes).
P. u. geospizopsis (Bonaparte, 1853) – Andes of C & S Colombia (C & E ranges), Ecuador and N Peru.
P. u. inca J. T. Zimmer, 1929 – Peru S to W Bolivia (La Paz).
P. u. tucumanus Chapman, 1925 – C Bolivia (Cochabamba) S to NW Argentina (Jujuy S to La Rioja).
P. u. unicolor (d'Orbigny & Lafresnaye, 1837) – Chile (Arica–Parinacota S to Magallanes) and W Argentina (Mendoza S to Santa Cruz).
P. u. cyaneus Nores & Yzurieta, 1983 – highlands of Córdoba, in NC Argentina.
P. u. ultimus Ripley, 1950 – highlands of Tierra del Fuego.



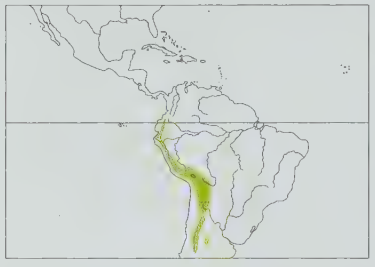
Descriptive notes. 14·5 cm; average 21·9 g. A medium-sized, stocky emberizid with relatively small bill. Male nominate race has lead-grey head and upperparts, throat and underparts only slightly paler, vent greyish-white; upperwing and tail blackish, feathers broadly edged grey (these areas appearing largely concolorous with body plumage); iris dark brown; bill and legs dark grey. Differs from *P. plebejus* mainly in distinctly larger size, and uniformly coloured plumage lacking paler supercilium and streaked upperparts. Female is mostly brown and strongly streaked: face, crown and upperparts brown with darker streaking, rump and lower back unstreaked brown with greyish wash; below, off-white with fine darker streaking throughout, from chin to undertail-coverts; wings and tail brownish; bare parts much as for male. Juvenile is like female, but darker brown, and more strongly streaked below. Race *geospizopsis* is larger and paler than nominate, female and some males with olive wash on ear-coverts; *nivarius* is slightly smaller than nominate, and darker grey on head and underparts; *inca* is darkest race, nearly sexually monomorphic, female only slightly duller grey than male and with slight tendency towards obscure streaking; *tucumanus* male is like nominate, but paler, and female more strongly streaked; *cyaneus* is similar to nominate, but somewhat paler, more bluish-grey; *ultimus* similar to nominate but larger, females with darker, more blackish streaks. Voice. Song a short sneezy "djeeeer"; song of S group, rarely given, is much more musical and attractive, a weak but far-carrying sweet wavering "swee-swee-swee-swee-sweeoo", with noticeable variations, but always repetitive notes with different ending. Calls a soft "chp" and a high-pitched feeble "zee".
Habitat. Open and grassy alpine habitats, ranging from wetter *páramo* in N, and *bofedal* wetlands (natural wetlands with spongy vegetation, or "cushion bogs") and edge in Altiplano, to dry rocky slopes and high-elevation grassland farther S. From 800 m in far S, to 5300 m in Altiplano and *páramo*.
Food and Feeding. A seed specialist; will also take invertebrates, particularly to feed to young. Forages on ground; in *páramo*, also flies up to *Espeletia* plants and feeds on seeds on the stalk. Usually in pairs, sometimes in small groups; may feed in association with *Diuca speculifera* and *P. erythronotus* or, farther S, with *P. gayi* and *Melanodera xanthogramma*.
Breeding. Season Nov–Jan in C Chile and Jan–Mar in N Argentina (Tucumán); fledglings Feb–Jul in Peru, and males in breeding condition Jul–Oct in Colombia. Nest made from grass and horsehair, finely woven, placed in crevice in rock wall or cliff, or in rocky scree area. Clutch 2–3 eggs, pale blue with brown spots, these concentrated at large pole. No other information.
Movements. Most populations resident; those in far S of range not well known, but presumably move to slightly lower elevations during winter months.
Status and Conservation. Not globally threatened. Common throughout its very extensive range. Occurs in various protected areas, such as national parks and national reserves, in most paarts of range. No known threats.
Bibliography. Armani (1985), Chapman (1915, 1925), Estrada & Rondan (2009), Fjeldså & Krabbe (1990), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Restall *et al.* (2006), Ridgely & Tudor (1989).

182. **Ash-breasted Sierra-finch**

Phrygilus plebejus

French: Phrygile plébéien **German**: Aschbrustämmerling **Spanish**: Yal Plebeyo

Taxonomy. *Phrygilus plebejus* Tschudi, 1844, no locality = highlands of Junín, Peru.
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). Recent molecular data suggest a sister relationship between this species and *P. unicolor*, but distant relationship to other members of genus. Further, the two appear to be part of a clade that includes also *Haplospiza* and *Catamenia* (relationship with *Haplospiza* suggested by early authors on basis of similarities in plumage, as well as structure). Present species and *P. unicolor* should probably be placed together in separate genus, and *Geospizopsis* can be resurrected for them. Three subspecies recognized.
Subspecies and Distribution.
P. p. ocularis P. L. Sclater, 1859 – Andes of Ecuador S to N Peru (N of Marañón Valley).
P. p. plebejus Tschudi, 1844 – Andes of Peru (S of Marañón Valley), N Chile (S to Antofagasta) and W Bolivia S to NW & WC Argentina (to Mendoza).
P. p. naroskyi Nores & Yzurieta, 1983 – NC Argentina (Sierra de Córdoba).



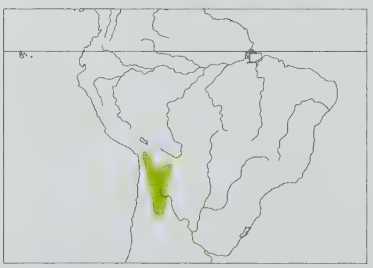
Descriptive notes. 11–11·5 cm; 13–17·4 g. A small, relatively short-tailed sierra-finch. Male nominate race has greyish face, paler grey on lores and supercilium; crown to back brownish-grey with darker streaking, lower back to uppertail-coverts unstreaked greyish; wing and tail brownish-grey; pale greyish-white below, flanks and breast slightly darker grey, undertail-coverts plain white; iris brown; bill black; legs blackish. Differs from *P. unicolor* in smaller size, less solidly grey plumage, streaking on upperparts, pale supercilium, and white belly. Female is similar to male, but browner and more extensively streaked: above, brownish with well-defined darker streaking, rump greyish and unstreaked; off-white below, streaked darker on breast and flanks, sides greyish-buff (less streaked below than female *P. unicolor*). Juvenile is similar to female, but duller. Race *ocularis* is smallest, overall greyer and less streaked above; *naroskyi* is more greyish, less brownish, than nominate, with noticeably darker flanks, wings and tail blackish (rather than brownish-grey), also smaller in size. Voice. Song a high-pitched, insect-like dry trill followed by shorter "chip" notes, "tzzzzzzzz chip chipa chipa chipa", or similar but with sweeter terminal notes, "tzzzzzzzz swee sweet sweet sweet"; N race *ocularis* gives buzzy trill, but no terminal notes. Call a high "tiip".
Habitat. Various open highland habitats, from flat dry grassy *puna* to rocky slopes, edge of *bofedal* wetlands ("cushion bogs"), open *Polylepis* woodlands and edge, also desert highlands and cactus-clad slopes. Thrives in sparsely vegetated habitats, including anthropogenic ones such as overgrazed regions, and near villages and settlements in highlands. Rather tolerant of arid conditions; also of overgrazed and very sparse habitats. Mainly 2500–5000 m; also down nearly to sea-level in Tumbesian region of S Ecuador and extreme NW Peru.
Food and Feeding. Primarily seeds, also arthropods. Forages in small flocks on ground; sometimes in mixed flocks with *Sicalis olivascens*.
Breeding. Season Oct–Jul, apparently timed to coincide with end of dry season, e.g. Oct–Nov in N Chile, Oct in Bolivia, Jun–Jul in S Peru (and Mar–Apr in Cuzco). Nest a messy structure of grass, hair, wool and feathers, reminiscent of bulky nest of House Sparrow (*Passer domesticus*), placed in crevice, under eave of adobe house, or even under large rock on ground, sometimes 20–30 cm above ground in clump of bunch-grass or in small bush. Clutch 2 eggs, pale blue-green with dark brown spots, these concentrated at wide end. No other information.
Movements. Appears to be sedentary.
Status and Conservation. Not globally threatened. Common or very common throughout its large range. Occurs in some protected areas, such as Lauca National Park and Las Vicuñas National Reserve (N Chile). No evidence that this species is suffering any decline in numbers.
Bibliography. Armani (1985), Dunning (2008), Fjeldså & Krabbe (1990), Hughes (1980), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Nores & Yzurieta (1983), Ridgely & Tudor (1989), Roe & Rees (1979), Schulenberg *et al.* (2007), Vuilleumier (1969a).

183. **Red-backed Sierra-finch**

Phrygilus dorsalis

French: Phrygile à dos roux **German**: Braunmantelämmerling **Spanish**: Yal Dorsirrojo

Taxonomy. *Phrygilus dorsalis* Cabanis, 1883, Cerro Bayo, near snow-line, Tucumán, Argentina.
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). May form a superspecies with *P. erythronotus*, and has been suggested as being conspecific; hybridization between the two reported, although without specimen evidence or a detailed analysis. Recent molecular results indicate that this species (*P. erythronotus* not sampled) is sister to the "hooded" group (*P. atriceps*, *P. punensis*, *P. gayi* and *P. patagonicus*) and *Sicalis*; more study required. Monotypic.
Distribution. N Chile (Andes of Tarapacá and Antofagasta), SW Bolivia (S from Oruro) and NW Argentina (Jujuy, Salta, Tucumán and Catamarca).



Descriptive notes. 15 cm; 35·4–40·5 g. A stocky finch with thick and rather triangular-looking bill. Head and upper nape are blue-grey, usually speckled white below eye, mantle and upper back contrastingly brick-red, lower back, rump and uppertail-coverts grey (like head); upperwing and tail blackish, in fresh plumage flight-feathers edged rusty; throat white, breast grey, flanks warmer with buff tone, belly whitish; iris dull reddish; bill and legs dark grey. Sexes alike. Juvenile is rather duller than adult, back browner and with obvious dark streaks. Voice. Song apparently remains unrecorded. Calls include a short "wheenk" and a nasal "phew".

Habitat. Typically found in *bofedales* (Altiplano wetlands, or "cushion bogs") adjacent to dry rocky *puna* slopes, also moister patches of *puna* grassland interspersed with tola (*Lepidophyllum quadrangulare*). Appears to prefer drier sites than those occupied by *P. erythronotus*. Recorded at 3300–4500 m.
Food and Feeding. Little known. Diet largely seeds, also arthropods. Forages in pairs or family groups on ground; often forages in crouched posture, with legs nearly hidden.
Breeding. Season Feb–May. Aerial display described in which bird rises some distance, hovers at apex and descends in fluttering flight like that of pipit (*Anthus*), either silently or while giving "wheenk" note. Nest loose, semi-spherical in shape, with large component of wool, hair and feathers, placed in crevice or inside rock pile in rocky outcropping. Clutch up to 3 eggs. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Generally uncommon and local. Present in some protected sites, such as national parks and national reserves; e.g. occurs in Reserva Nacional de Fauna Andina Eduardo Avaroa (Bolivia), where it is common. No evidence that this species is suffering any decline in numbers.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), McCarthy (2006), Philippi (1940), Ridgely & Tudor (1989), Rocha & Quiroga (1996).

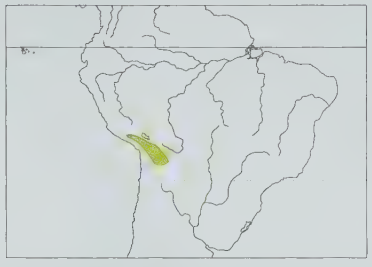
184. White-throated Sierra-finch

Phrygilus erythronotus

French: Phrygile bicolore **German**: Weißkehlämmerling **Spanish**: Yal Gorjiblanco

Taxonomy. *Chlorospiza erythronotus* R. A. Philippi [Krumwiede] and Landbeck, 1861, Parinacota, 10,000–17,000 feet [c. 3050–5200 m], Arica, Chile.
Molecular-genetic studies indicate that genus belongs in tanager family (Thraupidae). May form a superspecies with *P. dorsalis*, and has been suggested as being conspecific; hybridization between the two reported, although without specimen evidence or a detailed analysis. Recent molecular results indicate that *P. dorsalis* is sister to the "hooded" group (*P. atriceps*, *P. punensis*, *P. gayi* and *P. patagonicus*) and *Sicalis*, and this may apply also to present species (not sampled); more study required. Monotypic.

Distribution. S Peru (from SE Arequipa and S Puno) S to N Chile (highlands of Arica–Parinacota region) and SW Bolivia (W Oruro and W Potosí).



Descriptive notes. 16 cm. A relatively large finch, stocky-bodied but relatively long-tailed. Has head and upperparts to uppertail-coverts lead-grey, inconspicuous white streaking on ear-coverts and below eye, obscure darker streaks on crown and back; tail blackish with narrow pale edges; upperwing blackish with pale edging, the edges most obvious on primaries, and the dark wing contrasting with paler greyish body feathering; chin and throat white, surrounded by grey, which extends down to side of throat and across breast; lower breast to undertail-coverts white; wing-linings to marginal coverts white, sometimes showing as white wing edge on perched bird; iris dark chestnut; bill and legs blackish. Distinguished from superficially similar *Diuca speculifera* by smaller size, lack of bold white wing patch and white spot below eye, and lack of white tail sides. Sexes similar. Juvenile is similar to adult, but back washed warm brownish and streaked; very like juvenile of *P. dorsalis*, but back on average duller brown, not so reddish. Voice. Song unrecorded. Calls include short "wheenk" and nasal "phew".
Habitat. Preferred habitat moist *bofedal* wetlands ("cushion bogs") adjacent to rocky slopes with piled boulders or large rocks; feeds at edge of *bofedal*, flies up to rocky slope when alarmed. Generally in moister sites than those preferred by *P. dorsalis*. At 3600–4700 m.
Food and Feeding. Little known. Feeds largely on seeds, with smaller component of invertebrates. Forages in pairs or family groups on ground.
Breeding. No information. Season presumably Mar–May.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon. Occurs in some protected sites, such as Lauca National Park and Las Vicuñas National Reserve (N Chile). No evidence that this species is suffering any decline in numbers.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), McCarthy (2006), Philippi (1940), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).



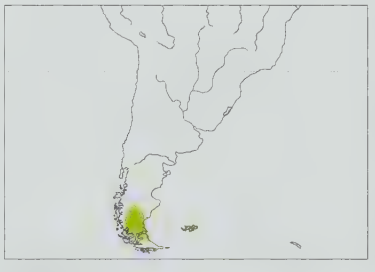
Genus *MELANODERA* Bonaparte, 1850

185. Canary-winged Finch

Melanodera melanodera

French: Mélanodère à sourcils blancs **Spanish**: Yal Cejiblanco
German: Schwarzkehl-Ammerfink
Other common names: White-bridled/Black-throated Finch; Falkland Black-throated Finch (*melanodera*)

Taxonomy. *Emberiza melanodera* Quoy and Gaimard, 1824, Falkland Islands.
Likely that genus belongs within tanager family (Thraupidae), but molecular data needed to support this assertion. Some morphological and plumage features suggest relationship with *Rowettia*. Races well differentiated, geographically isolated from each other, and perhaps better treated as two separate species; further work required. Two subspecies recognized.
Subspecies and Distribution.
M. m. princetoniana (W. E. D. Scott, 1900) – S Chile (Magallanes) and S Argentina (Santa Cruz and Tierra del Fuego).
M. m. melanodera (Quoy & Gaimard, 1824) – Falkland Is.
Descriptive notes. 14–15 cm; 25–35 g. A medium-sized and thickset emberizid with strongly triangular bill shape and very long wings. Male nominate race has mostly grey head with complex pattern of black lores, white supercilium from supraloral area to above ear-coverts and white band extending from base of malar region backwards to meet rear supercilium (thus, lores and dark eye surrounded above and below by white), and black throat surrounded by long white malar stripes which meet narrow white band across upper chest; upperparts olive to greenish-grey (greenish feather tips), rump more solidly greenish; tail and upperwing mainly yellow-olive, narrow yellow edging on primaries and rectrices; underparts dull yellow, with grey side of breast and flanks, white on rear belly and undertail-coverts; wing-linings yellow; iris dark brown; upper mandible blackish, lower mandible largely blue-grey; legs blackish. Female has whitish area around eye, brownish ear-coverts with buff streaking, pale yellowish-buff submoustachial stripe; crown and upperparts brownish-olive with broad darker streaks; tail brownish, outer two feather pairs with yellow base and white tips, next pair with restricted yellow base and no white on tip; wing brownish, primaries with yellow edges, tertials broadly edged yellowish-buff; throat whitish with small dark streaks, narrow dark malar stripe, otherwise whitish below, breast and flanks with dark streaks, some yellow on mid-belly, whitish vent and undertail-coverts; bare parts as on male. Juvenile resembles female, but more heavily streaked, with less yellow and green in plumage, duller bill; immature male similar to female, but more extensively yellow on wing and tail, and may show greenish on breast side and greyish face. Race *princetoniana* is brighter than nominate, grey areas of plumage tending more towards blue-grey, flight-feathers broadly edged yellow and with extensive yellow at bases, wing-coverts largely yellow and wing-linings yellow (in flight, wings flash an intense canary-yellow), tail similarly yellow on edges and base (in flight, also appears extensively yellow), yellow on underparts brighter and more extensive. Voice. Song of *princetoniana* a lively melodious, yet repetitive series of notes with intervening gaps only slightly longer than each note, "swee twee swee stweee towee twk swee..."; similar to that of *M. xanthogramma* (of race *barrosi*), but faster, livelier and slightly higher-pitched. Song of nominate race, given largely between Sept and Dec, a plaintive repetition of two or three phrases, e.g. "peeoo-payoo-payoo...". Call a soft, high-pitched "tsip".



Habitat. On mainland found in open grassland of perennial bunch-grass sometimes known as "tussock" or "coirón" (various species of *Stipa*, *Poa ligularis*, and *Bromus pictus*), from sea-level to 500 m. In Falklands, found in heathland with dwarf shrubs, grassy areas by beaches, and dunes with marram grass (*Ammophila arenaria*) and tussac (*Poa flabellata*) grassland; occurs up to at least 150 m.
Food and Feeding. Seeds and arthropods; in Falklands feeds on seeds of grasses, sorrel (*Rumex*), chickweed (*Stellaris media*), sand cabbage (*Senecio candicans*) and diddle-dee (*Empetrum rubrum*), and will also take flowers. Forages on ground; will also take seeds from grass seedheads. Singly or in pairs during breeding; in flocks of up to c. 20 individuals in non-breeding season, and flock of c. 1000 once observed in Falklands. In Magallanes (S Chile), in winter, may mix with *M. xanthogramma* in grassy steppe near sea-level.

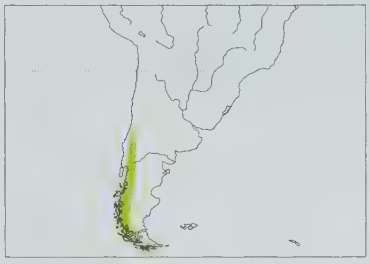
Breeding. Season Oct–Jan on mainland; in Falkland Is egg dates mid-Sept to late Dec; probably double-brooded in Falklands. Nest built mainly by female, made from fine grasses, lined with feathers and horsehair, placed on ground in grass clump or in crevice between stones, in Falklands occasionally on top of tussac grass. Clutch 3–4 eggs, pale blue-grey or greenish-grey with purple-brown spots, these concentrated around wide end. No other information.
Movements. On mainland, vacates higher-lying breeding sites (such as highlands above Porvenir, in Tierra del Fuego) and winters closer to coast, but remains at roughly same latitudes as during breeding. Sedentary in Falkland Is.
Status and Conservation. Not globally threatened. Uncommon or scarce to locally common. Fairly common and widespread in Falkland Is, where estimated population 7000–14,000 pairs in 1983–1993. Mainland population small, and appears to have suffered long-term decline probably as a result of overgrazing; native grass communities under pressure from overgrazing by sheep, and where grass becomes too short or too sparse this emberizid abandons the area. Whether decline is continuing or has been reversed because of lower numbers of sheep in Patagonia since end of 20th century remains to be studied.
Bibliography. Armani (1985), Dunning (2008), Gould (1839), Humphrey *et al.* (1970), Jaramillo (2003), Johnson & Goodall (1967), Pettingill (1973), Ridgely & Tudor (1989), Shirihai (2002), Woods (1988).

186. **Yellow-bridled Finch**

Melanodera xanthogramma

French: Mélanodère à sourcils jaunes **German**: Zügelammerfink **Spanish**: Yal Cejiamarillo
Other common names: Andean Yellow-bridled Finch (*barrosi*)

Taxonomy. *Chlorospiza* (?) *xanthogramma* Gould and G. R. Gray, 1839, East Falkland Island and Tierra del Fuego.
Type description includes Falkland Is, possibly indicating misidentified immature of *M. melanodera*, but this considered unlikely, as morphological and ecological differences between the two species in Falklands already well described at the time; no recent records of present species from Falklands, where presumably now extirpated. Likely that genus belongs within tanager family (Thraupidae), but molecular data needed to support this assertion. Some morphological and plumage features suggest relationship with *Rowettia*. Races well differentiated both in coloration and in size, and further work may suggest that they are better treated as two separate species. Shows a peculiar polymorphism, some birds being extensively washed green above and yellow below, others not; distribution and significance of this "green morph" not well understood. Two subspecies recognized.
Subspecies and Distribution.
M. x. barrosi Chapman, 1923 – Andes of C & S Chile (Atacama S to Magallanes N of Strait of Magellan) and WC & SW Argentina (Mendoza S to Santa Cruz).
M. x. xanthogramma (Gould & G. R. Gray, 1839) – Tierra del Fuego (extreme S Chile and S Argentina).
Descriptive notes. 15–17 cm; 35–37 g. A relatively large finch, thickset, with very long wings and strongly triangular bill. Male nominate race has complex facial pattern, with black lores (and dark iris) bordered above by narrow yellowish half-supercilium and below by yellowish eye-crescent, and greenish to greyish ear-coverts and crown, also distinct black throat patch bordered laterally



by yellowish malar stripes and below by paler yellow fringe on lower edge of throat; upperparts plain grey, tail greyish-brown, outer two rectrices largely yellow; upperwing greyish-brown, upperwing-coverts greyish, greater (and sometimes median) coverts with greenish or yellow wash, primaries edged yellowish, secondaries edged grey; underparts grey, with yellowish-white belly, and white vent and undertail-coverts; some individuals (green morph) have strong greenish-olive tone on crown and upperparts, and bright yellow belly; iris dark brown; bill and legs blackish. Female is strongly streaked brownish, has crown and upperparts brownish with darker streaks, face with paler buff around eye, buff ear-coverts with brown streaking; tail brownish, extensive whitish on inner web of outer rectrix; upperwing brownish, pale buff fringes on coverts and flight-feathers; throat whitish with small dark streaks, narrow dark malar stripe; breast and flanks buff, strongly streaked brown, otherwise whitish below; bare parts as on male; green-morph female is richer brown all over, with white areas of underparts replaced by bright yellow. Juvenile resembles female, but more heavily streaked; immature male similar to female, but may show blackish throat patch finely tipped buff on each feather, also less extensively streaked below, with yellowish central belly. Race *barrosi* is substantially larger than nominate, tail markings white (not yellow), upperwing-coverts greyer, lesser coverts with more greenish tone, primaries edged greyish (not yellow). Voice. Song of race *barrosi* is a lazy and slowly delivered melodious series of sweet notes, with gaps between notes longer than notes themselves, "feee...swee...twu...feee...suuwee...twu..." seemingly uttered continuously. Song of nominate similar, but noticeably buzzier, slightly faster and higher-pitched. Call a soft, high-pitched "tsip"; also gives quick high-pitched series of 4–8 notes on descending scale, "tsi-ti-ti-ti-tit".
Habitat. Breeds above tree-line in very sparsely vegetated to grassy alpine habitats interspersed with rocks; up to 600 m in S and 3500 m in N. Non-breeding habitat also open and grassy, and includes sea and lake shorelines, thus down to sea-level in winter.
Food and Feeding. Takes seeds and arthropods; in spring often feed on petals of introduced dandelions (*Taraxacum*). Forages on ground; in early spring, forages at edge of melting snow in manner of a rosy-finch (*Leucosticte*). In pairs during breeding season, also in small flocks at other times; in Magallanes (S Chile), in winter, may mix with *M. melanodera* in grassy steppe near sea-level.
Breeding. Season Oct–Jan, young fledging Nov–Jan. Nest concealed under boulder or hidden in grass on ground. No other information.
Movements. Descends to lower elevations during winter, or during late-spring snow storms; details of movements not known. In Tierra del Fuego, nominate race makes post-breeding descent and moves to lower grassy steppe habitats in N part of the island.
Status and Conservation. Not globally threatened. Uncommon to scarce, and patchily distributed. This species' mountain-top alpine habitat may be severely threatened by global warming; regular monitoring in order to detect any population changes is warranted.
Bibliography. Armani (1985), Dunning (2008), Gould (1839, 1841), Humphrey *et al.* (1970), Jaramillo (2003), Johnson & Goodall (1967), Reynolds (1932), Ridgely & Tudor (1989), Woods (1988).



PLATE 58

inches 2

cm 5

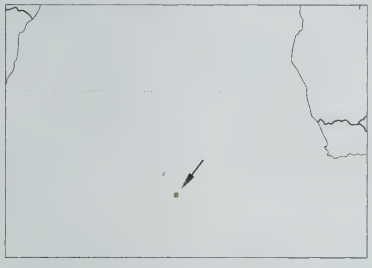
Genus *ROWETTIA* P. R. Lowe, 1923

187. **Gough Finch**

Rowettia goughensis

French: Rowettie de Gough **German**: Goughammerfink **Spanish**: Yal de Gough
Other common names: Gough Island Finch, Gough Bunting

Taxonomy. *Nesospiza goughensis* W. E. Clarke, 1904, Gough Island.
Sometimes placed in genus *Nesospiza*, but exhibits affinities also with *Melanodera*. Morphological and genetic evidence indicate that this species belongs with the Neotropical finches, distant from Old World *Emberiza*. Monotypic.
Distribution. Gough I, including vegetated offshore stacks, in S Atlantic.



Descriptive notes. 23–26 cm; 50–56 g. A large, handsome finch with long, relatively slender bill. Male is mostly olive-green, with black lores and bib highlighted by pale, yellowish supercilium, broken eyering, and indistinct submoustachial area; flight-feathers dark olive-brown with yellowish-olive outer margins; below, greenish of breast becomes somewhat more yellowish on belly; iris dark brown; bill blackish; legs dark grey. Female is on average slightly smaller than male, also slightly duller and with brownish facial markings, paler buffy-olive upper breast and stronger grey tinge on upperparts. Juvenile is mostly sandy buff with dark brown streaking on head, back and underparts, with rump richer buff with less heavy streaking, and margins of flight-feathers more yellow; some retain juvenile plumage for at least two years; immature similar to adult female, but facial markings indistinct and retains some blackish-brown streaking on contour feathers, rump tinged buff, immature male with more prominent dark facial markings than immature female. VOICE. Male advertises territory with high-pitched whistled song, "tsweeeep"; female responds with deeper chattering call, often duetting with male. Soft contact call "keet keet"; when Brown Skua (*Catharacta antarctica*) flies over, utters distinct alarm call while standing erect (head and bill pointing skywards); breeding female has distinctive swizzling call when soliciting food from male at nest.
Habitat. Occurs in most habitats from boulder beaches to highest mountain peaks, 900 m above sea-level; mostly in uplands, above 300 m. Most common in tussock grassland, wet heath and fjeldmark; now rare at lower elevations in fernbush and peatbogs.
Food and Feeding. Diet includes insects, spiders (Araneae), seeds and berries. Seeds mainly of sedges (*Carex insularis*, *Carex thouarsii*, *Scirpus sulcatus*, *Scirpus bicolor*, *Uncinia compacta*) and grasses (*Agrostis*, *Calamagrostis*, *Deschampsia*, *Holcus lanatus*, *Poa annua*); berries include especially fruits of *Nertera depressa*. Forages by gleaning from vegetation, including from epiphytic lichens growing on *Phylica arborea* trees and from stems of *Blechnum palmiforme* tree-ferns. Often pulls up moss and other loose vegetation with bill or feet to expose prey. Also tears apart rotten wood; occasionally hawks flying insects. Enters seabird burrows, and forages on insects associated with stranded seaweed on boulder beaches. Occasionally scavenges from skua kills.
Breeding. Season Sept–Dec (mainly Oct–Nov), starting earlier at lower elevations; one exceptional record of laying in Aug; single-brooded. Pair defends breeding territory. Nest built by female, a deep cup made from long grass and sedge leaves (material gathered close to nest-site), lined with finer vegetation, placed in dense vegetation on or close to ground, often on steep slope or cliff; historical records of nests built up to 1 m above ground in head of *Blechnum palmiforme* tree-fern in fernbush vegetation, but no recent records (species is virtually extinct in this habitat type). Clutch 2 eggs, rarely 1 or 3, light blue, finely speckled dark brown; may lay replacement if first clutch fails; incubation by female, fed near nest by male on average every 20–25 minutes, female also leaves eggs for brief foraging stints lasting 5–10 minutes; no information on duration of incubation period; chicks brooded by female only, male feeds female but does not feed chicks directly, both parents provision chicks once they are alone in nest, nestling period 20–26 days; young remain in dense cover near nest for a further week or so, then accompany foraging adults. Breeding success average: just over half of all clutches produce at least one chick; average of 0·87 fledglings per breeding attempt. As population decreases, more pairs include individuals in immature or even juvenile plumage, although breeding by juveniles yet to be confirmed.
Movements. Resident. Among ringed individuals (including fledglings), maximum recorded movement over periods of up to 7 years was 1·8 km.
Status and Conservation. CRITICALLY ENDANGERED. Rare to locally fairly common. Breeding population currently estimated at only 400–500 pairs, with total population of 1050–1350 individuals. The only passerine resident on Gough I (91 km²), where formerly abundant. Numbers have decreased since at least mid-20th century, especially in lowlands, apparently as a result of nest predation by introduced house mouse (*Mus domesticus*); still abundant on Penguin I, a mouse-free offshore stack. Mouse predation has driven this species away from coastal areas into suboptimal upland habitat, and is causing very rapid decline in its numbers; it is now rare at lower elevations in fernbush. Number of territory-holding individuals in immature and juvenile plumages has increased, suggesting that there are many vacant territories as population shrinks; at same time, proportion of juveniles in whole population has decreased greatly, indicative of reproductive failure and an ageing population. Introduced mice are significant predators also of seabird chicks on Gough I, and a plan is being formulated to attempt to eradicate mice from the island; initial results from a feasibility study of mouse removal appear promising. Gough is a nature reserve and World Heritage Site, and human population consists of a small number of staff at a meteorological station.
Bibliography. Abbott (1978), Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Clancey (1981), Clarke (1904, 1905), Collar & Stuart (1985), Cuthbert & Hilton (2004), Elliott, C.C.H. (1969), Elliott, H.F.I. (1957), Hirschfeld (2008), Holdgate (1957, 1958), Lowe (1923), Richardson (1984), Ryan (2007), Ryan & Cuthbert (2008), Ryan & Moloney (2002), Shirihai (2002), Stattersfield & Capper (2000), Verrill (1895), Voisin (1979), Williams & Imber (1982).

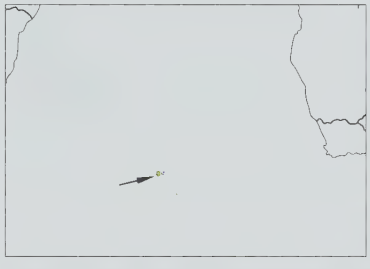
Genus *NESOSPIZA* Cabanis, 1873

188. **Inaccessible Finch**

Nesospiza acunhae

French: Nésospize de Tristan da Cunha **Spanish**: Yal de la Inaccesible
German: Tristanammerfink
Other common names: Inaccessible Bunting; Lowland Finch (*acunhae*); Upland Finch (*fraseri*); Dunn's Finch (*dunnei*); Tristan Bunting/Finch (when treated as conspecific with *N. questi* and/or *N. wilkinsi*)

Taxonomy. *Nesospiza acunhae* Cabanis, 1873, Tristan da Cunha.
Genus is closest to Neotropical finches, distant from Old World *Emberiza*. Genus confined to Tristan da Cunha island group, where it has undergone an adaptive radiation. Nominate race and *fraseri* formerly considered conspecific with *N. questi* of Nightingale I, but genetic evidence suggests independent evolution on each island. Races of present species breed assortatively in coastal habitats, where large-billed *dunnei* and small-billed, drab nominate race behave as distinct species (distinct songs, and territorial behaviour focused primarily on members of own race); in contrast, all three races interbreed in ecotone between *Blechnum* heath and *Phylica* woodland on the plateau. Three subspecies recognized.
Subspecies and Distribution.
N. a. acunhae Cabanis, 1873 – coastal scarps of Inaccessible I, in S Atlantic.
N. a. fraseri Ryan, 2008 – plateau of Inaccessible I.
N. a. dunnei Hagen, 1952 – coast and E plateau of Inaccessible I.



Descriptive notes. 17–21 cm; 24–49 g. An exceptionally variable species. Male nominate race is olive-green above and paler olive-grey below, with yellowish forecrown and throat; lores and feathers around eye pale grey; flight-feathers dark olive-brown with yellow-olive outer margins; iris dark brown; bill and legs dark grey. Female is on average slightly smaller than male, also duller and more streaked above. Juvenile and immature are even more heavily streaked than female. Race *fraseri* is brighter green above and more intensely yellow below than nominate, is on average larger in head, wing and tarsus length, but smaller bill; *dunnei* is about two-thirds larger than nominate and previous, and has much larger, deeper bill. VOICE. Male song a repeated phrase of 3–4 notes, "whit it teeu", more varied than that of *N. questi*; song of race *dunnei* deeper and slower than those of other races, and hybrids have distinct song. Females have subdued, querulous whistle. Both sexes give a chipping contact call, also alarm call when skua (*Catharacta*) appears.
Habitat. Nominate race largely confined to coastal lowlands and cliffs dominated by *Spartina arundinacea* tussock grassland; replaced on the plateau by *fraseri*, although some immatures of this race feed along coast in winter and spring. Race *dunnei* largely confined to areas of tall *Phylica arborea* woodland, where there is abundant fruit. All three races interbreed in ecotone between *Blechnum* heath and *Phylica* woodland on the plateau.
Food and Feeding. Diet mainly seeds, fruits and invertebrates. Small-billed nominate race eats seeds of *Spartina* and other grasses, sedges and forbs, as well as invertebrates; often forages on flies (Diptera) in intertidal zone and among stranded seaweeds. Race *fraseri* eats mainly sedge seeds and *Nertera* fruit, as well as invertebrates; its brighter plumage apparently results from greater intake of carotenoids, linked to dietary differences (between food provided by fernbush vegetation on the plateau and that of *Spartina* tussock grassland on coastal scarps). Race *dunnei* and large-billed hybrids feed mainly on *Phylica* fruit, although they also take invertebrates. Hybrids often glean insects from epiphytes on *Phylica* trees on E plateau. Chicks fed with caterpillars and other invertebrates; chicks of *dunnei* fed with *Phylica* fruit from an early age. Forages on various substrates, from bark, foliage and lichens to flowers, boulders and ground.
Breeding. Season Nov–Feb; single-brooded. Usually monogamous, and partners remain together for successive breeding attempts; one male of nominate race had two females on adjacent territories. Possible helper at one nest of race *dunnei*. Territorial, both sexes repelling intruders. Nest built by female, a cup made from grass and sedge leaves, placed in dense vegetation, usually close to ground, sometimes up to 1·2 m up in dense *Spartina* tussock. Clutch 1–2 eggs (average 1·8), light blue, finely speckled dark brown; may lay several replacements following failures; incubation by female, fed near nest by male, period 17–18 days; chicks brooded by female for first 5–7 days, after which both parents feed chicks, both also remove faecal pellets when chicks small, but allow these to accumulate on nest rim when chicks large, nestling period 18–21 days; fledglings remain in dense cover for 10 days after leaving nest, then accompany adults for up to 6 weeks. Main causes of failure are predation by Tristan Thrush (*Nesocichla eremita*), also inclement weather; starvation possibly a problem for *dunnei*, which have much lower breeding success (only 13% of eggs result in fledglings) than small-billed birds and hybrids (52%).
Movements. Mostly resident. Some immatures of race *fraseri* apparently forage along coast in winter, returning to the plateau in Sept–Oct.
Status and Conservation. VULNERABLE. Restricted-range species: present in Tristan Islands EBA. Abundant and widespread on Inaccessible I (14 km²), with estimated 10,000 pairs. Population of nominate race on main island of Tristan disappeared within 50 years of settlement, probably as a result of predation by introduced house mice (*Mus domesticus*) and feral cats (*Felis catus*). Density varies with habitat, up to 18 pairs/ha in coastal tussock, but only 2–6 pairs/ha on the plateau. Although this species is very numerous within its extremely small range, and is thought not currently to be declining, the possible arrival of invasive species could rapidly result in steep decline in its numbers, potentially leading to extinction within a short time period (as has happened on Tristan da Cunha). Paradoxically, Inaccessible I has become far more accessible with arrival of several motorized boats on Tristan, increasing risk of accidental introduction of mammalian predators and

On following pages: 189. Nightingale Finch (*Nesospiza questi*); 190. Wilkins's Finch (*Nesospiza wilkinsi*); 191. Slaty Finch (*Haplospiza rustica*); 192. Uniform Finch (*Haplospiza unicolor*); 193. Peg-billed Finch (*Acanthidops bairdi*); 194. Black-crested Finch (*Lophospingus pusillus*); 195. Grey-crested Finch (*Lophospingus griseocristatus*); 196. Long-tailed Reed-finch (*Donacospiza albifrons*); 197. White-winged Diuca-finch (*Diuca speculifera*); 198. Common Diuca-finch (*Diuca diuca*); 199. Short-tailed Finch (*Idiopsar brachyurus*); 200. Cinereous Finch (*Piezorina cinerea*); 201. Slender-billed Finch (*Xenospingus concolor*).

other invasive species. A further threat is invasion of introduced New Zealand flax (*Phormium tenax*) into areas of *Phylica* woodland, leading to degradation of habitat.
Bibliography. Abbott (1978), Anon. (2010c), Armani (1985), Bourne & David (1981), Butchart & Stattersfield (2004), Carmichael (1819), Collar & Stuart (1985), Elliott (1957), Fraser & Briggs (1992), Hagen (1952), Lack (1947), Lowe (1923), McCarthy (2006), Rand (1955), Richardson (1984), Ryan (2001, 2007, 2008), Ryan & Moloney (2002), Ryan, Bloomer *et al.* (2007), Ryan, Moloney & Hudon (1994), Shirihai (2002), Stattersfield & Capper (2000).

189. **Nightingale Finch**

Nesospiza questi

French: Nésospize du Quest **German**: Questammerfink **Spanish**: Yal de la Nightingale
Other common names: Nightingale Bunting; Tristan Bunting/Finch (when treated as conspecific with *N. acunhae* and/or *N. wilkinsi*)

Taxonomy. *Nesospiza acunhae questi* P. R. Lowe, 1923, Nightingale Island, Tristan da Cunha Group.
Genus is closest to Neotropical finches, distant from Old World *Emberiza*. Genus confined to Tristan da Cunha island group, where it has undergone an adaptive radiation. Usually considered conspecific with small-billed races (nominate and *fraseri*) of *N. acunhae* of Inaccessible I, but genetic evidence suggests independent evolution on each island. Cytochrome *b* sequence of present species appears identical to that of *N. wilkinsi*, but the two are highly distinct in terms of morphology and behave as separate species, with distinct vocal systems and no evidence of hybridization between them. Monotypic.
Distribution. Nightingale I, including offshore islets of Alex (Middle) and Stoltenhoff, in S Atlantic.



Descriptive notes. 16–18 cm; 24–29 g. Male has face and lores pale grey, rest of head and upperparts yellow-olive, finely streaked dark brown (mainly on crown and mantle); flight-feathers grey-brown, fringed yellow-olive; yellow-olive below, brightest on throat; iris dark brown; bill and legs dark grey to blackish. Differs from *N. wilkinsi* mainly in appreciably smaller size and much smaller bill. Female is on average slightly smaller than male, also duller and slightly more streaked. Juvenile and immature resemble female, but are buffy brown and more heavily streaked. Voice. Male advertises territory with high-pitched, sharp song, "whit-wheu whit-wheu..." repeated monotonously; female has subdued, querulous whistle. Both sexes give a chipping contact call, also alarm call when skua (*Catharacta*) appears.
Habitat. Throughout Nightingale and adjacent islets, from rocky shoreline to highest peaks. Most abundant in *Spartina arundinacea* tussock grassland and *Scirpus*-dominated areas around The Ponds (in centre of island).
Food and Feeding. Diet mainly seeds and berries; also some invertebrates. Forages on plants and on the ground.
Breeding. Little known. Breeds in Nov–Jan. Nest an open cup, built low down among dense vegetation, usually sedges (Cyperaceae) or grasses, occasionally among ferns. Clutch 1–2 eggs (report of 4–5 eggs in a clutch almost certainly erroneous), light blue, finely speckled dark brown. No other information.
Movements. Presumably resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Tristan Islands EBA. Abundant; global range tiny, c. 4 km². Total population estimated at no more than c. 5000 pairs, of which at least 4000 pairs on main island; no evidence of decline in numbers. Although this species is very numerous within its extremely small range, and is thought not currently to be declining, the possible arrival of invasive species could rapidly result in steep decline in its numbers, potentially leading to extinction within a short period. With arrival of several motorized boats on Tristan, Nightingale I has been visited more frequently by other islanders, increasing risk of accidental introduction of mammalian predators such as rats and mice (Muridae) and other invasive species.
Bibliography. Abbott (1978), Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Collar & Stuart (1985), Elliott (1957), Hagen (1952), Lack (1947), Lowe (1923), Rand (1955), Richardson (1984), Ryan (2007, 2008), Ryan & Moloney (2002), Ryan *et al.* (2007), Shirihai (2002), Stattersfield & Capper (2000), Wilkins (1923).

190. **Wilkins's Finch**

Nesospiza wilkinsi

French: Nésospize de Wilkins **German**: Wilkinsammerfink **Spanish**: Yal de Wilkins
Other common names: Grosbeak Bunting, Big-billed Finch/Bunting; Tristan Bunting/Finch (when treated as conspecific with *N. acunhae* and/or *N. questi*)

Taxonomy. *Nesospiza wilkinsi* P. R. Lowe, 1923, Nightingale Island, Tristan da Cunha Group.
Genus is closest to Neotropical finches, distant from Old World *Emberiza*. Genus confined to Tristan da Cunha island group, where it has undergone an adaptive radiation. This species usually considered conspecific with large-billed race (*dunnei*) of *N. acunhae*, but genetic evidence suggests independent evolution on each island. Cytochrome *b* sequence of present species appears identical to that of *N. questi*, but the two are highly distinct in terms of morphology and behave as separate species, with distinct vocal systems and no evidence of hybridization between them. Monotypic.
Distribution. Nightingale I, in S Atlantic.
Descriptive notes. 20–22 cm; 41–53 g. A large, robust finch with heavy, deep-based bill. Male is olive-green above and below, with yellowish supercilium, throat and upper breast; lores and area around eye grey; iris dark brown; bill slate-grey, whitish base of lower mandible; legs grey-brown. Distinguished from *N. questi* mainly by much greater size and much larger bill, on average almost twice the bill depth and mass of latter. Female is on average slightly smaller than male, also duller and slightly more streaked. Juvenile and immature resemble female, but buffy brown and more heavily streaked. Voice. Male song "whut-prreu whut-prreu...", distinctly deeper and slower than that of *N. questi*; female has subdued, querulous whistle, lower-pitched than that of female *N. questi*. Both sexes give a chipping contact call, also alarm call when skua (*Catharacta*) appears.
Habitat. Territorial adults occupy areas with *Phylica arborea* trees, also foraging in surrounding tussock grassland. Immatures may wander more widely.



Food and Feeding. Diet consists mainly of *Phylica* fruit and seeds; also includes small invertebrates. Clambers around in canopy of *Phylica* trees, crushing woody fruits to obtain large seeds; gleans invertebrates among *Spartina* tussock grassland and on the ground under *Phylica* copses.
Breeding. Little known. Egg-laying recorded Nov–Jan, but adults territorial at least Sept–Mar. Clutch 1–2 eggs, light blue, finely speckled dark brown. No other information.
Movements. Resident; ringed individuals recovered less than 200 m from original site after 8 years.
Status and Conservation. ENDANGERED. Restricted-range species: present in Tristan Islands EBA. Uncommon; has tiny breeding range, probably no more than 2 km². Global population extremely small, at most 100 pairs on Nightingale I; not recorded on offshore islets. Considered unlikely that population was ever much larger than it is now, and was probably adversely affected historically by cutting of *Phylica* wood for fuel, a practice which has now largely ceased. Although population currently appears stable, it is under constant threat from possible arrival of invasive species. With arrival of several motorized boats on Tristan, islanders from elsewhere visit Nightingale, and risk of accidental introduction of mammalian predators is thus permanent. A further potential threat is accidental introduction of certain invertebrates or pathogens which could alter food sources or reduce seed-set of *Phylica*; a black fungus-like growth has previously been transported from Tristan to Inaccessible I and, although there is currently no evidence of its presence on Nightingale, the risk remains. Islanders visiting Nightingale may cut *Phylicus* for fuel, and habitat potentially threatened also by catastrophic weather events. Invasive New Zealand flax (*Phormium tenax*) has been removed from the island.
Bibliography. Abbott (1978), Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Collar & Stuart (1985), Elliott (1957), Hagen (1952), Lack (1947), Lowe (1923), McCarthy (2006), Rand (1955), Richardson (1984), Ryan (2007, 2008), Ryan & Moloney (2002), Ryan *et al.* (2007), Shirihai (2002), Stattersfield & Capper (2000).

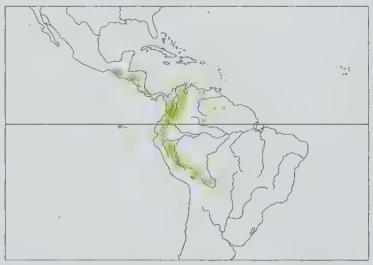
Genus *HAPLOSPIZA* Cabanis, 1851

191. **Slaty Finch**

Haplospiza rustica

French: Haplospize ardoisé **German**: Schieferämmerling **Spanish**: Yal Pizarroso

Taxonomy. *Phrygilus rusticus* Tschudi, 1844, Peru.
Molecular data suggest that this genus is part of a clade which includes also *Catamenia*, as well as *Phrygilus unicolor* and *Phrygilus plebejus* (but not others of that genus); in particular, a relationship between present genus and *Phrygilus unicolor* was suggested by early authors on basis of similarities in plumage and structure; molecular data indicate also that *Acanthidops* is related to present genus. This species probably forms a superspecies with *H. unicolor*. Middle American race *uniformis*, larger-billed than Neotropical ones, may deserve study to assess possibility that it represents a distinct species. Proposed race *barrilesensis*, described from W Panama (Barilles, in Chiriquí) on basis of purportedly smaller size than *uniformis*, is treated as a synonym of latter, as supposed differences based on very small samples. Three subspecies recognized.
Subspecies and Distribution.
H. r. uniformis P. L. Sclater & Salvin, 1873 – SE Mexico (S Chiapas; formerly also C Veracruz) and highlands of Guatemala, Honduras, N El Salvador and NW Nicaragua; also highlands of NC Costa Rica and extreme W Panama.
H. r. rustica (Tschudi, 1844) – N & W Venezuela S in Andes, including all three ranges in Colombia, to C Bolivia.
H. r. arcana (Wetmore & Phelps, Jr, 1949) – tepuis of S Venezuela.



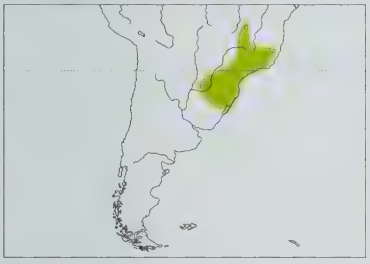
Descriptive notes. 12·5 cm; average 15·5 g. A slim finch with long, pointed bill and proportionately long, yet rounded, wing. Male nominate race is mostly plain lead-grey, paler on belly and vent; upperwing blackish with grey edging; tail blackish with grey edging; iris brown; bill blackish; legs dull brownish to blackish. Differs from similar *H. unicolor* mainly in noticeably longer bill, also some minor plumage differences. Female is dull brownish above, obscurely streaked, wing and tail dusky with brown edging throughout, off-white with yellowish tint below, olive-streaked on breast; bill dusky, distinguished from similar female of *Volatinia jacarina* by larger size, longer and more triangular bill, and more thickset body. Immature male is similar to adult, but wings have brown cast and upperwing-coverts edged brownish. Races differ subtly in darkness of plumage and in bill structure: *arcana* is distinctly darker, more blackish above, than nominate; *uniformis* has thicker and wider bill than others. Voice. Song, from perch, sometimes in flight (then shorter and less complex), high-pitched and sputtering in nature, aptly described as "sizzling". Shorter song 1–2 seconds long, a quick series of high-pitched trills and buzzes, "ti-ti-ti tswee-tswotit-dzzzz", sometimes reminiscent of song of Bananaquit (*Coereba flaveola*). Longer songs more than 3 seconds in duration, quicker and jumbled in nature. N race (*uniformis*) gives much more insect-like song dominated by high-pitched buzz, "tzzzzzzz-sitis-tzzz" or "tzi-tzeeeeeeeee". In one study involving ten males in Costa Rica, three song types identified; songs differed in length, also in type of sibilant note incorporated in the trill and where in trill it was inserted; a more complex and longer flight song was also identified. Call a high "tseep".
Habitat. Humid highland-forest edge where *Chusquea* bamboo present. A *Chusquea* specialist. Also forages in open grassy areas adjacent to highland forest. At 1200–3000 in Mexico and Central America; 1500–3500 m in Andes.
Food and Feeding. Seeds. Forages for bamboo seeds in undergrowth, on ground or near ground; at other times may forage for grass seeds in open areas at edge of forest. During non-breeding periods forms small flocks of up to 20 individuals.

Breeding. Little known. Season entirely dependent on the seeding of bamboo, which appears to be seemingly random in timing; egg dates Apr in Costa Rica and Sept in Ecuador. Nest globular with side entrance in Costa Rica, more open-topped in Ecuador (sample too small to determine if this a genuine geographical difference); one nest was placed 1·5 m above ground on fern-festooned bank next to a mule trail, contained 3 or 4 unspotted white eggs. No other information.
Movements. Irruptive, with local concentrations when *Chusquea* bamboo flowers and seeds; no detailed information on movements.
Status and Conservation. Not globally threatened. Generally uncommon to rare throughout its wide range, but becomes locally common where bamboo is seeding en masse. This species' irruptive behaviour, coupled with its preferred highland habitat, makes it very difficult adequately to assess populations, and in particular if its numbers have declined owing to the cutting of montane forests. As its needs are so specific, and as an adequate supply of seeding bamboo is possible only with huge tracts holding bamboo within them, this species would appear to be susceptible to population declines from even patchy and local habitat loss.
Bibliography. Armani (1985), Barajas *et al.* (1994), Garrigues & Dean (2007), Howell & Webb (1995), Martínez-Sánchez (1989), Miller & Moore (1954), Restall *et al.* (2006), Ridgely & Tudor (1989), Ríos-Uzcategui (1997), Sánchez (2005), Schulenberg *et al.* (2007), Stiles & Hespenheide (1972), Ugalde & Torres (2006), Willard *et al.* (1991).

192. **Uniform Finch**
Haplospiza unicolor

French: Haplospize unicolore **German**: Einfarbämmerling **Spanish**: Yal Unicolor

Taxonomy. *Haplospiza unicolor* Cabanis, 1851, Rio Grande do Sul, Brazil.
Molecular data suggest that this genus is part of a clade which includes also *Catamenia*, as well as *Phrygilus unicolor* and *Phrygilus plebejus* (but not others of that genus); in particular, a relationship between present genus and *Phrygilus unicolor* was suggested by early authors on basis of similarities in plumage and structure; molecular data indicate also that *Acanthidops* is related to present genus. This species probably forms a superspecies with *H. rustica*. Monotypic.
Distribution. E Paraguay, NE Argentina (Misiones) and SE Brazil (S Minas Gerais and S Espírito Santo S to Rio Grande do Sul).



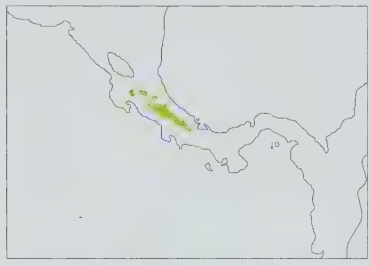
Descriptive notes. 12·5 cm; 14–17·5 g. A slim finch with well-proportioned conical bill. Male is almost entirely blue-grey and unstreaked, paler on belly and vent; upperwing blackish with blue-grey edging; tail blackish with blue-grey edging; iris dark brown; bill black; legs olivaceous to very dark pink. Differs from similar *H. rustica* mainly in noticeably shorter bill, some minor plumage differences; from *Tiaris fuliginosus* in larger size and longer and more pointed bill. Female is olive and obscurely streaked above, wings and tail dusky with olive edgings, off-white with yellowish tint below, breast olive-streaked, vent and undertail-coverts whitish with brown streaks; bill dusky with yellowish base of lower mandible, legs blackish. Immature male resembles adult, but duller and paler in body plumage, with paler bill and slightly yellowish base of lower mandible. Voice. Song high-pitched and buzzy, and short, lasting from half-second to nearly a full second, beginning explosively and ending with buzzy noise or high-pitched trill (sounding as if spat out), at times reminiscent of songs of *Volatinia jacarina*, "Pst-ts-tswaeeee" or "Pst-tsweee-bzzzzzz". Also performs long song, a continuous jumble of high-pitched buzzes and short notes lasting 4–8 seconds. May sing during short flights.
Habitat. Humid forest borders and undergrowth where abundant bamboo (*Guadua* and *Chusquea*). To 1400 m.
Food and Feeding. Seeds of bamboo, appearing to prefer *Guadua*; also grass seeds and insects. Forages near and on ground; at times also higher.
Breeding. Timing unclear, perhaps synchronized with bamboo flowering and seeding, specifically with the seeding of *Guadua* species; in Paraguay males sang throughout Mar–Apr during an irruption, suggesting possible breeding activity; in Brazil (Rio Grande do Sul) males with active gonads in Feb. In aerial song display, makes short fluttering flights, with legs dangling, between two branches a few metres above ground. No other information.
Movements. Irruptive, moving to areas of flowering and seeding bamboo.
Status and Conservation. Not globally threatened. Uncommon to rare throughout its range; becomes locally common where bamboo is seeding en masse. This species' irruptive nature and its preferred habitat make reliable assessment of populations very difficult, and determination of any decline in numbers owing to cutting of forests almost impossible. As its needs are so specific, and as an adequate supply of seeding bamboo is possible only with huge tracts that contain bamboo within them, this species would appear to be susceptible to population declines from even patchy and local habitat loss.
Bibliography. de Andrade & de Andrade (1997), Areta *et al.* (2009), Armani (1985), Olmos (1996), Ridgely & Tudor (1989), Sick (1993), Smith (2008).

Genus *ACANTHIDOPS* Ridgway, 1882

193. **Peg-billed Finch**
Acanthidops bairdi

French: Bec-en-cheville gris **German**: Spitzschnabelämmerling **Spanish**: Yal Costarricense

Taxonomy. *Acanthidops bairdi* Ridgway, 1882, Volcán de Irazú, Costa Rica.
Molecular evidence and bill shape suggest that genus is part of a group that contains also *Diglossa* and *Xenodacnis* (both currently placed in family Thraupidae) and *Catamenia*, but plumage details suggest that it may be closest to *Haplospiza*. Species name often misspelt "*bairdii*". Monotypic.
Distribution. Highlands of Costa Rica (S from Cordillera Guanacaste) and W Panama (W Chiriquí).
Descriptive notes. 13 cm; 16 g. A small finch with peculiar bill shape, very narrow, in profile long and fine, yet thicker-based, looking constricted a third of the way from base, and long and thin for rest of length. Male is entirely dark grey and unstreaked, underparts only slightly paler than upperparts, on some belly paler and rear flanks olive-toned, others darker grey throughout; iris dark brown; upper mandible blackish, lower mandible often yellowish; legs dull pinkish. Female is brownish-olive above, obscurely streaked from crown to back, face greyish with pale buffy supercilium; upperwing-coverts tipped cinnamon to whitish (creating two pale wingbars), tertials and flight-feathers edged chestnut, tail brownish; rich buff below, obscurely streaked on throat, breast and flanks, with lower flanks to undertail-coverts rich olive-russet; bare parts much as for male. Juvenile resembles female, but wingbars paler, more buffish, also paler below. Voice. Song 3–4 rapid-fire high-pitched notes followed by almost electric buzz, "t-t-t-tzééééwww". Call a high-pitched "tsip".



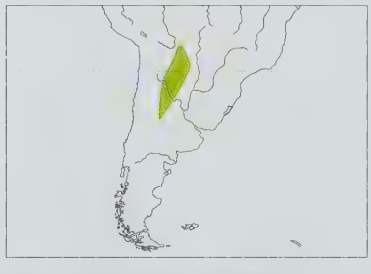
Habitat. Edges and more open areas of highland forest and cloudforest, particularly if bamboo thickets present; forages also in pastures adjacent to forest. At 1500–3100 m.
Food and Feeding. Food primarily arthropods, both insects and spiders (Araneae); also seeds, particularly of bamboo, as well as other grasses (e.g. *Trisetum*), and takes nectar at times. In forest forages along limbs in manner similar to that of a foliage-gleaner (Furnariidae), also in low shrubbery and on ground; in grassy areas adjacent to forest will sally up to grass stalks and bring them down in order to feed on seeds. Consumes larger berries in curious manner, piercing them with bill and then transporting them to horizontal branch, where it squeezes berry to obtain the juice, and then discards the skin. Forages in pairs, singly and in small flocks.
Breeding. Season Mar–Jun. Nest built by female, a bulky, compact cup of plant material, one consisted mainly of leafy liverworts, moss and very small amounts of a fruticose lichen, interior layers of fern rhizomes, straw and *Thuidium* moss, placed c. 2·25 m up in centre of *Vaccinium* shrub. Clutch typically 4 eggs, greenish-blue with very small spots of burnt amber, these concentrated at broad end and forming a wreath; incubation by female, period 12–14 days. No other information.
Movements. Resident; moves locally to take advantage of periodic seeding of bamboo.
Status and Conservation. Not globally threatened. Restricted-range species: present in Costa Rica and Panama Highlands EBA. Generally uncommon to rare throughout its range; becomes locally common where bamboo is seeding en masse. Not a strict bamboo specialist, but the only records from Panama were during a bamboo seeding period.
Bibliography. Armani (1985), Garrigues & Dean (2007), Sánchez-Pérez & Hernández-Esquivel (1990), Sassi (1939), Stiles & Hespenheide (1972), Stiles & Skutch (1989), Wetmore *et al.* (1984).

Genus *LOPHOSPINGUS* Cabanis, 1878

194. **Black-crested Finch**
Lophospingus pusillus

French: Lophospingue à huppe noire **Spanish**: Soldadito Común
German: Schwarzhauben-Zwergkardinal

Taxonomy. *Gubernatrix pusilla* Burmeister, 1860, Tucumán, Argentina.
Molecular data indicate that genus may be sister to White-banded Tanager (*Neothraupis fasciata*), and that these in turn are part of a clade which includes also *Diuca diuca*, *Paroaria* cardinals, Magpie Tanager (*Cissopis leverianus*) and *Schistochlamys* tanagers; this would suggest that all should be included in the tanager family (Thraupidae). Monotypic.
Distribution. S Bolivia (S Santa Cruz, E Chuquisaca and E Tarija) and W Paraguay S to C Argentina (Salta and Formosa S to E San Juan, N San Luis and W Córdoba).



Descriptive notes. 14 cm; 14–20·5 g. A relatively slim-looking finch with long tail, bill triangular and robust for size of the bird, and head obviously crested. Male has striking, bold black-and-white head pattern, with black forehead to crown, including pointed crest, broad black mask from lores through eye and widening towards side of neck, small white lower eye-crescent, white moustachial and malar region broadening towards rear, contrasting black throat; hindneck and body grey, darker above than below, undertail-coverts white; wing and tail dark grey with paler grey edging, outer rectrices edged white on outer web; iris dark brown; bill dull pinkish-yellow with black culmen (appears bicoloured); legs dusky. Female is similar to male in pattern, but black areas of face replaced with brown, throat pale with darker malar stripe; upperparts brownish, median and lesser upperwing-coverts whitish, often greater coverts distinctly grey (appearing as greyish wingpanel on perched bird); underparts greyish, obscurely streaked; bare parts much as for male. Immature is like female, but browner above and more noticeably streaked below. Voice. Flocks may give jumbled busy set of calls, reminiscent of a flock of Budgerigars (*Melopsittacus undulatus*). Call a nasal "chnip"; excitement calls a series of nasal notes given quickly as a chatter.
Habitat. Open *chaco* woodland and forest edge, including grassy pastures and roadsides adjacent to woodland. Usually below 1000 m; to 2000 m in Bolivia.
Food and Feeding. Little information. Feeds on seeds and arthropods. Forages on ground, often in pairs or small flocks.
Breeding. Nest built by male, a cup-shaped structure of vegetable fibres and lichens tangled with spider webs, and lined with rootlets, animal hair and some feathers; often placed in large cactus. Clutch 3 eggs, pale bluish-green with brown spots. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Generally uncommon and local; reasonably abundant in some places. No known threats.
Bibliography. Armani (1985), Blendinger & Ojeda (2001), Bosche (1988), Canevari *et al.* (1991), Klicka *et al.* (2007), Leitch (1970), Ridgely & Tudor (1989), Roder (1991).

195. **Grey-crested Finch**

Lophospingus griseocristatus

French: Lophospingue gris **German**: Grauzwergkardinal **Spanish**: Soldadito Gris

Taxonomy. *Emberiza griseo-cristata* d'Orbigny and Lafresnaye, 1837, Valle Grande, Santa Cruz, Bolivia.
Molecular data indicate that genus may be sister to White-banded Tanager (*Neothraupis fasciata*), and that these in turn are part of a clade which includes also *Diuca diuca*, *Paroaria* cardinals, Magpie Tanager (*Cissopis leverianus*) and *Schistochlamys* tanagers; this would suggest that all should be included in the tanager family (Thraupidae). This species was formerly given its own genus, *Schistospiza*, but exhibits obvious plumage similarities to, and no structural differences from, present genus. Monotypic.
Distribution. W & S Bolivia (E La Paz, E & S through C Cochabamba, W Santa Cruz, W Chuquisaca and W Tarija) and extreme N Argentina (E Jujuy and N Salta).



Descriptive notes. 14 cm; 13·1–20·2 g. Pale grey to brownish emberizid with relatively deep-based bill, and a crest usually kept lowered. Head is plain grey, with darker crest; upperparts grey, olive wash on back, more blue-grey on rump; upperwing brownish, grey upperwing-coverts and grey edging of flight-feathers (making folded wings appear largely greyish); tail brownish-grey, white tips on inner webs of outer three pairs of rectrices (creating large white tail corners in flight); throat, breast and flanks pale grey, contrasting whitish belly, vent and undertail-coverts; iris dark; upper mandible dark, lower mandible largely yellow to pinkish with dark tip; legs dusky. Sexes alike. Juvenile is much more brownish than adult, with short crest, pale buff supercilium, off-white throat, and two narrow buffy wingbars. Voice. Song consists of 3–4 different elements given in bouts of average of six elements, quality of song throaty and gaps between elements nearly equivalent to lengths of latter, a bout lasting c. 5 seconds, "pwee switoo pizitoo switoo pizitoo switoo pizitoo"; resembles song of *Diuca diuca*, but sharper and with throaty-sounding elements. Another song type is longer and continuous, with longer gaps between elements, thus slower more relaxed tempo.
Habitat. Desert and near-desert habitats in dry intermontane valleys, also dry scrub with taller cactus and mesquite (*Prosopis*). Likes, or perhaps requires, open areas of bare earth near vegetation, where often forages; also uses roadsides and agricultural fields adjacent to xeric scrub. At 1000–3100 m.
Food and Feeding. Diet not studied; appears to be a mix of seeds and arthropods. Forages on ground in small flocks.
Breeding. Little known. In Bolivia, juveniles observed in Dec and Jun (Cochabamba) and in Apr (Santa Cruz). No other information available.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally common in Bolivia; much rarer in Argentina. A poorly known species.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Klicka *et al.* (2007), Ridgely & Tudor (1989).

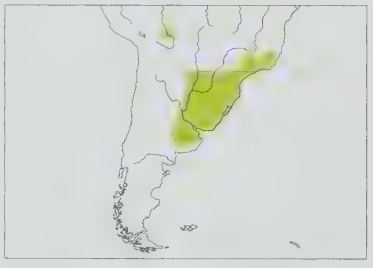
Genus *DONACOSPIZA* Cabanis, 1851

196. **Long-tailed Reed-finch**

Donacospiza albifrons

French: Donacospize des marais **German**: Riedammerfink **Spanish**: Cachilo Canela

Taxonomy. *Sylvia albifrons* Vieillot, 1817, Paraguay.
Song and colour pattern suggest that this species may be closely related to *Poospiza*. Monotypic.
Distribution. Bolivia (Beni); SE Paraguay and SE Brazil (S from S Paraná, S São Paulo, S Minas Gerais and W Rio de Janeiro) S to NE Argentina (Misiones, Corrientes, E Formosa and E Chaco S to E Córdoba and NE Buenos Aires) and Uruguay.



Descriptive notes. 15 cm; 14–16·5 g. A small and slim finch with long tail, short and rounded wings, and relatively small and well-pointed bill; tail feathers pointed (and often frayed to even narrower points), inner two pairs longer than outer rectrices, shape not dissimilar to that of a *Synalaxis* spinetail. Male has grey cap and face, well-defined whitish-cinnamon supercilium that tapers behind eye, narrow buffy lower eye-crescent; dark eyeline through grey face (giving a rather serious-looking expression); grey of crown blends into tawny-brown on back, which streaked blackish, lower back and rump brighter tawny and much less streaked; tail feathers brown, edged tawny; upperwing brown with tawny edgings, lesser upperwing-coverts blue-grey (often hidden); throat and underparts pale tawny, slightly paler or approaching white on chin and areas bordering grey face, whitish or pale buff on vent and undertail-coverts; iris dark; bill black; legs dusky pink. Female is very like male, perhaps slightly less colourful, but much overlap in appearance. Immature is similar to adult, but tail shorter and not so pointed, face yellowish with darker crown and mask, duller in colour and more heavily streaked above, wing feathers crisply edged buff, underparts yellowish and streaked on breast. Voice. Song a pleasant series of two or three elements repeated, e.g. "twee-cha twee-cha twee-cha..." or "twee-ta wheet-cha twee-ta wheet-cha...", reminiscent of songs of *Poospiza*; shorter version given in aerial display. When particularly excited during territorial defence (as is often the case during playback experiments), both adults respond with a chattering and jumbled duet song. Calls include nasal note, often doubled, "thup-thup"; also a series of "tiip" notes e.g. "tiip tiip tiip tiip".
Habitat. Marshes and reedbeds with tall emergent vegetation (*Typha*, *Eryngium*, *Scirpus*, *Iris*), also wet tall-grass fields, and open shrubby areas near marshes or standing water; closely associated with water. To 900 m.
Food and Feeding. Primarily insects; will also take seeds. Forages by probing in emergent vegetation. Sometimes follows army ants (Formicidae). In pairs and family groups.
Breeding. Season Oct–Feb; juveniles seen in Jul in Bolivia. Performs short song flight, flying directly upwards a few metres, before gliding down to reeds while singing. Nest a semi-spherical structure created from soft dry grass, placed near or on ground on thick grass clump. Clutch 4 eggs, white with darker spotting on wide pole. Parasitization by Shiny Cowbird (*Molothrus bonariensis*) recorded. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common where its tall-grass marsh habitat exists. Main threat is the draining of wetlands.
Bibliography. Armani (1985), Azpiroz (2003a), Belton (1985), Di Giacomo & Aguilar (1987), Di Giacomo & Di Giacomo (2006), Friedmann *et al.* (1977), Maillard *et al.* (2008), de la Peña (1989), Ridgely & Tudor (1989), Schmitt & Schmitt (1987), Sick (1993).

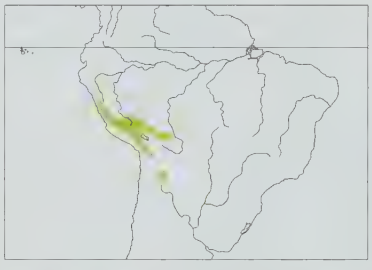
Genus *DIUCA* Reichenbach, 1850

197. **White-winged Diuca-finch**

Diuca speculifera

French: Diuca leucoptère **German**: Spiegelammer **Spanish**: Diuca Aliblanca

Taxonomy. *Emberiza speculifera* d'Orbigny and Lafresnaye, 1837, Bolivia.
Previously thought to form a superspecies with *D. diuca*, but aspects of morphology, voice and typically hopping (rather than walking) locomotion suggest that it is not close to that species; likely more closely related to *Phrygilus erythronotus* and *Phrygilus dorsalis*. Race *magnirostris* doubtfully distinct from nominate. Two subspecies provisionally recognized.
Subspecies and Distribution.
D. s. magnirostris Carriker, 1935 – highlands of C Peru (Ancash to Junín and Huancavelica).
D. s. speculifera (d'Orbigny & Lafresnaye, 1837) – Andes of SC & S Peru (S from Arequipa, Cuzco and Puno; probably also this race in Ayacucho and Apurímac), N Chile (Arica–Parinacota and Tarapacá), W Bolivia (La Paz, Cochabamba and NW Oruro), and NW Argentina (Jujuy).



Descriptive notes. 17·5–19 cm. A large finch with relatively long, stout bill, thickset body, and very long wings; bold white patches in plumage. Nominate race has head mostly grey, blackish on lores, with noticeable white elongate patch below eye; upperparts plain grey; tail blackish, outer rectrix with bold white edge, other feathers with greyish-white edges; upperwing-coverts entirely grey, flight-feathers blackish, large white patch at base of outer primaries (unmistakable in flight), secondaries and tertials edged greyish; grey of face extends well down to side of throat, and borders clean white patch on throat down to edge of upper breast; breast otherwise grey, flanks grey, and belly to undertail-coverts white; iris dark; bill and legs black. Sexes alike. Juvenile resembles adult, but brownish above, with buffy throat. Race *magnirostris* is very like nominate, but bill averages longer. Voice. Possible song a very simple repetition of various short notes with wide intervals between elements, "tsweep—weep—twoop—tsweep—", notes so widely separated as to sound barely different from a bird giving call notes, but difference is that short elements are varied (not a single call note repeated); more study needed in order to determine if this simple vocalization is indeed song. Calls a high, thin "tseep" and a rising "pheep".
Habitat. Breeds in alpine rocky crags and even glaciers, foraging in *bofedal* wetlands ("cushion bogs"); will roost in crevasses within glaciers. Also in *puna* bunch-grass, but prefers to forage in moister sites, particularly *bofedales* with cushion plants (*Distichlis*, *Plantago rigida*). At 4000–5500 m. Possibly breeds at higher elevation than any other passerine in the Americas, nesting recorded to 5400 m.
Food and Feeding. Diet not studied; likely a mix of arthropods and seeds. Forages on ground, in pairs. Forages with body close to ground, often crouching such that legs difficult to see.
Breeding. Season begins at end of wet season, in Apr, and continues to Aug. Nest a bulky structure of grass and twigs, with well-made, deep cup near centre, lined with finer grasses and feathers, placed usually in rock crevice, sometimes on glacier (the only avian species currently known to use high-elevation glaciers as substrate for nest). Clutch 2–3 eggs, pale greenish with darker purplish-brown spots. No other information.
Movements. Sedentary. During intense snow storms may temporarily descend to lower elevations, returning upwards once storm has passed.
Status and Conservation. Not globally threatened. Reasonably common throughout its range. Because it is restricted to the highest Altiplano region, global warming may restrict its habitat in the future; populations should be monitored.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hardy & Hardy (2008), Jaramillo (2003), Ridgely & Tudor (1989).

198. **Common Diuca-finch**

Diuca diuca

French: Diuca gris **German**: Blausteißammer **Spanish**: Diuca Común
Other common names: Lesser Diuca-finch (*minor*)

Taxonomy. *Fringilla Diuca* Molina, 1782, Chile.
Previously thought to form a superspecies with *D. speculifera*, but aspects of morphology, voice and typically walking (rather than hopping) locomotion suggest that it is not close to that species. Recent molecular data indicate that present species is the earliest offshoot in a clade which includes *Lophospingus*, White-banded Tanager (*Neothraupis fasciata*), *Paroaria* cardinals, Magpie Tanager

(*Cissopis leverianus*) and *Schistochlamys* tanagers; this would suggest that all should be included in the tanager family (Thraupidae). Four subspecies recognized.

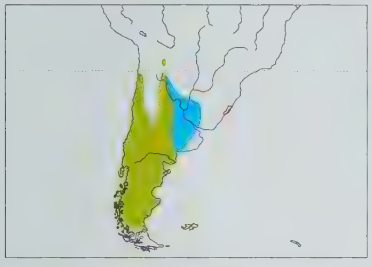
Subspecies and Distribution.

D. d. crassirostris Hellmayr, 1932 – NC Chile (Antofagasta S to Coquimbo), extreme S Bolivia (SE Potosí) and N Argentina (Jujuy and Salta S to La Rioja).

D. d. diuca (Molina, 1782) – C & SC Chile (Coquimbo S to Aysén) and adjacent Argentina (Mendoza S to Santa Cruz).

D. d. minor Bonaparte, 1850 – C & S Argentina (Córdoba, San Luis and S Buenos Aires S through E Mendoza to Santa Cruz) and S Chile (N Magallanes); non-breeding also N to NE Argentina (Tucumán and Entre Ríos), S Brazil (W Rio Grande do Sul) and Uruguay.

D. d. chiloensis R. A. Philippi [Bañados] & Peña, 1964 – Chiloé I (SC Chile).



Descriptive notes. 16–18 cm; 25–41 g. A medium-sized finch with thickset body, and stout bill with rounded culmen. Male nominate race has head mostly dark grey, slightly darker on lores, narrow white eye-crescent below eye; upperparts plain dark grey, back washed olive, lower back and rump blue-grey; tail brownish-grey, inner webs of outer three feather pairs with large white tips (creating large white tail corners in flight); upperwing-coverts grey, darker on centres and paler on edges, flight-feathers blackish with grey edging; throat and malar area extensively white, cleanly demarcated at lower border from dark grey breastband; grey of breast extends to flanks and contrasts with white belly and vent, white of belly extends upwards in inverted V-shape into grey of breast, flanks often with buffy tinge, becoming rusty behind legs, undertail-coverts whitish with rusty wash; iris brown; bill blackish, blue-grey base of lower mandible; legs brownish-grey to blackish. Female is very like male, but tinged olive or brownish, also rusty tone of flanks paler and less extensive. Immature is dull and brownish, but with similar pattern to that of female, and vent buff (not rufous). Races differ mainly in size or in saturation of plumage colour: *crassirostris* is largest, has proportionately large and thick bill (noticeable in the field), also outer web of outermost tail feather wholly white; *minor* is smallest, and tinged brownish above; *chiloensis* is smaller than nominate, plumage coloration more saturated. Voice. Song musical and pleasant, 4–5 notes delivered lazily, with final element accented, "tiuup tween chwuup twééip", reminiscent of song of Golden-billed Saltator (*Saltator aurantiirostris*). Call a sweet "tweep".

Habitat. Occupies wide diversity of open or semi-open and edge habitats, including agricultural areas, rural towns, city parks, pastures, *matorral* scrub, desert scrub, dry forest edge and shrubland within Monte Desert (Argentina), and temperate-forest edge. Sea-level to 2500 m.

Food and Feeding. Diet seeds, particularly grass seeds (80% of food in stomach samples from Argentina), and invertebrates, proportions varying depending on season. Seeds important in winter (in winter in Argentina, densities of this species correlated with seed densities in the environment); in spring and summer will take more arthropods. Forages mostly on ground, where it walks, rather than hops, with gait like that of a quail (Phasianidae); tendency to do some foraging on low shrubs, rather than strictly on ground, in spring and summer. In pairs and family groups; also small flocks in non-breeding season.

Breeding. Season Sept–Feb in Chile and Nov–Jan in NC Argentina; up to three broods in a season in C & S Chile, single-brooded in Monte Desert of Argentina. Nest an open cup made from dry grass and vegetable fibres, lined with soft vegetation or wool, placed at various heights in bush or tree, in C Chile either hidden in thornless tree with dense foliage or sited conspicuously in thorny tree with low leaf density (latter nests also lined with thorny twigs); in Argentina placed in platform of old, abandoned spiny nest of furnariid, e.g. Short-billed Canastero (*Asthenes baeri*) or Brown Cachalote (*Pseudoseisura lophotes*), or of Monk Parakeet (*Myiopsitta monachus*). Clutch 2–4 eggs, most commonly 3, pale green, densely spotted and blotched brown. Nests frequently parasitized by Shiny Cowbird (*Molothrus bonariensis*).

Movements. Mostly resident. S Argentine race (*minor*) appears to be at least partially migratory; recorded from NE Argentina, Uruguay and S Brazil only in winter.

Status and Conservation. Not globally threatened. Common to locally abundant in much of Chile and W & S Argentina. Subjective observations in SC Chile suggest that this species is not as common as it was several decades ago; speculated that more intensive agricultural practices have perhaps caused a decline. Introduced House Sparrow (*Passer domesticus*) has been blamed locally for lowering numbers of this species near villages and in urban areas.

Bibliography. Armani (1985), Bertonatti & Guerra (1997), Blendinger (2005a, 2005b), Blendinger & Ojeda (2001), Fjeldså & Krabbe (1990), Jaramillo (2003), Johnson & Goodall (1967), Klicka *et al.* (2007), Lazo (1996), Lazo & Anabalón (1991), Marone *et al.* (1997), Marone, de Casenave, Milesi & Cueto (2008), McCarthy (2006), Mezquida (2003), Navas & Bó (1988b), Ridgely & Tudor (1989).

Genus *IDIOPSAR* Cassin, 1867

199. **Short-tailed Finch**

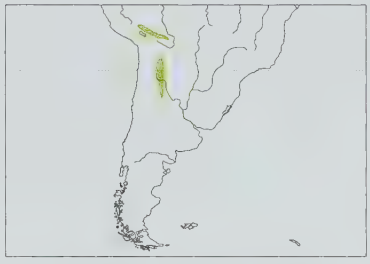
Idiopsar brachyurus

French: Idiopsar à queue courte **German**: Kurzschwanzammer **Spanish**: Yal Colicorto
Other common names: Andean Boulder-finch, Short-tailed Diuca-finch

Taxonomy. *Idiopsar brachyurus* Cassin, 1867, La Paz, Bolivia.
Monotypic.

Distribution. S Peru (S Cuzco and Puno) S through highlands of Bolivia (La Paz, W Cochabamba, E Oruro, E Potosí and W Tarija) to NW Argentina (Jujuy, highlands of Salta, Tucumán and Catamarca).

Descriptive notes. 18–18·5 cm; one male 43 g. A large and thickset finch with very long and stout-based, spike-like bill; big body can make tail appear somewhat short. Male has head grey, fine whitish streaking below eye; upperparts all plain lead-grey; wing and tail greyish, similar in colour to upperparts, but wing paler, outer edge of outer rectrix white; paler grey below, particularly on throat and central breast, contrasting with darker sides, with belly and vent whitish, undertail-coverts grey; iris reddish-brown; bill horn-grey, paler lower mandible; legs dull pinkish. Differs from similarly plumaged *Phrygilus unicolor* in large size, proportionately large body and relatively



short tail, and very long and peculiar bill. Female is similar to male, but with browner tone. Juvenile is like female, but browner still, and obscurely streaked below, also grizzled grey on face, and has brown eye and yellowish base of lower mandible. Voice. Song a simple repetition of notes, "tseet tsu tsree tseet tsu tsree..." or "schrii su su schrii su su schrii su su". Call a high-pitched "ziht".

Habitat. A specialist of boulderfields and talus slopes comprised of larger rocks and boulders adjacent to *puna* grasslands. Generally not found away from rock piles or boulders, although in Argentina seen to use rock walls (*pircas*) in an Andean village and recorded also from boulder-strewn riverbanks adjacent to *Festuca* grassland; in Cuzco (Peru) also edge of *Polylepis* forest near grassland. At 4000–4600 m, rarely down to 3500 m.

Food and Feeding. No detailed information on diet; seen to feed on seeds, also on lichen on rocks. Study of diet important, as this species may be very particular in terms of food choices. Forages mostly on ground. In Peru, obtained seeds of *Gentianella aurantiaca* by digging around one spot (to depth of 2·7 cm) and looking for a seed, then extracting edible part, discarding seed sheath and breaking the seed before consuming it. Found alone and in pairs; also, flocks of up to six individuals observed. Has tendency to perch on a conspicuous rock with bill held pointing at upward angle, which makes bill often appear upturned.

Breeding. Largely unknown. Males in breeding condition in Jan in Bolivia (La Paz); in Argentina female observed while inspecting crevices in adobe walls, perhaps looking for nesting site. No other information.

Movements. Sedentary, so far as is known.

Status and Conservation. Not globally threatened. Rare and/or local throughout much of its range; locally common in a few sites in Bolivia. Occurs in three protected areas In Bolivia: Carrasco National Park (Cochabamba) and Cordillera de Sama Biological Reserve and Tariquía National Reserve (Tarija).

Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Lloyd *et al.* (2005), Mazar Barnett, Clark *et al.* (1998), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Vuilleumier (1969a).

Genus *PIEZORINA* Lafresnaye, 1843

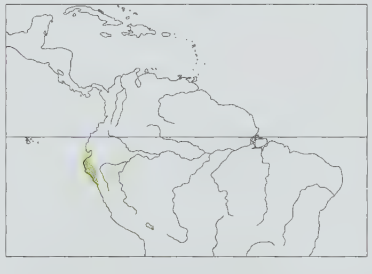
200. **Cinereous Finch**

Piezorina cinerea

French: Piézorhin cendré **German**: Grauämmerling **Spanish**: Yal Cinéreo

Taxonomy. *Guiraca cinerea* Lafresnaye, 1843, Galapagos Islands; error = coastal north-west Peru.
Genus name often spelt "*Piezorhina*", but this is an unjustified emendation; original spelling (where name applied as subgenus for present species) should stand. Monotypic.

Distribution. NW Peru from Tumbes S to La Libertad.



Descriptive notes. 16·5 cm. Distinctive, relatively large and thickset emberizid with peculiar large and thick, rounded-looking bill with strongly rounded culmen. Has head mostly pale grey, blackish mask from base of bill to forehead and lores, contrasting with pale bill; upperparts pale grey with very slight sandy wash, wings and tail similarly greyish; pale grey below, contrasting white throat, and whitish belly and vent; iris brown; bill and legs yellow. Sexes alike. Juvenile lacks dark face of adult, is pale sandy grey on upperparts, off-white below, with buffy breast and flanks, and bill and legs duller, more pinkish-yellow. Voice. Song a jerky series of rich, short squeaky phrases. Calls include "teep" and "tee-too", as well as a dry "tik-tik-tik".

Habitat. Occupies open, arid, sandy habitats with short shrubs and small and scattered trees; present up to 300 m.

Food and Feeding. Seen to forage on the ground in singles and pairs. No other information.

Breeding. Eggs reported in May–Jun, the transitional period between rainy and dry seasons. Nest a well-built cup of yellowish plant fibres, secured by spider webs, with spider egg cases and shreds of dry yellow leaves attached to outside, tends to be placed on fork of branch of small tree. Clutch 2–3 eggs, pale blue with dense brownish markings. Heavily parasitized by Shiny Cowbird (*Molothrus bonariensis*); appears sometimes to build new lining on top of parasitized nest. No other information.

Movements. Generally sedentary. One record of vagrant in extreme S Ecuador (S Loja).

Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Common within its small range and limited habitat. Not well known; apparently no immediate threats.

Bibliography. Armani (1985), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Trollope (1993), Williams (1981a).

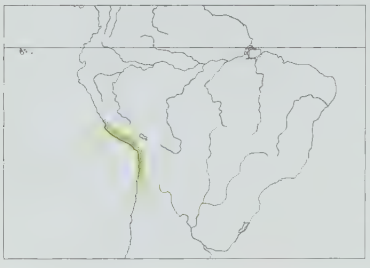
Genus *XENOSPINGUS* Cabanis, 1867

201. **Slender-billed Finch**

Xenospingus concolor

French: Xénospingue uniforme **German**: Feinschnabelämmerling **Spanish**: Yal Picofino

Taxonomy. *Sylvia concolor* d'Orbigny and Lafresnaye, 1837, Arica, Chile.
Monotypic.
Distribution. S Peru from S Lima (R Rímac) S to Tacna, and NW Chile S to N Antofagasta (R Loa).



Descriptive notes. 15–17 cm; 20–22 g. A very long and slim finch, with tail and bill long and slender, as is body, and legs proportionately long; bill distinctive in shape and very atypical, long and narrow with only slight curve of culmen, and rather straight gonys. Plumage is almost entirely slate-grey, slightly paler grey on underparts, becoming greyish-white on vent; black area on lores extending to lower forehead and chin; partial white eyering; wing and tail unmarked dark grey; iris deep brown; bill and legs deep yellow. Sexes alike. Juvenile and first-year immature lack black mask of adult, although they do show pale buffy eyering, are brownish-grey, brown wings with buff wingbars, paler buffish below, obscurely streaked on underparts, with bill and legs dusky; second-year resembles adult, but has brownish tone to back, sometimes faint streaking on breast, often a dark tip of yellow bill, wings greyish and lack wingbars, black mask still absent. Voice. Song choppy-sounding, delivered slowly (2 elements per second), a series of single whistles, each differing slightly in pitch from others, interspersed with harder "chup" notes, song lasting c. 4 seconds, "twee chup cheeuu truup chee tweet chup...". Calls include metallic "tzip", lower "cheep", and distinctive series of buzzy scolding notes, "chip-chip-chip-t'tzzzp".

Habitat. Desert valleys, where it prefers areas with dense riparian shrubbery adjacent to more open areas or grassy patches. In N Chile takes readily to olive (*Olea europaea*) plantations because of their size and density. In Peru, found in areas with continuous coverage of *Prosopis pallida*, *Tessaria integrifolia* and *Baccaris salicifolia*, as well as introduced olive groves and Chinese tamarisk (*Tamarix chinensis*); absent from valleys where native trees and shrubs completely eliminated. Occurs from sea-level up to 500 m in most areas, but in S portion of range up to 2500 m; vagrant up to 3500 m.
Food and Feeding. Mainly insects; seeds appear to form relatively unimportant part of diet; takes fruit on occasion. Foraging mostly in dense shrubbery. Gleans insects from foliage. Found in pairs and family groups.
Breeding. Season Dec–Jun in S Peru. Both members of pair present during nest-building, but apparently only female builds nest, a globular mass 11–13 cm in diameter, made from interwoven twigs, placed 1·5–2 m up in fork in riparian vegetation. No other information.
Movements. Sedentary; vagrant reported in Putre (Parinacota Province), in NE Chile.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Fairly common in Chilean part of range; less common and more local in Peru. No data on global population total, but appears to be fairly small, and habitat now fragmented. This species' habitat of river valleys is subject to heavy adverse impact through spread of agriculture and human habitations. In Chile, at least, it adapts well so long as some thick shrubbery is present near agricultural areas or settlements; towards end of 20th century colonized a new area in Antofagasta, having not been recorded in that province since mid-1940s. Has already suffered substantial loss and degradation of habitat in Peru, and is probably in slow decline there.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), González (1997), González & Hoegsaas (1998), González & La Torre-Cuadros (2001), Jaramillo (2003), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

PLATE 59 ➤



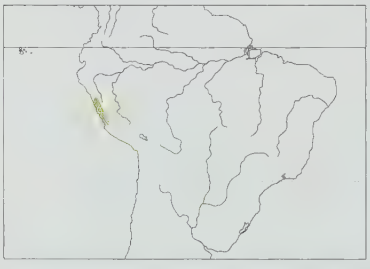
Genus *INCASPIZA* Ridgway, 1898

202. Great Inca-finch

Incaspiza pulchra

French: Chipiu remarquable **German**: Inkaammer **Spanish**: Incaspiza Alirrufo
Other common names: Great Inca-sparrow

Taxonomy. *Haemophila pulchra* P. L. Sclater, 1886, Matucana, upper River Rímac valley, about 8000 feet [c. 2440 m], Lima, Peru.
Forms a superspecies, and sometimes considered conspecific, with *I. personata* and *I. ortizi*. Monotypic.
Distribution. W slope of Andes (in Ancash and Lima), in W Peru.

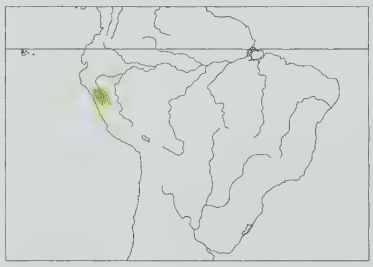


Descriptive notes. 16·5 cm; 25·5–32 g. A rather long-tailed finch with slim, pointed bill. Has grey head, browner on crown and nape, with blackish lores, eyeline and narrow line over base of bill (not extending to forehead), narrow whitish-grey supercilium above this mask; upperparts brownish, scapulars rufous, lower back to uppertail-coverts dull brown; tail black with white outer edges; upperwing largely rufous, browner inner half of tertials, grey lesser upperwing-coverts (often hidden by body feathers or scapulars); mask connects with black on throat to upper breast, rest of breast grey, flanks buffy grey, belly and vent off-white; iris dark brown; bill and legs orange-yellow. Differs from *I. personata* in smaller size, browner back, with less black on face, more black on throat, and greyer breast. Sexes similar in pattern, the female browner on crown and somewhat duller. Immature is duller than adult, lacks black on face and throat, is streaked above and below, bill dull yellow with dark culmen, legs dull yellow. Voice. Song a series of high, thin whistles, "tsew tseee? tsew tswee?". Call a single "tsew" or "tsee"; also a short, quavering descending note, "tsee'le'le'le'le".
Habitat. Arid slopes and ravines with large cacti (of genus *Melocactus*) and/or ground bromeliads. At 1000–2700 m, mostly above 1500 m.
Food and Feeding. Feeds on fruits of *Melocactus* cacti. Forages on ground, with tail held cocked. Generally alone or in pairs; in non-breeding season in groups of up to seven individuals.
Breeding. Fledglings and juveniles seen between May and Jun. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Peruvian High Andes EBA. Uncommon and local; reported as common in Ancash. No known threats.
Bibliography. Armani (1985), Bond (1951a), Fjeldså & Krabbe (1990), González (2003), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

203. Rufous-backed Inca-finch

Incaspiza personata

French: Chipiu costumé **German**: Schwarzstirnammer **Spanish**: Incaspiza Dorsirrufo
Other common names: Rufous-backed Inca-sparrow



Taxonomy. *Haemophila personata* Salvin, 1895, near Cajamarca, 10,000 feet [c. 3050 m], Peru.
Forms a superspecies, and sometimes considered conspecific, with *I. pulchra* and *I. ortizi*. Monotypic.
Distribution. Upper Marañón Valley in S Cajamarca, E La Libertad, NE Ancash and W Huánuco, in NW Peru.
Descriptive notes. 16·5–18 cm; 29·5–33 g. A rather long-tailed finch with slim, pointed bill. Has grey head, browner on nape, with blackish mask fully surrounding bill, extending narrowly to forehead and below to most of throat;

upperparts, including lower back to uppertail-coverts, rufous, greyer nearer tail; tail black with white outer edges; upperwing largely rufous, grey outer median and greater upperwing-coverts, browner inner half of tertials; lower throat and breast grey, flanks buffy grey, belly and vent off-white; iris brown; bill bright yellow; legs orange-yellow. Distinguished from *I. pulchra* mainly by larger size, more extensive black on face, wholly rufous upperparts lacking brown, paler underparts. Sexes alike. Immature is duller than adult, lacks black on face and throat, is streaked above and below, bill dull yellow with dark culmen, legs dull yellow. Voice. Song a weak and high "tisew-ti'tswéé?". Calls include high "tseet" notes.
Habitat. Inhabits dry mountain slopes with cacti and agave and with *Puya raimondii*; occurs at 2300–4000 m.
Food and Feeding. Little information on diet. Forages on ground, singly and in pairs.
Breeding. Males in breeding condition between late Mar and Jun, and fledglings found in May. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Marañón Valley EBA and Peruvian High Andes EBA. Uncommon. Not well known.
Bibliography. Armani (1985), Bond (1951a), Fjeldså & Krabbe (1990), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

204. Grey-winged Inca-finch

Incaspiza ortizi

French: Chipiu d'Ortiz **German**: Grauflügelammer **Spanish**: Incaspiza Aligrís
Other common names: Grey-winged Inca-sparrow

Taxonomy. *Incaspiza ortizi* J. T. Zimmer, 1952, near La Esperanza, 1800 m, Cajamarca, Peru.
Forms a superspecies, and sometimes considered conspecific, with *I. pulchra* and *I. personata*.
Monotypic.
Distribution. NW Peru, very locally in NE Piura, C Cajamarca and NE La Libertad.



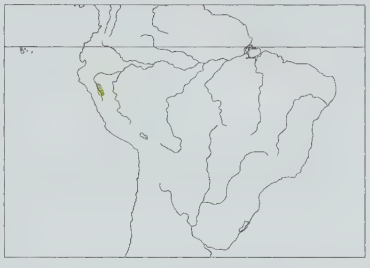
Descriptive notes. 16·5 cm; 29–38 g. A long-ish-tailed finch with slim, pointed bill. Male has mostly grey head, browner on nape, with dark mask that fully surrounds bill, extending narrowly to forehead and to chin and upper throat; upperparts entirely greyish-brown and obscurely streaked, lower back to uppertail-coverts brownish; tail black with white outer edges; upperwing largely grey, with browner inner greater upperwing-coverts, browner-edged tertials; lower throat and breast grey, flanks also grey, belly and vent off-white; iris dark chestnut; bill and legs bright yellow, legs often more orange-yellow. Differs from *I. laeta* mainly in much less strongly patterned face and grey-brown (not rufous) back. Female is very like male, differing only in having on average less pure grey on breast and flanks and less white on centre of belly, also slightly less black on face; sometimes has dark culmen. Immature is duller than adult, lacks black on face and throat, bill dull yellow with dark culmen, legs dull yellow. Voice. Song a series of weak and quavering whistles, one ascending element sounding almost electronic, "seeew sweee? seee? seew sueeesu...".
Habitat. Desert scrub, preferring thick scrub on arid hillsides, particularly those with larger cacti. In Huancabamba found on rocky hilltop with dense scrub of acacia (*Acacia*), cacti and terrestrial bromeliads with average height 1·5 m; in Hacienda Limón in open acacia woodland with grass and thorny scrub lacking cacti and bromeliads. Tolerant of habitat degradation from grazing and logging, and known to occur also in burnt areas. At 1800–2600 m.
Food and Feeding. Feeds on seeds and other plant matter; also insects, including caterpillars. Forages at or near ground in dense vegetation, never moving far from cover. Shy, more retiring than congeners. Singly and in pairs.
Breeding. Nestlings and juveniles found in Jun–Sept; breeding season likely starts in May. No other information.
Movements. Sedentary.
Status and Conservation. VULNERABLE. Restricted-range species: present in Marañón Valley EBA and Peruvian High Andes EBA. Uncommon and local. Known from only four sites, but possibly more widespread. Global population thought unlikely to exceed 10,000 individuals. Confined to Palamba (N of Huancabamba), in extreme NE Piura, La Esperanza (NE of Santa Cruz, on Pacific slope) and Hacienda Limón (E of Celendín), both in Cajamarca, and E of R Marañón near Longotea (close to Amazonas border), in La Libertad. Habitat on Huancabamba slopes has been extensively cleared for agriculture and pasture, and no other suitable habitat known in vicinity; if this hilltop were to be burnt, the species would almost certainly disappear from this locality, the N limit of its range. Farther S it persists in heavily disturbed sites on steep slopes. Although there are no data on current size of population and trend, the species seems able to survive in disturbed habitats; no evidence of any decline exists and no serious threats have been identified at known sites. Further fieldwork desirable in order to determine if undiscovered populations exist elsewhere in the region.
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Parker *et al.* (1985), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

205. Buff-bridled Inca-finch

Incaspiza laeta

French: Chipiu à moustaches **German**: Goldschnabelammer **Spanish**: Incaspiza Bigotudo

Taxonomy. *Haemophila laeta* Salvin, 1895, Cajabamba, Cajamarca, Peru.
Monotypic.
Distribution. Upper Marañón valley in S Cajamarca, SW Amazonas, E La Libertad and adjacent NE Ancash, in NW Peru.



Descriptive notes. 14·5 cm; 19·5–23·5 g. A longish-tailed finch with slim, pointed bill. Has grey head and nape; blackish mask extending broadly to forehead and covering much of face, including area behind and below eye, and throat; large pale buff spot in lower malar area; mantle, back and scapulars rufous, becoming greyish on rump and uppertail-coverts; tail black with white outer edges; upperwing looks largely grey, with browner-edged tertials; underparts grey on breast, contrasting noticeably with buff belly and flanks, vent off-white; iris dark brown; bill bright orange-yellow; legs orange-yellow. Sexes very similar, the female somewhat duller, the crown and nape tinged with earth-brown. Immature is duller than adult, lacks black on face and throat, is streaked above and below, bill dull yellow with dark culmen, legs dull yellow. Voice. Song unrecorded. Call a high "tseet", often repeated; gives dry rasping, scold like that of a wren (Troglodytidae) when annoyed.
Habitat. Dry woodland with *Bombax* trees, cacti and thorn-scrub; 1000–2750 m.
Food and Feeding. No information on diet. Forages on ground and in bushes and trees; not so shy as other members of genus. Singly and in pairs.
Breeding. Birds in breeding condition mid-Apr to mid-Jun. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common. Has small range, within which no threats as yet identified.
Bibliography. Armani (1985), Bond (1951a), Fjeldså & Krabbe (1990), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

206. Little Inca-finch

Incaspiza watkinsi

French: Chipiu de Watkins **German**: Watkinsammer **Spanish**: Incaspiza Chico

Taxonomy. *Incaspiza watkinsi* Chapman, 1925, Perico, River Chinchipe, Cajamarca, Peru.
Monotypic.
Distribution. Lower portion of Marañón Valley in NE Cajamarca and adjacent W Amazonas, in NW Peru.



Descriptive notes. 13 cm; 17–22·5 g. A small, longish-tailed finch with slim, pointed bill. Male has head, including nape, grey, slightly paler greyish-white supercilium anterior to eye; blackish on lores and around base of bill, narrowly connected at bill base to black on chin and uppermost throat; upperparts brownish, obscurely streaked, contrasting slightly with rufous scapulars; lower back to uppertail-coverts brownish-grey; tail black with white outer edges; upperwing largely grey, with browner-edged tertials, and browner edges on inner greater coverts; throat and breast grey, grey extending to flanks, lower flanks with browner wash, belly and vent off-white; iris dark brown; bill bright yellow; legs yellow with orange tone. Female is similar to male, but crown browner, bill has dusky culmen. Immature is duller than adult, lacks black on face and throat, is more strongly streaked, including on breast, bill dull yellow with dark culmen, legs dull yellow. Voice. Song a thin and high "tsee-tsέw! swee?". Calls include high "tseet" notes.
Habitat. Undisturbed lowland desert scrub with good densities of ground bromeliads; 390–900 m.
Food and Feeding. Little information. Forages terrestrially; in pairs or singly.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Fairly common. Has very small range, within which it appears to be suffering slow to moderate decline owing to habitat degradation and expansion of oil palm (*Elaeis guineensis*) plantations. Global population not assessed; reasonably common in most areas where found. Systematics surveys required in order to monitor this species' numbers and identify key threats. Remaining native arid scrub habitats in Marañón drainage merit full protection.
Bibliography. Anon. (2010c), Armani (1985), Bond (1951a), Butchart & Stattersfield (2004), Chapman (1925), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).


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ssp affinis
210
ssp hypocondria
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♂
212
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ssp nigrorufa
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ssp whitii
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217
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torquata
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219
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ssp pectoralis
220
221
222
223
PLATE 60
inches 2
cm 5

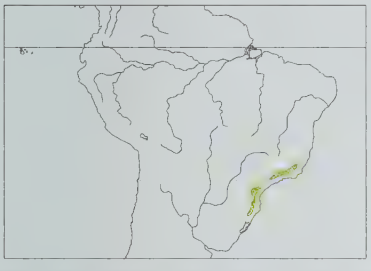
Genus *POOSPIZA* Cabanis, 1847

207. **Bay-chested Warbling-finch**

Poospiza thoracica

French: Chipiu à poitrine baie **Spanish**: Monterita Pectoral
German: Maronenbrust-Ammerfink

Taxonomy. *Fringilla thoracica* Nordmann, 1835, Brazil.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Monotypic.
Distribution. Coastal mountains along Minas Gerais–Rio de Janeiro border, and highlands from E São Paulo and Paraná S to NE Rio Grande do Sul, in SE Brazil.



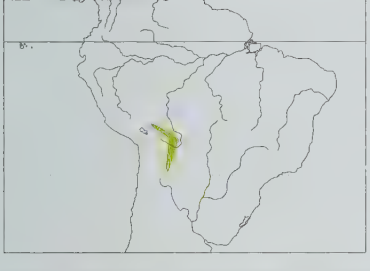
Descriptive notes. 13·5 cm; 11–12·8 g. A dainty warbling-finch with rather petite bill with gently curved culmen. Male has grey head, large and bold white crescent below eye, blackish area around eye creating masked appearance, well-demarcated white throat and malar region; grey of head blends into slightly browner back, rump brownish-grey; tail greyish-brown; upperwing greyish, bases and edges of outer primaries white (creating white flash on folded wing), marginal coverts white (showing as white at bend of wing); below, bright bay-coloured breastband, this colour extending down flanks, with lower breast and belly white, crissum creamy buff; iris dark brown; bill dark grey, darker culmen and tip; legs reddish-grey to greyish-brown. Female is like male, but slightly paler, colours less saturated. Juvenile undescribed. Voice. Song a pleasant and sweet series of three or so repeated elements, elements separated by a short silence (but not enough to break up rhythm of song), "tsup tseep tsweet tsup tseep tsup sweet...". Call a flat "chuup" and also a higher pitched "tiip".
Habitat. Montane-forest edge and shrubby situations or open woodland, as well as clearings with scattered shrubs or trees; regularly in second-growth thickets. At 800–1500 m.
Food and Feeding. Small invertebrates; also fruit, such as the melastome *Leandra sublanata*. Gleans invertebrates from foliage. Forages in pairs and in small flocks; often a component of mixed foraging flocks.
Breeding. Breeding reported in Jan. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Occurs in various parks and preserves in Atlantic Forest zone of Brazil, including Itatiaia National Park, where it is common.
Bibliography. Armani (1985), Belton (1985), Gridi-Papp *et al.* (2004), Parrini *et al.* (2009), Ridgely & Tudor (1989), Sick (1993), de Vasconcelos & D'Angelo Neto (2009).

208. **Bolivian Warbling-finch**

Poospiza boliviana

French: Chipiu de Bolivie **German**: Zimtbrust-Ammerfink **Spanish**: Monterita Boliviana

Taxonomy. *Poospiza boliviana* Sharpe, 1888, Bolivia.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. This species is thought to be either sister to *P. ornata* or part of a clade that also includes latter. Monotypic.
Distribution. Andes of W Bolivia (La Paz, Cochabamba, W Santa Cruz, W Chuquisaca and W Tarija) and extreme NW Argentina (N Salta).



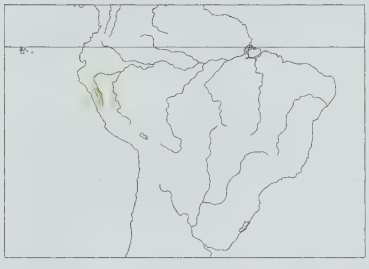
Descriptive notes. 15–16 cm. A standard-shaped warbling-finch with relatively small and pointed bill. Plumage is greyish-brown above, with slightly more greyish crown, dark grey face bordered above by long white supercilium; tail dusky, broad white tips on outer pair of rectrices; upperwing greyish-brown like upperparts, secondaries edged rufous; white throat, chestnut breastband that extends down to flanks, with belly and vent white, crissum buffy white; iris dark brown; bill dark grey, black tip and culmen; legs blackish. Differs from *P. hypocondria* in having much more rufous below, no malar stripe. Sexes alike. Juvenile is paler and duller than adult, with supercilium tinged buff, underparts faintly streaked. Voice. Song not described. Call a sharp "twiip".
Habitat. Dry and semi-humid scrub, including open woodland, sometimes with *Polylepis* bushes, scrub, shrubby hillsides and riparian thickets, also dry scrub mixed with cacti; also hedgerows adjacent to agricultural fields. At 1600–3100 m.
Food and Feeding. Behaviour suggests diet of arthropods and seeds. Forages on ground and in dense shrubbery. Singly and in pairs; also with other finches such as *P. hypocondria* or *P. torquata*, as well as *Zonotrichia capensis*.
Breeding. Singing reported in Mar and juveniles seen in Apr. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Rare to uncommon. Previously thought to be confined to Bolivia, but recently recorded in extreme NW Argentina. Occurs in three protected areas in Bolivia: Tunari National Park (Cochabamba), Amboró National Park (Santa Cruz) and Tariquía National Reserve (Tarija).
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Klicka *et al.* (2007), Lougheed *et al.* (2000), Mazar Barnett *et al.* (2001), Ridgely & Tudor (1989).

209. **Plain-tailed Warbling-finch**

Poospiza alticola

French: Chipiu alticole **German**: Grauschwanz-Ammerfink **Spanish**: Monterita de Cajamarca

Taxonomy. *Poospiza alticola* Salvin, 1895, Huamachuco, 10,400 feet [c. 3170 m], La Libertad, Peru.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Earlier research suggests that this species is most closely related to *P. torquata*, *P. melanoleuca* and *P. erythrophrys*. Monotypic.
Distribution. Upper Marañón Valley in S Cajamarca, La Libertad and E Ancash (essentially W of R Marañón, except for sites in W La Libertad), in W Peru.



Descriptive notes. 16 cm. A slim and long-tailed warbling-finch with relatively long and finely pointed bill. Male is greyish-olive above, darker on crown; face blackish-brown, bordered above by long white supercilium, and below by white submoustachial stripe; tail dusky brown and unmarked; upperwing dusky, primaries with thin pale edges; throat white, bordered by narrow dark malar stripe, centre of breast and belly also white, side of breast rufous, this colour continuing down flank, washed grey on rear flank, crissum greyish-buff; iris dark brown; bill black, lower mandible partially brownish-orange; legs dusky. Female is slightly paler and duller than male. Juvenile is dusky above and on throat and breast, darkest on head and nearly lacking paler supercilium, with flanks and vent buff. Voice. Song a warble, rich in quality, "chew tew-tueeee?". Calls buzzy in nature, sometimes given in rapid series, "zree-zree-zree"; also a sharp "tip".
Habitat. Montane scrub, shrubby areas and low woodland, particularly ravines. Found mostly in *Polylepis–Gynoxys* woodland or woodland dominated by alder (*Alnus*), and other forests where *Gynoxys* present; is either strongly associated with *Gynoxys* or perhaps a *Gynoxys* specialist. At 2900–4300 m, mostly above 3500 m.
Food and Feeding. Feeds on arthropods; also on sugary secretions from underside of *Gynoxys* leaves. Forages both in foliage of dense shrubs and on ground. Typically in pairs; often in mixed-species foraging flocks. May be in close competition with Tit-like Dacnis (*Xenodacnis parina*), another *Gynoxys* specialist.
Breeding. Birds in breeding condition in Sept and juveniles found in Feb–Mar; season possibly Oct–Feb. No other information.
Movements. Sedentary.
Status and Conservation. ENDANGERED. Rare to locally uncommon within its restricted range. Has fairly small range, within which remaining area of suitable habitat decreasing, and populations severely fragmented. Global population probably very small; estimated to lie in the range 1000–2499 individuals. Occurs at generally low densities. Most reports are from Cordillera Blanca (in Ancash), where fairly common at Morococha and in Huascarán National Park; up to 2·5 birds/km² at latter locality. Main continuing threats to this species are cutting of woodland for firewood, and lack of regeneration because of burning and intensive grazing, thus reducing the extent of its preferred habitat of mixed *Polylepis–Gynoxys* woodlands. Additional adverse factors include the shift from camelid-farming to the farming of sheep and cattle, and soil erosion and degradation through agricultural intensification, also road-building; further, afforestation projects have often been inappropriate, with the use of exotic tree species instead of native ones. The species is present in Huascarán National Park, but even within this protected area habitat degradation continues.
Bibliography. Anon. (2010c), Armani (1985), Bond (1951a), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Klicka *et al.* (2007), Lougheed *et al.* (2000), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

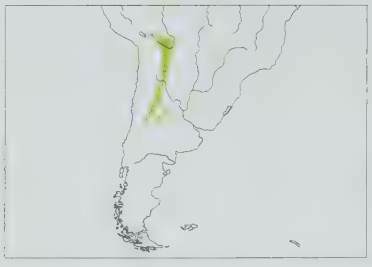
210. **Rufous-sided Warbling-finch**

Poospiza hypocondria

French: Chipiu à flancs roux **German**: Rotflanken-Ammerfink **Spanish**: Monterita Pechigrís

Taxonomy. *Emberiza hypocondria* d'Orbigny and Lafresnaye, 1837, Sicasica, Bolivia.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. A different study suggests that this species is most closely related to *P. caesar*. Species name often misspelt "*hypochondria*". Two subspecies recognized.
Subspecies and Distribution.
P. h. hypocondria (d'Orbigny & Lafresnaye, 1837) – Andes of Bolivia from S La Paz S (including C Cochabamba, W Santa Cruz, W Chuquisaca and N & E Potosí) to W Tarija.
P. h. affinis Berlepsch, 1906 – NW Argentina from Salta and Jujuy S along E slope of Andes to S San Juan and N Mendoza; also W Córdoba in winter.
Descriptive notes. 13·5–16·5 cm; 18–24·5 g. A relatively long-tailed warbling-finch. Male nominate race is brownish-grey above, face greyer, long buff-white supercilium, narrow buff subocular

On following pages: 211. Rusty-browed Warbling-finch (*Poospiza erythrophrys*); 212. Cinnamon Warbling-finch (*Poospiza ornata*); 213. Black-and-rufous Warbling-finch (*Poospiza nigrorufa*); 214. Buff-throated Warbling-finch (*Poospiza lateralis*); 215. Grey-throated Warbling-finch (*Poospiza cabanisi*); 216. Rufous-breasted Warbling-finch (*Poospiza rubecula*); 217. Chestnut-breasted Mountain-finch (*Poospiza caesar*); 218. Collared Warbling-finch (*Poospiza hispaniolensis*); 219. Ringed Warbling-finch (*Poospiza torquata*); 220. Black-capped Warbling-finch (*Poospiza melanoleuca*); 221. Cinereous Warbling-finch (*Poospiza cinerea*); 222. Cochabamba Mountain-finch (*Compsospiza garleppi*); 223. Tucuman Mountain-finch (*Compsospiza baeri*).



crescent, broad buffish-white submoustachail stripe, narrow dark malar stripe; tail dark dusky brown, outer feather with entirely white outer web and white distal half of inner web, next two rectrices with decreasing amount of white on tip of inner web; upperwing largely brownish-grey, with buffy fringes and tips forming narrow wingbars; throat white, breast and upper flanks grey, lower flanks orange-rufous, lower breast, belly and vent buff; iris dark brown; bill grey, with blackish on upper mandible; legs blackish. Female is very like male, but marginally paler, separable only when sexes observed together. Juvenile is buffy brown above, supercilium before eye ochraceous buff, breast and belly ochraceous buff, becoming pale cinnamon ochraceous on flanks, with side of breast and flanks obscurely streaked; immature similar, but upperparts darker and browner, throat, breast and belly dark buff, greyish wash on side of breast. Race *affinis* is larger than nominate, more greyish on rump and buffier below, with more restricted white on outer tail feathers. VOICE. Song jumbled, sounding at times out of tune, and with very short stops between elements, "tch-zwe-ta-chp-zwe-ta-cshw-zwe-ta...", less melodious and more hurried than that of many congeners. Call a high "zwee".

Habitat. Thick shrubby areas, particularly on hillsides and ravines, in semi-arid regions, also shrubs and hedges adjacent to agriculture; in Bolivia can be found also at edge of *Polylepis* forest. At 2500 m to 4200 m; in non-breeding season down to 1000 m in extreme S part of range.

Food and Feeding. Feeds largely on insects; stomach contents include insects and plant matter. Forages in dense shrubbery, rarely on ground. Often probes in dead-leaf clusters. May wag tail from side to side, although never really cocking it. Found in pairs and small groups; often in mixed-species flocks.

Breeding. Juveniles found between Mar and Jun. No other information.

Movements. Mostly sedentary. In S part of range some make post-breeding descent to foothills of Sierras de Córdoba (Argentina); in Bolivia, seasonal variation in numbers detected at Liriuni–San Miguel (in Cochabamba), with higher numbers in austral winter, suggesting local seasonal movements.

Status and Conservation. Not globally threatened. Uncommon to fairly common throughout its range. No immediate threats identified.

Bibliography. Armani (1985), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Lougheed *et al.* (2000), Mazar Barnett, Clark *et al.* (1998), Ridgely & Tudor (1989).

211. Rusty-browed Warbling-finch

Poospiza erythrophrys

French: Chipiu à sourcils roux **German**: Rostbrauen-Ammerfink **Spanish**: Monterita Cejirrufa

Taxonomy. *Poospiza erythrophrys* P. L. Sclater, 1881, Sierra de Totoral, Catamarca, Argentina.

New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Molecular evidence suggests that this species is part of a clade that also includes *P. alticola*, *P. torquata* and *P. melanoleuca*, where similar-looking *P. ornata* was found not to be a close relative. Two subspecies recognized.

Subspecies and Distribution.

P. e. cochabambae Gyldenstolpe, 1941– C & S Bolivia (Cochabamba and W Santa Cruz S to Chuquisaca).

P. e. erythrophrys P. L. Sclater, 1881 – S Bolivia (Tarija) and NW Argentina (Jujuy and Salta S to Tucumán and Catamarca).



Descriptive notes. 13·5–14 cm; 13·2–15 g. A slim warbling-finch with small and thin bill. Male nominate race has crown and face blue-grey, long deep rufous supercilium; upperparts greyish-brown; tail brown, white outer rectrices; upperwing brownish, outer primaries with white edging (creating white flash on folded wing), greater primary coverts with white outer edges; throat and breast dark rufous, flanks and belly paler, vent cinnamon; iris dark brown; bill blue-grey, black culmen; legs dusky. Differs from *Compsospiza garleppi* and *Compsospiza baeri* in smaller size, white in tail and wing, browner (less grey) back, and generally less solidly grey-and-rufous coloration. Female is slightly paler below and more brownish-grey, less blue-grey, above than male. Juvenile is paler and duller than adult, pale cinnamon below, and white of wing replaced by buff. Race *cochabambae* is more greyish on back, thus little colour contrast between back and crown, also has more striking white wingpanel on closed primaries, and entire outer half of greater secondary coverts white. VOICE. Song a melodious set of three or four elements given in a sequence and then repeated in same order, "chwit cheet swee, chwit cheet swee..." or "swee ti-tip swee cha, swee ti-tip swee cha..."; some song versions sibilant and high-pitched, others lower and more robust-sounding. Call a sharp "chwip", sometimes repeated in excitement.

Habitat. Edge of montane (Yungas) forest, often at edge of alder (*Alnus*) groves, also second growth and shrubby ravines. At one site sampled in Tucumán, in Argentina, mature Yungas forest was preferred habitat, with minor use of secondary growth. At 900–3100 m.

Food and Feeding. Invertebrates and fruits recorded in diet. Analyses of faecal samples gave a mixture of invertebrates, including spiders (Araneae), beetles (Coleoptera), flies (Diptera), and ants and wasps (Hymenoptera), as well as fruit. Forages in low trees and shrubs, rarely on ground. Gleans insects from leaves. In pairs and small groups; often joins mixed-species foraging flocks.

Breeding. Season Nov–Jan in S of range (Tucumán). Nest a half-sphere made from lichens and fibres of ferns. Clutch 3 eggs, blue-white with brown and blackish blotches, these particularly around wide end. No other information.

Movements. Largely sedentary. One mist-netting study noted presence in both dry and wet seasons in the Myrtaceae zone of Yungas forest (1200–1600 m), but presence only during dry (winter) season in lower transitional zone (900–1200 m), suggesting some seasonal altitudinal movements.

Status and Conservation. Not globally threatened. Locally common. Has reasonably extensive range, within which not known to be at any risk.

Bibliography. Armani (1985), Blake & Rougès (1997), Fjeldså & Krabbe (1990), Lougheed *et al.* (2000), de la Peña (1989), Ridgely & Tudor (1989), Rougès & Blake (2001).

212. Cinnamon Warbling-finch

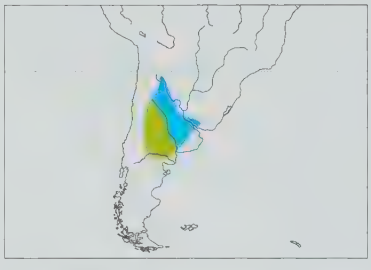
Poospiza ornata

French: Chipiu cannelle **German**: Schmuckammerfink **Spanish**: Monterita Canela

Taxonomy. *Phrygilus ornatus* Leybold, 1865, between Paso Portillo and Melocotón, Mendoza, Argentina.

New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Molecular evidence suggests that this species is either sister to *P. boliviana* or part of a clade that also includes latter. Monotypic.

Distribution. Breeds in C Argentina from San Juan and La Rioja S through Mendoza, San Luis, N La Pampa and W Buenos Aires; non-breeding also N & E to Salta, Tucumán, Córdoba and N Buenos Aires.



Descriptive notes. 13 cm; 11·8–12·7 g. A relatively stocky and thick-billed warbling-finch. Male has head, including crown and nape, slate-grey, bold pale cinnamon supercilium widening behind eye, narrow cinnamon lower eye-crescent; upperparts chestnut (some have grey on outer scapulars), paler chestnut on lower back and rump, with uppertail-coverts grey; tail brownish-grey, white outer rectrices; upperwing brownish-grey, lesser upperwing-coverts grey, median and greater coverts broadly tipped white (creating two bold white wingbars, lower one very wide and nearly forming white panel on folded wing), primaries with narrow white fringes, wider and more obvious white fringes on secondaries (creating indistinct white inner flash on folded wing); chin and upper throat cinnamon, turning rufous on breast, and paler cinnamon farther back on belly, becoming whitish with cinnamon wash on vent and crissum; iris dark brown; upper mandible black with blue-grey cutting edge, lower mandible blue-grey; legs blackish. Female is similar to male, but paler cinnamon below, wingbars may be buffy. Juvenile undescribed; first-year male slightly duller than adult, with narrower wingbars and less white on primaries and secondaries. VOICE. Song a repeated series of 3–4 notes, timbre of voice with an almost buzzy nature, "tzeew chweew tzew cheew, tzeew chweew tzew cheew...", more sibilant and hurried than that of congeners.

Habitat. Arid Monte Desert woodland, and woodland edge; also taller scrub in xeric Andean foothill ravines. In open woodlands forages in taller and denser situations than those exploited by *P. torquata*. Sea-level to 1000 m.

Food and Feeding. Primarily seeds of perennial grasses, in particular *Sporobolus cryptandrus* and *Pappophorum*, also seeds of *Capparis atamisquea* tree; this contrasts with diet of sympatric *P. torquata* (which relies on arthropods during breeding season). Forages close to or on ground; also in trees and shrubbery, then preferring *Prosopis flexuosa* and *Capparis atamisquea*. Often forages in pairs.

Breeding. Nesting in Monte Desert (Mendoza) variable from year to year, e.g. in Ñacuñán did not breed in drier years of 1995–1996 and 1998–1999, but in wetter 1997–1998 began egg-laying early Dec and continued to mid-Jan. Nest a large cup (larger yet shallower than that of sympatric *P. torquata*) made from grass stems and hairy achenes of composites, lined with fine vegetable fibres; of 60 nests in Mendoza, 45 placed in chañar (*Geoffroea decorticans*) and 15 in zampa (*Atriplex lampa*), chañar trees chosen were shorter than average available in environment; overall, nest placed 0·8 m above ground in plants with average height 1·6 m (average 1·8 m up in chañar, 1·3 m from ground in zampa); common creosote bush (*Larrea divaricata*) avoided. Clutch 3 eggs, whitish with evenly distributed brown spots; no information on incubation and nestling periods.

Movements. Partial migrant, some moving N & E after breeding; also, breeding varies from year to year depending on local rainfall patterns (accordingly, breeding distribution somewhat fluid). In E Mendoza, arrives in spring and numbers build up in summer; breeds if seed supply adequate, but in dry years may arrive in spring and desert the area for other possible breeding sites, perhaps farther S (but destination unclear). This facultative migratory behaviour creates great fluctuations in densities from year to year, and breeding range may shift annually within Monte Desert and *espinal* zones; even so, in E Mendoza all leave during autumn and winter, presumably moving N for winter. In NE Argentina, two records from Entre Ríos and reported also from Santa Fe, and at least one winter record from Uruguay (Canelones Department), all suggesting that E movement in winter months perhaps more widespread than previously realized.

Status and Conservation. Not globally threatened. Uncommon and local; status at localities changes annually, depending on rainfall patterns and availability of seed stock in environment. At Ñacuñán (Mendoza), densities varied from 0·6 birds/ha in shrubland to 0·9 birds/ha in open woodlands.

Bibliography. Armani (1985), Azpiroz (2003a), Azpiroz & Menéndez (2008), Blendinger (2005a), Blendinger & Ojeda (2001), Cueto, de Casenave & Marone (2008), Cueto, Marone & de Casenave (2006), Klicka *et al.* (2007), Lougheed *et al.* (2000), Marone (1992a, 1992b), Mezquida (2004), Mezquida & Marone (2003), Milesi *et al.* (2008), de la Peña (1989), Ridgely & Tudor (1989), Roesler *et al.* (2006), Zackrisson (1972).

213. Black-and-rufous Warbling-finch

Poospiza nigrorufa

French: Chipiu noiroux **German**: Rotbrust-Ammerfink **Spanish**: Monterita Sietevestidos
Other common names: Black-and-chestnut/Chestnut Warbling-finch (*whitii* and *wagneri*)

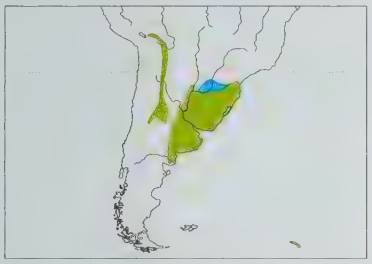
Taxonomy. *Emberiza nigro-rufa* d'Orbigny and Lafresnaye, 1837, Santa Fe, Argentina.

New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Closest relatives of present species uncertain; further study required. Races *whitii* and *wagneri* sometimes treated together as a separate species, differing from nominate in song, habitat, and both juvenile and adult plumages; this treatment seems reasonable, but further details of these differences, in particular vocal differences, are needed. Race *wagneri* poorly differentiated from *whitii*, and perhaps better synonymized. Three subspecies currently recognized.

Subspecies and Distribution.

P. n. wagneri Stolzmann, 1926 – La Paz (around Mt Chulumaní), in W Bolivia.

P. n. whitii P. L. Sclater, 1883 – Bolivia (Cochabamba, Santa Cruz, Chuquisaca and Tarija) and NW & NC Argentina (Salta, Jujuy and Tucumán S to E San Juan and N Mendoza, also W Córdoba and highlands of San Luis).
P. n. nigrorufa (d'Orbigny & Lafresnaye, 1837) – SE Brazil (Santa Catarina and Rio Grande do Sul), Uruguay and NE Argentina (E Formosa, Corrientes and Misiones S to E Córdoba, E La Pampa, E Rio Negro and Buenos Aires); non-breeding also SE Paraguay (Ñeembucú, C Paraguay and Alto Paraná regions).

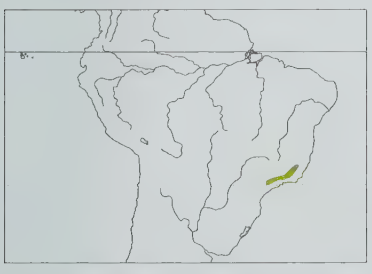


Descriptive notes. 15 cm; 13–20·7 g. A medium-sized warbling-finch with rather long and pointed bill, also long and somewhat round-tipped tail. Nominate race has crown and face blackish-grey, long and narrow white supercilium becoming cinnamon a short distance behind eye, narrow white submoustachial stripe; nape and upperparts paler brownish-grey; tail dusky, outer rectrices with large, square-cut white tips; upperwing plain blackish-grey; chin white, throat and breast rufous, this colour extending to flanks, becoming paler cinnamon on vent and crissum; middle of belly white, extending towards breast in inverted V-shape; iris brown; bill dark grey, black culmen and tip; legs blackish. Sexes similar. Juvenile lacks cinnamon supercilium, is off-white and densely streaked brown below. Race *whitii* is slate-grey (rather than brownish-grey) above, deeper chestnut below, with more restricted white on belly, much more extensive white on outer rectrices, juvenile pale ochre to cinnamon below with flanks streaked and darker olive with narrow pale streaking on breast and breast side, immature similar to adult, but paler, lacking streaking below; *wagneri* is dubiously distinct from previous, but said to have more extensive white moustache. Voice. Song of nominate race a pleasant and melodious repeated series of 3 notes, with resonant quality, first 2 notes identical, "tweet tweet-chew, tweet tweet-chew...", sometimes transliterated as "Who dressed you?". Song of *whitii* differs in various respects from that of nominate, is delivered more slowly, tends to be lower-pitched, and much more variable and complex, more like a continuous song, with multiple elements cycled through in delivery reminiscent of fast Red-eyed Vireo (*Vireo olivaceus*) song, and also includes doubled elements ("tip-tip") and low-pitched quavering sounds ("pweerr"), e.g. "tchew tip-tip chew-chew twiip chew tip-tip tweee seewup pweerrr chew-chew...". Call a high "tziip".
Habitat. Nominate race found in shrubby areas and woodlands, including hackberry (*Celtis tala*) woodlands (known in Argentina as "*talares*") within grassy *pampas*, also shrubby areas adjacent to marshes, bushy areas near water, thickets of pampas grass (*Cortaderia*) adjacent to woodland or shrublands, also suburban areas and gardens; sea-level to 500 m. Race *whitii* occurs in shrubby thickets, humid secondary growth, clumps of trees along roadsides, and highland agricultural areas with adjacent shrubbery, at 600–2500 m.
Food and Feeding. Little information on diet. Forages on ground, or near ground. Often found in pairs; race *whitii* often forms part of mixed-species foraging flocks.
Breeding. Nests recorded Oct–Jan in NE Argentina; eggs recorded in Jan in La Paz (Bolivia, race *wagneri*), and in Argentina egg dates for race *whitii* in Nov (Córdoba) and Apr (Tucumán), suggesting later timing of breeding by latter race. Nest a cup made from dry grasses, placed usually less than 1 m above ground and sometimes woven in with leaves in shrubbery. Clutch 3–4 eggs, pale blue with dark spots throughout; incubation c. 14 days; chicks fed by both parents, nestling period 16 days.
Movements. Largely sedentary. Race *whitii* apparently makes seasonal movements in drier parts of its range, e.g. at Tambo (Santa Cruz), in Bolivia, fairly common in wet season, but only a rare visitor in dry season. Similarly, nominate race recorded in Paraguay only during austral winter, suggesting that it is a partial migrant.
Status and Conservation. Not globally threatened. Nominate race common; *whitii* fairly common in most of range, patchy and uncommon in N part; *wagneri* uncommon.
Bibliography. Armani (1985), Belton (1985), Fjeldså & Krabbe (1990), Hayes (1995), Lougheed *et al.* (2000), de la Peña (1989), Ridgely & Tudor (1989), Sick (1993), Wetmore (1926).

214. Buff-throated Warbling-finch
Poospiza lateralis

French: Chipiu à croupion roux **German**: Rotbürzel-Ammerfink **Spanish**: Monterita Culirrufa
Other common names: Red-rumped Warbling-finch (when treated as conspecific with *P. cabanisi*)

Taxonomy. *Fringilla lateralis* Nordmann, 1835, Rio de Janeiro, Brazil.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Closest relatives of present species uncertain; further study required. Until recently thought to be conspecific with *P. cabanisi*, but separated on basis of differences in song and plumage. Monotypic.
Distribution. Mountains of Espírito Santo, Rio de Janeiro, N São Paulo and adjacent parts of Minas Gerais, in SE Brazil.

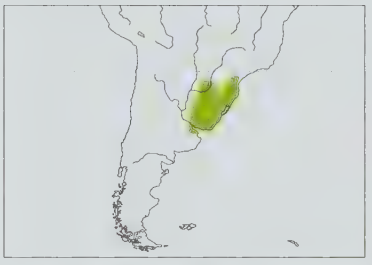


Descriptive notes. 15 cm; 16·1–21 g. A medium-sized warbling-finch with somewhat small bill. Male has head grey, darker on crown, with indistinct or almost non-existent pale greyish supercilium (most visible in front of eye, where becomes buffy-white); grey continues on nape and side of neck and throughout mantle, back and scapulars, with lower back to uppertail-coverts rufous; tail blackish with brown edgings, outer two pairs of rectrices nearly entirely white, and next pair has only terminal third white; upperwing greyish, including shoulder (lesser upperwing-coverts), median and greater coverts grey, outer greater coverts tipped whitish, tertials grey, outer primaries strongly edged white (creating white flash on folded wing); chin whitish, throat buff, becoming darker buff on centre of breast, breast side grey like back, flanks contrastingly and broadly rufous (almost reaching centre of lower breast), vent and crissum also rufous, central belly white; iris dark chestnut; bill greyish, usually blacker above and paler, often bluer, below; legs dark grey. Female is slightly paler, less colour-saturated than male. Immature is washed greenish above, with yellowish supercilium, forehead and throat. Voice. Song a series of 4 repeated notes, "tsip tsip tsip-tsip tsip tsap tsip...", seldom varying from this pattern (unlike much more complex song of *P. cabanisi*); monotonous repetitive nature of song has led some to compare it with songs of White-vented Violet-ear (*Colibri serrirostris*). Call a clean sharp "chap!".
Habitat. Moist montane Atlantic Forest, particularly in areas of *Podocarpus* and *Araucaria*; 350–1800 m.
Food and Feeding. Food appears to be a mix of invertebrates and seeds. In one detailed observation at massive hatch of winged termites (Isoptera) in NE São Paulo, this was the most common avian species; total of 50–70 individuals congregated and fed on the termites, by sallying up and capturing them on the wing. Forages generally alone and in pairs; also in small groups during non-breeding season.
Breeding. No information.
Movements. Sedentary; no evidence of altitudinal movements.
Status and Conservation. Not globally threatened. Fairly common to common; can be the passerine with the highest density in some areas of *Podocarpus–Araucaria*. Well represented in several protected areas in Brazil, including Itatiaia National Park and Campos do Jordão State Park, among others.
Bibliography. Armani (1985), Assis *et al.* (2007), Barbosa & de Almeida (2008), Lougheed *et al.* (2000), Olson & Alvarenga (2006), de la Peña (1989), Ridgely & Tudor (1989), Sick (1993).

215. Grey-throated Warbling-finch
Poospiza cabanisi

French: Chipiu de Cabanis **German**: Graubrust-Ammerfink **Spanish**: Monterita de Cabanis
Other common names: Red-rumped Warbling-finch (when treated as conspecific with *P. lateralis*)

Taxonomy. *Poospiza cabanisi* Bonaparte, 1850, Paraguay = probably Bonpland, Misiones, Argentina.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Closest relatives of present species uncertain; further study required. Until recently thought to be conspecific with *P. lateralis*, but separated on basis of differences in song and plumage. Monotypic.
Distribution. S Paraguay (Alto Paraná and Central), NE Argentina (Misiones and Corrientes S through Entre Rios to extreme NE Buenos Aires), SE Brazil (S São Paulo and Paraná S to Rio Grande do Sul) and Uruguay.

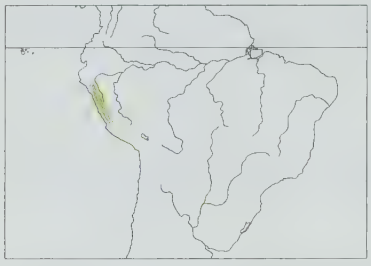


Descriptive notes. 15 cm; 18–21 g. A medium-sized warbling-finch with somewhat stout, yet point-tipped bill. Male has head grey, darker on crown, with slightly paler grey to white narrow supercilium, pale grey speckling on cheek, pale greyish to white moustachial stripe; grey continues on nape and side of neck, becoming brownish on mantle, scapulars and back, with lower back to uppertail-coverts rufous; tail blackish with brown edgings, almost half of outermost rectrix white, less than a third of adjacent feather white; upperwing dusky, greyish shoulder (lesser upperwing-coverts), inner greater coverts edged brown, outer greater coverts with paler edges and whiter tips, tertials edged brown, primaries strongly edged white (creating white flash on folded wing); throat pale grey to white, grey continuing to breast, flanks contrastingly rufous, vent and crissum pale cinnamon, central belly white; iris chestnut; bill dull yellowish-grey, blackish culmen; legs dusky grey to brownish-flesh. Female is duller and slightly less colour-saturated than male. Immature has yellowish supercilium, and yellowish wash on throat. Voice. Song a series of 4–5 repeated notes, high-pitched and with sibilant timbre, "tcheew twip-chip chew, tcheew twip-chip chew...", more variable and less monotonous than that of *P. lateralis*. Call quite distinctive, nasal and sharp, with marked harmonic structure, "zzchap", sometimes doubled or given in series, much less sharp and more nasal than call of *P. lateralis*.
Habitat. Riparian forest, gallery forest, humid forest edge, and open woodlands; from sea-level up to 500 m.
Food and Feeding. Invertebrates and seeds. Forages usually within 2 m of ground, rarely on ground. Forages alone and in pairs; also in small groups during non-breeding season.
Breeding. Season Oct–Dec. Nest a cup made from vegetable fibres. Clutch 3 eggs, blue-green with black blotches. Often parasitized by Shiny Cowbird (*Molothrus bonariensis*). No further information available.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common throughout its reasonably extensive range.
Bibliography. Armani (1985), Assis *et al.* (2007), Belton (1985), Friedmann (1938), Hayes (1995), Lougheed *et al.* (2000), de la Peña (1989), Ridgely & Tudor (1989).

216. Rufous-breasted Warbling-finch
Poospiza rubecula

French: Chipiu rougegorge **German**: Rostbauch-Ammerfink **Spanish**: Monterita Pechirrufa

Taxonomy. *Poospiza rubecula* Salvin, 1895, Huamachuco, 10,400 feet [c. 3170 m], La Libertad, Peru.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within present genus, is sister to that clade. Closest relatives of present species uncertain; further study required. Has been hypothesized that, on basis of plumage similarities, it is closely related to *Compsospiza* mountain-finches. Monotypic.
Distribution. W slope of Peruvian Andes from S Cajamarca and La Libertad S to Lima and probably Ica.
Descriptive notes. 14–16·5 cm. A rather small-billed warbling-finch, small and triangular bill reminiscent of that of a conebill (*Conirostrum*). Has blackish face contrasting with striking orange-rufous upper forehead and supercilium, and crown and rest of head lead-grey; upperparts grey, sometimes a little more olive-grey on back; tail and upperwing plain dusky; chin blackish like face, throat, breast and belly orange-rufous, flanks greyish (slightly paler than upperparts), centre of



belly white, crissum rufous; iris dark brown; bill black, blue-grey base of lower mandible; legs purplish-pink. Sexes similar. Immature is grey above, lacks supercilium, mixed white and rufous below, with grey streaks on breast and flanks. Voice. Song a slightly accelerating and variable rich warble with emphatic nature, and squeaky timbre, sometimes ends on buzzy note, "sweeu tichit twee para-chwéé?".

Habitat. Bushy undergrowth of mixed dry Andean woodlands of short stature dominated by *Oreopanax*, *Myrcianthes* and *Escallonia*, montane scrub and also dry scrub at edge of *Polylepis* forests; also thick composite scrub on slopes, and most closely associated with the composite shrubs *Eupatorium* and *Gynoxys*. At 2500–3800 m.

Food and Feeding. Young leaf buds, berries and seeds recorded as eaten. Forages in low shrubs or trees. Singly and in pairs; sometimes forms part of mixed-species foraging flocks.

Breeding. Little known. Adults feeding juveniles in Jul, and immatures seen between Jan and May; individuals singing in Lima Mar–Apr. No other information.

Movements. Mostly sedentary; some evidence of minor elevational movements.

Status and Conservation. ENDANGERED. Very rare. Little known. Has been found at just a handful of isolated localities. Densities very low at sites where it does occur, and estimated that total population is very small, in range 250–999 individuals. In Zárate Forest (Lima), only six individuals have been recorded, but this more than at any other locality. This species has already suffered extensive habitat loss and degradation, and this is continuing owing particularly to cutting of woodland for timber and firewood, overgrazing by livestock, and planting of non-native trees. Agricultural intensification and a shift from camelid-rearing to the farming of more destructive livestock (goats, sheep and cattle) have been main causes of habitat loss; more recently, afforestation with exotic trees, e.g. eucalypts (*Eucalyptus*) and pines (*Pinus*), represent a new and highly adverse factor. Rates of habitat loss and degradation have increased in recent years within range occupied by this emberizid. Recorded within Huascarán National Park, in Cordillera Blanca (Ancash), but even here habitat degradation is occurring. Surveys required in order to determine the species' precise distribution, and effective protection of Zárate Forest a priority.

Bibliography. Anon. (2010c), Armani (1985), Barrio (1995), Bond (1951a), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Lougheed *et al.* (2000), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stattersfield & Capper (2000).

217. Chestnut-breasted Mountain-finch

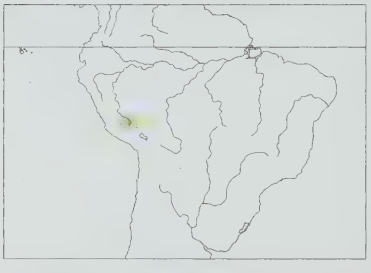
Poospiza caesar

French: Chipiu césar **German**: Kaiserammerfink **Spanish**: Monterita Pechicastaña
Other common names: Chestnut-bellied/Cuzco Mountain-finch, Chestnut Warbling-finch

Taxonomy. *Poospiza caesar* P. L. Sclater and Salvin, 1869, Tinta, Cuzco, Peru.

Formerly classified in its own genus, *Poospizopsis*. New molecular data indicate that present genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within this genus, is sister to that clade. A molecular-genetic study of various members of the genus suggests that present species is sister to *P. hypocondria*. Monotypic.

Distribution. Andes of Apurímac and Cuzco, in SE Peru.



Descriptive notes. 17–18·5 cm. A large and relatively stocky, robust finch with long, stout bill. Has black forehead and mask, strongly contrasting narrow white supercilium starting just in front and above eye, otherwise crown and rest of head grey, continuing as grey upperparts to rump and uppertail-coverts; tail grey, upperwing plain dark grey; chin and throat white, contrasting wide rufous breastband; flanks grey, belly white, crissum rufous like breast; iris dark brown; bill black, small grey patch at base of lower mandible; legs blackish. Sexes alike. Juvenile is similar to adult, but grey and blackish areas tinged brown, has buff wash on throat. Voice. Song a rich and variable warble with squeaky timbre, not unlike song of Golden-billed Saltator (*Saltator aurantiirostris*) but more complex and incorporating buzzy notes, "chip cheeo swipchea", lasts 2–3 seconds and repeated at intervals of c. 10 seconds. Call a thin "tsee?".

Habitat. Highland scrub and low woodlands in semi-arid zone, including secondary growth and edge situations; preference for low shrubbery mixed with taller columnar cacti, and sometimes in mosaic with open areas and patches of taller woodland. At 2900–3500 m.

Food and Feeding. No details of diet. Forages mostly on ground, otherwise skulking through dense vegetation close to ground; more terrestrial than congeners. Usually in pairs; may join mixed-species foraging flocks at times.

Breeding. Males defending territories in Mar in Cuzco and male in breeding condition in Apr. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Locally fairly common. No significant threats identified.

Bibliography. Bond (1951a), Estrada & Rondan (2009), Fjeldså & Krabbe (1990), Lougheed *et al.* (2000), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

218. Collared Warbling-finch

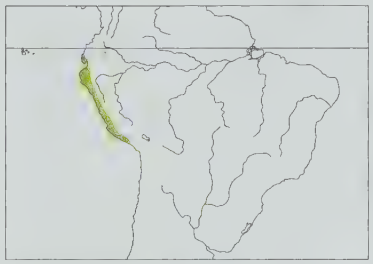
Poospiza hispaniolensis

French: Chipiu à col noir **German**: Schwarzbrust-Ammerfink **Spanish**: Monterita Collareja

Taxonomy. *Poospiza hispaniolensis* Bonaparte, 1850, Santo Domingo; error = Peru.

New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within this genus, is sister to that clade. A recent molecular-genetic study suggested that this species is rather distantly related to very similar-looking *P. torquata*; found to have a basal position in genus in some analyses, and in a clade with *P. ornata* and *P. boliviana* in other analyses; more work required in order to determine correct placement of this warbling-finch, and if similarity to *P. torquata* is due to convergence. Monotypic.

Distribution. SW Ecuador (SW Manabí, W Guayas, also rarely S Loja and S El Oro), and coastal slope of Peru from Tumbes S to Arequipa.



Descriptive notes. 13·5 cm; one male 16·5 g. A small, compact warbling-finch with relatively short and triangular bill. Male has grey crown, black stripe on sides of crown meeting centrally on forehead, long white supercilium, contrasting black mask, and broken white eyering; nape and side of head behind black ear-coverts grey, turning brownish-grey on back, rump and uppertail-coverts; tail blackish, extensive white on inner webs of outer rectrices (folded tail looks largely white from below); upperwing grey, median coverts tipped pale grey, greater coverts tipped whitish-buff (creating one or two pale wingbars), tertials with pale brown fringes; clean white chin, throat and underparts accented by broad black breastband, which narrows at centre of breast (in fresh plumage, feathers of breast side tipped brownish), flanks pale grey, belly and vent white (white often intruding in inverted V-shape into black breastband), cinnamon patch on largely white crissum; iris dark brown; bill blue-grey, black culmen and tip; legs dull pinkish. Female is much duller than male, brown above and streaked, face pattern similar to male's, but mask dull grey-brown (rather than black), and below off-white with obscure pale brown streaks, lacking cinnamon on crissum; wings brown with buffy wingbars, buffy edges of flight-feathers, greyish-brown shoulder (lesser upperwing-coverts), tail brownish, white pattern on inner webs of outer rectrices as on male; bill dull pinkish, often with blackish tip, legs brownish-pink. Immature is similar to female, but duller and more streaked. Voice. Loud, vigorous whistled song "twik, swick-sweeu", reminiscent of that of Golden-billed Saltator (*Saltator aurantiirostris*). Call a low gruff "djer-djer".

Habitat. Desert scrub, particularly with dense shrub layer and near water; riparian scrub. Found also in agricultural areas with scattered bushes, low trees or hedgerows. Sea-level to 1000 m, sometimes to 2500 m.

Food and Feeding. Feeds largely on invertebrates. Forages both in low trees and on or near ground in dense vegetation. Generally in pairs; does not associate particularly with other members of family.

Breeding. In Ecuador, egg dates mid-Feb to mid-May, following onset of rainy season, but song activity during dry season (Jul–Sept); single-brooded, but some attempt second brood, particularly in wetter years. Clutch 3–4 eggs. No other information.

Movements. Appears to move depending on rainfall patterns; in SW Ecuador, numbers increase at start of rainy season (Jan), although some may be present in area throughout year.

Status and Conservation. Not globally threatened. Locally common, abundant on I de la Plata (Ecuador); scarce at S end of range in Peru. No significant threats known.

Bibliography. Armani (1985), Lougheed *et al.* (2000), Marchant (1959), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Trollope (1984).

219. Ringed Warbling-finch

Poospiza torquata

French: Chipiu sanglé **German**: Bandammerfink **Spanish**: Monterita Acollarada

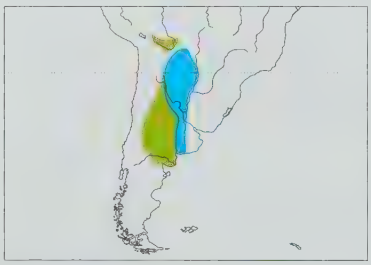
Taxonomy. *Emberiza torquata* d'Orbigny and Lafresnaye, 1837, Sicasica, La Paz, Bolivia.

New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within this genus, is sister to that clade. A recent molecular-genetic study indicated that present species belonged to a clade that included also *P. alticola*, *P. erythrophrys* and *P. melanoleuca*, and was rather distantly related to very similar-looking *P. hispaniolensis*; more work needed to confirm that plumage similarity to last-mentioned is due to convergence. Of particular interest is that cytochrome *b* sequences of the two races of present species differed by as much as 4·4% (equivalent to that of undisputed species included in the study); this suggests that *pectoralis* may be a cryptic species, although further comparative data on song, behaviour and plumage differences is necessary before treatment as separate species can be considered. Two subspecies recognized.

Subspecies and Distribution.

P. t. torquata (d'Orbigny & Lafresnaye, 1837) – C Bolivia (highlands of La Paz, Cochabamba, W Santa Cruz and N Chuquisaca).

P. t. pectoralis Todd, 1922 – breeds N & C Argentina from E Salta, Jujuy and Formosa S to Mendoza, La Pampa, NE Rio Negro and W Buenos Aires; non-breeding also N to SE Bolivia (Tarija) and W Paraguay (Alto Chaco region).



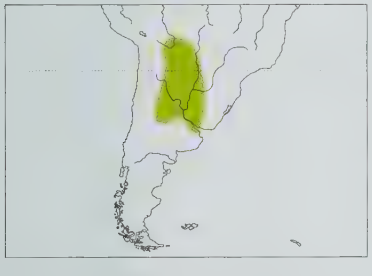
Descriptive notes. 12–14 cm; 10–13·2 g. A slim warbling-finch with small bill with rather rounded culmen. Male nominate race has crown grey with blackish lateral stripe, blackish-grey mask bordered above by long white supercilium, small white subocular crescent; nape and side of head posterior to black ear-coverts grey, upperparts to rump and uppertail-coverts grey; tail blackish, extensive white on outer three feather pairs, outermost rectrix entirely white on outer web and with terminal half of inner web white, white decreasing in extent on next two feathers; upperwing grey, white patch on outer median and greater upperwing-coverts, extending to pale bases and fringes on outer primaries, grey fringes on tertials; clean white chin and throat, broad black breastband narrowing at centre of breast, flanks pale grey, belly and vent white, white intruding as inverted V-shape into black breastband, crissum cinnamon; iris dark brown; bill blackish; legs dusky. Female is very like male, but slightly duller in colour saturation, with narrower and paler breastband. Immature is similar to female, but breastband is weak and brownish. Race *pectoralis* is substantially smaller than nominate, has broader black breastband, more white on outer rectrices, and blacker face, often also paler, nearly whitish edges of tertials. Voice. Song of nominate race a series of c. 5 notes given in repeated pattern,

sometimes altered with slightly different note order, or with inserted note that breaks up monotonous repetition, sweet and cheerful, each phrase often ending in a more exclamatory note, "suu-wee sveew swee-Chup...". Song of race *pectoralis* has sibilant timbre and faster delivery, "tsiu-tseetu tsiu-tseetu trrrp...". Call (nominate) a high "zip", sometimes in series.
Habitat. Arid woodlands, *chaco* thorn-forest, Monte Desert (both shrublands and open woodlands), often on sandy soil; also deciduous scrub and forest. In Bolivia, open Andean dry forest, in dry to semi-humid secondary scrub and on degraded open *Dodonaea* slopes, in Cochabamba also locally in open *Polylepis* woodland; arid slopes in intermontane valleys in Santa Cruz. Sea-level to 1800 m.
Food and Feeding. During breeding season feeds largely on arthropods (in contrast to sympatric *P. ornata*, which relies on grass seeds); seeds become more important in diet during autumn and winter. Forages mainly in shrubs and short trees, exploiting a broad range of species throughout year, most commonly *Prosopis flexuosa*. Gleans insects from leaves, often in excited almost parulid-like manner; also takes grass seeds by perching on thicker stems while extracting seeds. Found in pairs and in family groups; joins mixed-species foraging flocks of New World sparrows and finches during non-breeding season.
Breeding. Nominate race in breeding condition Jan–Feb; start of egg-laying from mid-Oct to late Dec in drier years, extended to early Feb in wetter years; some evidence of two broods. Nest a cup of grass stems and rootlets, smaller but deeper than that of *P. ornata*, lined with hairy achenes of composites, hair and feathers, placed at average of 1 m from ground in plant (mean height of plants used 1·8 m); of 109 nests in Mendoza (Argentina), 92% in chañar (*Geoffroea decorticans*) or in zampa (*Atriplex lampa*), and common creosote bush (*Larrea divaricata*) avoided. Clutch 3–4 eggs, pale blue with brownish to reddish blotches and scrawls. No other information.
Movements. Nominate Andean race mostly sedentary; variation in abundance, from uncommon in austral summer to fairly common in austral winter, at Tambo (Santa Cruz) suggests some seasonal altitudinal movements. Lowland *pectoralis* resident in some areas, partially migratory (moving N & E in austral winter) in others; at one well-studied site in Argentina (Ñancuñan, in Mendoza), annual abundance varies from year to year; also, records from Paraguay only Apr–Sept, during austral winter, and recorded in Bolivian Chaco only as non-breeding winter resident.
Status and Conservation. Not globally threatened. Fairly common to common throughout its extensive range.
Bibliography. Armani (1985), Blendinger (2005a), Blendinger & Ojeda (2001), Canevari *et al.* (1991), Hayes (1995), Lougheed *et al.* (2000), Mezquida (2004), Mezquida & Marone (2003), Milesi *et al.* (2008), de la Peña (1989), Ridgely & Tudor (1989), Storer (1989b).

220. **Black-capped Warbling-finch**
Poospiza melanoleuca

French: Chipiu à capuchon **Spanish**: Monterita Cabecinegra
German: Schwarzkappen-Ammerfink
Other common names: White-breasted Warbling-finch; Grey-and-white Warbling-finch (when treated as conspecific with *P. cinerea*)

Taxonomy. *Emberiza melanoleuca* d'Orbigny and Lafresnaye, 1837, Chiquitos, Bolivia.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within this genus, is sister to that clade. A recent molecular-genetic study indicated that present species belonged to a clade that included also *P. alticola*, *P. erythrophrys* and *P. torquata*. Until recently it was treated as conspecific with *P. cinerea*. Monotypic.
Distribution. SE Bolivia (Cochabamba and Santa Cruz S to E Chuquisaca and E Tarija), W & C Paraguay (except extreme E Alto Paraná), N & NC Argentina (Salta, Jujuy and Formosa S to San Luis, C Cordóba and extreme N Buenos Aires), W Uruguay and SE Brazil (extreme W Rio Grande do Sul).

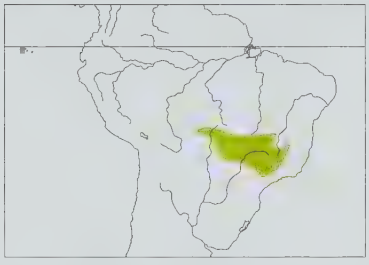


Descriptive notes. 13 cm; 9–15 g. A small, compact and relatively short-tailed warbling-finch with small, triangular bill. Male has black hood from forehead to nape, cleanly demarcated by white submoustachial and malar area; upperparts blue-grey; tail blackish, white outer feathers; upperwing blackish, blue-grey shoulder, blue-grey edging on upperwing-coverts and flight-feathers; throat and underparts gleaming white, except for pale grey flanks; iris reddish; bill black, sometimes grey base of lower mandible; legs black. Female has less extensive black cap and may appear duller in direct comparison with male; iris not so bright as male's. Immature has black on head restricted to lores and side of face, at most. Voice. Song a high-pitched and monotonously repeated three-part (sometimes four-part) "twasut tsee twaas". Calls include muffled "chuf-chuf-chuf", singly or in series, when excited; also an ascending, metallic-sounding "pifzzztt"; when flock alarmed, birds excitedly give high-pitched calls and "chuf" calls, developing into a sputtering chatter.
Habitat. Chaco woodlands, *espinal* (thorny woodlands), savanna and shrub-forest; prefers dense vegetation.
Food and Feeding. Seeds, fruits and flowers; may also take arthropods, particularly during breeding season. Forages largely in shrubbery, scrub and small trees. Tends to be found in small flocks, possibly family groups.
Breeding. Nests found during Oct–Feb In Argentina; nest-building in mid-Nov in Brazil. Nest a cup made from dry grass and vegetable fibres, sometimes lichen, lined with much finer material such as wool, placed low down, usually within 1 m of ground, in thick herbaceous vegetation or in low shrub or tree. Clutch 3–4 eggs, white or pale greenish with black scrawls and blotches, these particularly around wide end. Nests known to be parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Relatively common, sometimes abundant; widespread. No known threats.
Bibliography. Armani (1985), Belton (1985), Canevari *et al.* (1991), Cornet (2002), Hennessey *et al.* (2003), Lougheed *et al.* (2000), de la Peña (1987, 1989), de la Peña & Pensiero (2003), Storer (1989b).

221. **Cinereous Warbling-finch**
Poospiza cinerea

French: Chipiu à tête cendrée **German**: Graukopf-Ammerfink **Spanish**: Monterita Cinérea
Other common names: Grey-and-white Warbling-finch (when treated as conspecific with *P. melanoleuca*)

Taxonomy. *Poospiza cinerea* Bonaparte, 1850, Minas Gerais, Brazil.
New molecular data indicate that genus forms a clade with the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*, and that *Compsospiza*, which often subsumed within this genus, is sister to that clade. Until recently this species was treated as conspecific with *P. melanoleuca*. Monotypic.
Distribution. S interior Brazil from C Mato Grosso E to S Goiás, Minas Gerais and N São Paulo.



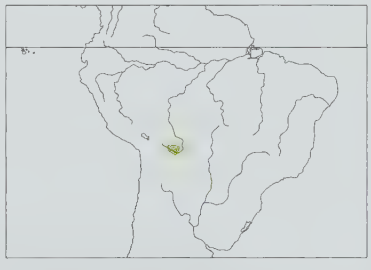
Descriptive notes. 13 cm; 8·4–15·2 g. A small, compact and relatively short-tailed warbling-finch with small, triangular bill. Male has forehead, crown and nape grey, contrasting blackish mask (lores and most of ear-coverts) cleanly demarcated on lower edge by white moustachial and malar area; upperparts blue-grey; tail blackish, white outer feathers; upperwing blackish, blue-grey shoulder and blue-grey edging on upperwing-coverts and flight-feathers; throat and underparts gleaming white, except for pale grey flanks; iris deep chestnut; bill black, sometimes grey base of lower mandible; legs black. Female has less extensive and less dark mask, may appear duller in direct comparison with males; iris not so bright as male's. Immature has head washed brown. Voice. Song apparently unrecorded; high-pitched lively warbles described, possibly song. Call a muffled "chupf", sometimes in series.
Habitat. Occupies *cerrado* woodlands, open dry woodlands and scrub; thought to like fairly open wooded habitats. Also *campo rupestre* habitats, favouring orchards, old pastures and even burnt-over scrub. Mainly 600–1400 m.
Food and Feeding. No information.
Breeding. Breeding record in Sept. Has been known to host Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Sedentary.
Status and Conservation. VULNERABLE. Uncommon to rare, and locally distributed. Suspected to have suffered rapid and continuing decline owing to reduction in area of suitable habitat. Recent records from eight sites in Minas Gerais, four in Goiás, and one (near Brasília) in Distrito Federal. Not recorded in Mato Grosso since 1904 and none in São Paulo since 1901, and possibly extinct in these regions. Although this species has probably always been rather scarce, extent of habitat loss suggests that it has probably undergone significant reduction in numbers. Since c. 1950 much of the *cerrado* habitat has been destroyed or severely altered by combined effects of grazing, invasive grasses, annual burning, and conversion to eucalypt (*Eucalyptus*) plantations, soybean-growing and pastures for exportable crops (encouraged by government land reform). On the other hand, recent reports suggest that it is able to tolerate, and perhaps even favour, degraded areas, perhaps indicating that it is more numerous than previously believed; possibly semi-nomadic in response to fire succession, and seems to be extending its range towards degraded areas in E Minas Gerais. This species is protected under Brazilian law; it occurs in various reserves and parks, including Das Emas National Park, Brasília, Serra do Cipó and Chapada dos Veadeiros National Parks, Peti Reserve, Serra do Brigadeiro State Park and Mangabeiras Park.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Lopes *et al.* (2010), Lougheed *et al.* (2000), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000).

Genus *COMPSOSPIZA* Berlepsch, 1893

222. **Cochabamba Mountain-finch**
Compsospiza garleppi

French: Chipiu de Cochabamba **Spanish**: Monterita de Cochabamba
German: Garleppammerfink
Other common names: Slate-and-rufous Warbling-finch

Taxonomy. *Compsospiza garleppi* Berlepsch, 1893, Vacas, Cochabamba, Bolivia.
Genus often subsumed in *Poospiza*, but recent molecular data indicate that it is sister to a clade formed by latter genus and the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*. This species may form a superspecies with *C. baeri*, and has been considered conspecific. Monotypic.
Distribution. Cochabamba and adjacent N Potosí, in C Bolivia.



Descriptive notes. 17–18 cm. Rather large and heavy finch with long tail, but stocky and thick-set body. Most of head and upperparts are leaden grey, with bold orange-rufous forehead, supercilium and crescent below eye; tail and upperwing dark grey, lacking any obvious pattern; entirely orange-rufous below, slightly paler on belly; iris deep brown; bill blackish, lower mandible paler, blue-grey; legs dusky. Sexes alike. Juvenile is greyish-brown above, throat and breast dusky, streaked buff, belly buffy and narrowly streaked dusky. Voice. Males has two song types: one given near nest, and while female building, a series of 3–5 stereotypical soft notes, generally increasing slightly in pitch, including high-pitched introductory note followed by warbled whistles, "tzeet twooo–swee...tzeet twoo–swee...", appears not to have particularly territorial function (playback does not elicit strong response from birds); second song type less common, a series of whistles and intervening pauses, but covering much wider range of frequencies, more variable, and including broad-frequency buzzy note, this song eliciting strong aggressive response if played back to pairs. Call a high-pitched, soft ascending "sweep".
Habitat. Humid inter-Andean valleys with moist ravines near tree-line, in narrow transitional zone between dry Valle and *puna* zones. Usually in mixed agricultural land with native shrubs; includes brushy canyons and slopes, from dense shrubbery to more open scrub at edge of bunch-grass, also *Polylepis* woodland and alder (*Alnus*) thickets. At 2700–4200 m, usually 3000–3800 m.

Food and Feeding. No information on diet. Forages low in shrubbery and on ground.
Breeding. Breeds in rainy season, Jan–Apr; generally single-brooded, but will renest if first attempt fails. Nest built by female, male helping rarely (often singing nearby), a well-formed cup built mainly from dry grasses, soft lining of green grass stems and animal hair, covered externally with mosses or bark of *Polylepis*, usually placed on fork of branch low down in shrub (*Gynoxys*, *Baccharis*, *Berberis*, *Polylepis besseri*) or well hidden in pampas grass (*Cortaderia*) or in ground bromeliad (*Puya*). Clutch 1 or 2 eggs, off-white with dense brownish spotting; incubation by female, period 14 days; chicks fed by both parents, nestling period 18 days.
Movements. Sedentary.
Status and Conservation. ENDANGERED. Uncommon to rare in Cochabamba; locally frequent in Potosí. Estimated global population in 1990s between 400 and 4000 individuals, and declining. Rate of current population decline thought to be 10–19% over 10 years. Formerly thought to be restricted to Cochabamba, but discovered in Potosí in 2005, with additional site records in latter department in 2008. Fieldwork in 2009 suggests that this species is tolerant of small-scale habitat alteration and destruction, but seems to be absent from highly degraded areas devoid of native vegetation. It requires a mosaic of habitats, of which *Polylepis* is one (contrary to earlier reports, it is not a *Polylepis* specialist); it fares well in agricultural areas and other sites influenced by humans, but only so long as native shrubbery is present, and is absent from heavily modified areas or those lacking native shrubs. It has been suggested that the replanting of a variety of native shrub species could be the best management strategy for this species. Occurs in Tunari National Park, in Cochabamba; a sizeable proportion of this park, however, has already been converted to pine (*Pinus*) stands, and its future protection is by no means assured.
Bibliography. Balderrama (2006, 2009), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Huanca *et al.* (2009), Lougheed *et al.* (2000), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

223. Tucuman Mountain-finch

Compsospiza baeri

French: Chipiu du Tucuman **German**: Baerammerfink **Spanish**: Monterita de Tucumán

Taxonomy. *Buarremon baeri* Oustalet, 1904, Lagunita, Tucumán, Argentina.
Genus often subsumed in *Poospiza*, but recent molecular data indicate that it is sister to a clade formed by latter genus and the tanager (Thraupidae) genera *Hemispingus* and *Thlypopsis*. Present species may form a superspecies with *C. garleppi*, and the two have been considered conspecific. Monotypic.
Distribution. Extreme S Bolivia (S Tarija) and Andes of NW Argentina from Jujuy, Salta, Tucumán and Cajamarca S to NE & W La Rioja.
Descriptive notes. 16·5–18 cm; 31·5–34·5 g. Relatively large and heavy finch with long tail, but stocky and thickset body. Male has most of head and upperparts grey, bold orange-rufous forehead, supercilium and crescent below eye; tail and upperwing dark grey, lacking any obvious pattern;



throat and upper breast orange-rufous, lower breast, flanks and upper belly grey, lower belly and vent palest grey to whitish, crissum orange-rufous like throat; iris muddy brown to deep reddish-brown; bill blackish above, paler blue-grey below; legs greyish. Female is very similar to male, but extent of rufous on throat and breast smaller. Juvenile is grey-brown above, streaked indistinctly on crown, and pale brown with darker streaks below. Voice. Song is a series of short whistles, differing slightly in frequency, "swit-jeet-siit-swop-sweet-swit...", extremely similar to that of *C. garleppi*. Contact call a high "sip" note; also a sharper repeated "tip-tip...tip...tip-tip", likely an alarm call.
Habitat. Mosaic of *puna* grassland with adjacent shrubby woodland of alders (*Alnus*), as well as *Polylepis* and other shrubs. In non-breeding season may be found also in willow (*Salix*) thickets by streams, and may descend to gardens in towns such as Tafi del Valle. At 2500–3100 m; down to 1200 m in winter in S part of range.
Food and Feeding. Individual seen carrying a grasshopper (Orthoptera); probably also feeds on seeds. Forages on ground and low in shrubbery. Often in pairs; joins mixed-species foraging flocks in non-breeding season.
Breeding. Birds with enlarged gonads in Dec, and main season Jan–Mar, with egg dates in late Jan and early Feb and fledglings in Apr. Nest placed in dense tussock of *Stipa* or *Festuca* grass. Clutch 2–3 eggs, white with purplish-brown spotting. No other information.
Movements. Largely sedentary; minor movements downslope in winter.
Status and Conservation. VULNERABLE. Generally uncommon. Has rather small and fragmented range, within which estimated global population of only a few thousands, probably 5000–10,000 individuals. Recently (in 1999) found in extreme S Bolivia, where two individuals noted at Estancia Waykhu, in S Tarija. Occurs at low densities, 0·02–0·03 birds/km² during breeding season in Tucumán, increasing to 0·24 birds/km² during non-breeding season, at 2600–3100 m elevation. Recorded at comparatively few sites in NW Argentina: Termas de Reyes (Jujuy), Chicoana, R Tranca and R Peña Negra (Salta), Sierra de Medina and Sierra del Aconquija (Tucumán), Sierra de Ambato (Catamarca), and Sierra de Velazco and Banda Florida (La Rioja). Natural habitat in the region has been destroyed by human settlement and accompanying goats and cattle; also, expanding agriculture threatens some sites, and fires in nearby grasslands could spread into ravines occupied by this species. In Tucumán, occurs in El Infiernillo Reserve (specially created for this species) and recorded recently at Campo de los Alisos National Park; recent records also from Cordillera de Sama Biological Reserve, in S Bolivia.
Bibliography. Bodrati (2005), Butchart & Stattersfield (2004), Fjeldså & Krabbe (1990), Lougheed *et al.* (2000), Pearman (2001), Peris (1997), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

PLATE 61 ➤



PLATE 61

inches 2
cm 5

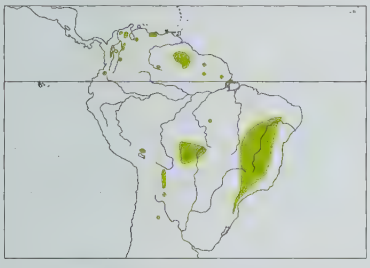
Genus *SICALIS* Boie, 1828

224. Stripe-tailed Yellow-finch

Sicalis citrina

French: Sicale citrin **German**: Zitronengilbammer **Spanish**: Chirigüe Citrino

Taxonomy. *Sycalis citrina* Pelzeln, 1870, Jaguaraíba, Paraná, Brazil.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Races poorly differentiated, and species perhaps better treated as monotypic. Three subspecies currently recognized.
Subspecies and Distribution.
S. c. browni Bangs, 1898 – W & N Colombia (Santa Marta, Antioquia, Cauca, Santander, Norte de Santander and Cundinamarca), Venezuela (Sierra de Perijá, coastal mountains, Trujillo, Mt Duida and tepuis of Bolívar and Amazonas) and adjacent tepui region of Guyana, Suriname and N Brazil (locally E to Amapá).
S .c. occidentalis Carriker, 1932 – SE Peru (Puno) and NW Argentina (Salta, Tucumán and E La Rioja).
S. c. citrina Pelzeln, 1870 – E Brazil (S Pará, Goiás and Piauí S to E Mato Grosso and Paraná).
Also occurs (probably *occidentalis*) in much of Bolivia (La Paz, Cochabamba, Santa Cruz, Chuquisaca and Tarija), and (probably nominate) in NE Bolivia (Beni) and perhaps adjacent Brazil.



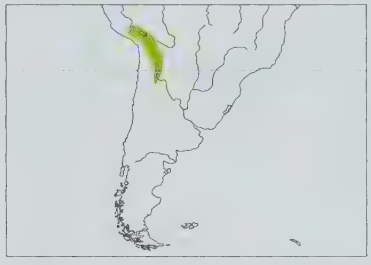
Descriptive notes. 11 cm; 10·7–12·9 g. A small, stocky and compact yellow-finch with relatively short and deep bill; head often looks squarish in shape. Male nominate race has head mostly plain yellow with olive wash; upperparts olive-yellow with fine darker streaking (except on rump); upperwing brownish-grey, yellow edging on upperwing-coverts and flight-feathers; tail dusky, white terminal half on inner web of outer two rectrices; below, entirely yellow with slight olive cast; iris dark brown; bill blue-grey, darker culmen; legs pink to flesh-coloured. Female is brownish above, face dull and lacking pattern other than pale eye-crescents, finely streaked from crown to rump; pale yellow below, streaked brown on breast and flanks; wings brownish, paler (but not bright yellow) edging on upperwing-coverts and flight-feathers; tail has white patterning like that of male, but somewhat reduced; bill dusky, legs dull pink. Juvenile is like female, but browner and more streaked, including face; immature like female, but streaking on breast and flanks more extensive and coarser. Race *browni* is smaller than nominate, has shorter tail and more slender bill, but differences very slight, ear-coverts possibly a little greener, underparts a purer yellow; *occidentalis* is similar to nominate, but brighter yellow below, breast with narrow sharply defined streaks. Voice. In much of range, male song, given from perch and in flight display, begins with a series of chattering notes and ends in a trill, quite musical, "weet-twu, chu'u'u'u'u'u'u" or "wit-tr-tr-tr-tr-t-t-t-t-t-t"; songs in Brazil (nominate race) more complex, "weeta-weeta twi-chuu twi-chuu twi-chuu", may be reminiscent of a siskin (*Carduelis*). Call a simple "chup".
Habitat. Various types of grassy and open habitats. Grasslands and savanna, including highland grasslands in Colombia; also edges of marshes in grassy areas. In Bolivia in *campo cerrado*, sparsely vegetated rocky outcrops that stand out in flat shrubby terrain; in NW Argentina found in meadows interspersed with montane forest patches, at c. 1400 m. Occurs from tropical to temperate zones; 400–2800 m, rarely to 3700 m.
Food and Feeding. Diet a mix of seeds and arthropods, latter mostly during breeding season. Seems especially attracted to seeding grasses, and will cling to stems in order to reach seeds; feeds also on seeds on ground. Forages in pairs and in small flocks.
Breeding. In E Brazil breeding begins after start of rainy season (Dec–May), most often Jan–Mar; in N Colombia, birds in reproductive condition in Jun (E Andes), and copulation observed in Jul and juveniles in Aug (Cundinamarca); birds in breeding condition in Jun in Peru; males performing flight displays in late Dec in N Argentina (Salta). Male performs flight display, rising to 6 m off ground, while singing. Nest an open cup, placed in small shrub, ferns or sometimes in dense grass clump, average height from ground 30 cm. Clutch (Brazil) 2–3 eggs, pale turquoise with brown markings, these more densely distributed around wide pole; incubation period 12 days; nestling period 13 days.
Movements. No information; possibly somewhat nomadic.
Status and Conservation. Not globally threatened. Uncommon to fairly common, and very local. Very patchily distributed, but occurs over huge range and, unusually when range so fragmented, at wide variety of elevations.
Bibliography. Armani (1985), Carriker (1931), Dunning (2008), Fjeldså & Krabbe (1990), Gressler (2008), Maillard *et al.* (2008), Pearman (2001), Renssen (1974), Restall *et al.* (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Todd & Carriker (1922), de Vasconcelos & Endrigo (2008).

225. Puna Yellow-finch

Sicalis lutea

French: Sicale jaune **German**: Punagilbammer **Spanish**: Chirigüe Puneño

Taxonomy. *Emberiza lutea* d'Orbigny and Lafresnaye, 1837, Pampas d'Oruro [= Oruro], Bolivia.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Monotypic.
Distribution. SE Peru (highlands from SE Cuzco and NE Arequipa E to Puno and Tacna), Bolivian highlands (La Paz, Cochabamba, Oruro and Potosí and W Tarija), extreme NE Chile (Visviri area of Arica–Parinacota) and NW Argentina (dry *puna* of Jujuy and Salta).



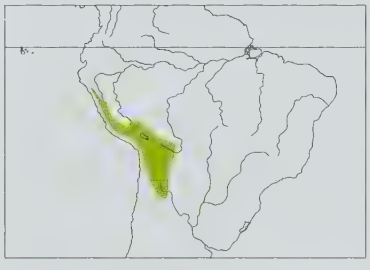
Descriptive notes. 13·5–14 cm; 14·6–17·9 g. A stocky and pot-bellied, short-tailed yellow-finch with deep, short bill with straight culmen. Male is golden-yellow throughout, with little patterning: head yellow with slight green wash, pale yellow eyering; upperparts plain yellow-green, marginally greener than head, rump to uppertail-coverts slightly brighter yellow than back; below, plain bright lemon-yellow, flanks washed olive; upperwing dusky, feathers broadly edged yellow (wing appears essentially yellowish), tertials with contrasting whitish edges; tail dusky, outer rectrices broadly edged yellow (only centre of tail appears dark on perched bird); iris dark brown; bill blackish, grey base of lower mandible; legs flesh-coloured to blackish. Female is only slightly duller than male. Juvenile is brownish-olive and streaked throughout above, buffy below; immature has head essentially greenish-yellow, pale yellow or whitish eyering and greyish lores, back pale brownish-yellow and indistinctly streaked, brighter yellow on rump and uppertail-coverts, yellow with olive wash below, flanks greyish, wings and tail dusky, broad yellow edges on lesser and outer median and greater upperwing-coverts, yellow edges on primaries and base of secondaries, tertials distinctly white-fringed, noticeable yellow edging on outer rectrices. Voice. Song "twu trrrr whipa-whipa trrr whipa-whipa tuii trrr", slower than that of other highland members of genus and notes often repeated. Calls include rich "tchew" or "tjup", sometimes doubled as "tjup-tjup", sometimes shortened as "zit"; also a mewing "meluu".
Habitat. Open country in *puna*, dry grassland and open scrubby sites, usually in flatter sites, rather than on slopes; commonly in broad river valleys, particularly if nesting banks available. Unlike e.g. *S. olivascens* and *S. uropigyalis*, is not attracted to adobe houses and villages. At 3800–4500 m.
Food and Feeding. No information on diet. Forages on ground, in small flocks of 4–20 individuals; tends not to mix with other members of genus.
Breeding. Eggs in Feb in Argentina (Jujuy) and juveniles in Apr in Bolivia (La Paz). May be somewhat colonial, and uses nest-sites or other holes for roosting throughout year. Nest a cup 2 cm deep and 14 cm in diameter, of dry grass, built in earthen bank or cliff, the birds making a hole and excavating a tunnel; one nest in Jujuy was in tunnel 1·2 m deep, with entrance hole 1·5 m from ground in earthen bank; in NW Argentina reported also as using abandoned nests of furnariids and cavities made in cacti by White-fronted Woodpecker (*Melanerpes cactorum*). Clutch 3–4 eggs, white and unspotted. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally common. Occurs in several national parks and other protected areas in Bolivia.
Bibliography. Armani (1985), Blendinger (1999), Canevari *et al.* (1991), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Hoy (1980), Olrog & Navas (1961), de la Peña (1987), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

226. Bright-rumped Yellow-finch

Sicalis uropigyalis

French: Sicale à croupion jaune **German**: Goldbürzel-Gilbammer **Spanish**: Chirigüe Culigualdo

Taxonomy. *Emberiza uropigyalis* d'Orbigny and Lafresnaye, 1837, Bolivia.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Proposed race *connectens*, described from upper Urubamba Valley (Cuzco), in S Peru, doubtfully distinct from nominate, with which synonymized. Species name often altered to "*uropygialis*", but this is an unjustified emendation. Two subspecies recognized.
Subspecies and Distribution.
S. u. sharpei (Berlepsch & Stolzmann, 1894) – W & C Peru from Cajamarca S to Junín.
S. u. uropigyalis (d'Orbigny & Lafresnaye, 1837) – SE Peru (Puno) and highlands of Bolivia S to N Chile (Arica–Parinacota, Tarapacá and Antofagasta) and NW Argentina (Salta, Jujuy and Tucumán).



Descriptive notes. 13–14 cm; 21–24·4 g. A stout and long-bodied, relatively short-tailed yellow-finch with very long wings, showing long primary extension on perched bird; bill stout, but relatively long and pointed, with slightly curved culmen. Male nominate race has unstreaked yellow head and nape, well-demarcated and contrasting grey mask (lores and ear-coverts), whitish eye-crescents above and below eye; mantle and back blue-grey, contrasting with yellowish head and yellow lower back to uppertail-coverts; yellow below, with well-demarcated grey flanks; upperwing blue-grey, in fresh plumage with silvery-white edges on primaries; tail feathers blackish with light blue-grey edging, becoming yellower basally; iris dark brown; bill blue-grey, dark culmen; legs dull pinkish. Female is similar to male, but yellow areas duller, and grey areas more brownish-grey; yellow on head less extensive, with grey-brown hindcrown and nape, grey of flanks more extensive, reaching side of breast and continuing to vent, and sometimes to crissum (which otherwise dull yellow); brownish-grey upperparts may show indistinct streaking. Juvenile is duller, more brownish, than adult, and strongly streaked above and below, tertials with distinct warm brown fringes; immature male duller yellow below than adult, grey of plumage with brownish tone, obscurely streaked on crown and back, wing-coverts edged buffy white; immature female like adult, but breast obscurely streaked, and yellow in plumage not so bright. Race *sharpei* lacks grey on flanks of male, and has shorter bill, more extensive yellow on rump. Voice. Song loud and twittering, lasting 2–4 seconds, irregularly ascending and descending, "de de de de de dit chittit", last notes accentuated, quite variable both in length and in sweetness, some songs canary-like, others harsher and slower; more work needed in order to determine if different song types are given

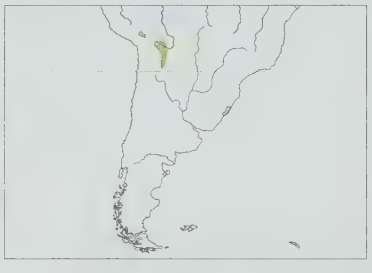
On following pages: 227. Citron-headed Yellow-finch (*Sicalis luteocephala*); 228. Greater Yellow-finch (*Sicalis auriventris*); 229. Greenish Yellow-finch (*Sicalis olivascens*); 230. Patagonian Yellow-finch (*Sicalis lebruni*); 231. Orange-fronted Yellow-finch (*Sicalis columbiana*); 232. Saffron Finch (*Sicalis flaveola*).

by single males or if some differences are geographical. Flight call a soft, sweet doubled note, "wee-weet".
Habitat. High *puna* grasslands, including grass–shrub mixture on slopes; may forage in moist *bofedal* wetlands ("cushion bogs"), particularly if adjacent to drier grasslands or rocky and brushy slopes; often drawn to small Andean villages or adobe houses. At 2500–4800 m.
Food and Feeding. Few data on diet; presumably mainly seeds and other vegetative material, though a shift to arthropods in breeding season likely. Forages on ground. Generally in pairs and in small flocks; in non-breeding season, particularly during times of high snowfall, can form large flocks of up to 500 individuals. May mix with other high-elevation finches such as various *Phrygilus* species and *Diuca speculifera*; sometimes forages with *S. olivascens* and with *S. luteocephala*, both of which generally found at lower elevations than present species.
Breeding. Adults feeding nestlings from Apr to early Jun in Peru, fledglings in Apr in Bolivia (Cochabamba) and nests in Jan–Feb in NW Argentina. Nest a cup of dry grasses, 12 cm in diameter, placed in hole in bank or, most often, in wall of adobe building or under roof; one nest in Argentina (Jujuy) was at end of tunnel c. 30 cm deep in mud wall, with entrance hole 30 cm above the ground. Clutch 4 eggs, white with grey and chestnut speckles, these concentrated at wide end. No other information.
Movements. Apparently sedentary; may perform local or elevational movements in direct response to periods of high snowfall.
Status and Conservation. Not globally threatened. Often fairly common to common. This species has a large range, and adapts well to human presence, being often found near villages or isolated dwellings in *puna*. No particular problems in terms of habitat loss. Occurs in five protected areas in Bolivia.
Bibliography. Armani (1985), Dunning (2008), Fjeldså & Krabbe (1990), Johnson & Goodall (1967), de la Peña (1987), Ridgely & Tudor (1989), Roe & Rees (1979).

227. Citron-headed Yellow-finch
Sicalis luteocephala

French: Sicale à tête jaune **German**: Graunacken-Gilbammer **Spanish**: Chirigüe Cabecigualdo

Taxonomy. *Emberiza luteocephala* d'Orbigny and Lafresnaye, 1837, Chuquisaca; error = Totora, Cochabamba, Bolivia.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Monotypic.
Distribution. Andes of Bolivia (Cochabamba, W Santa Cruz, Chuquisaca, Potosí and Tarija) and extreme N Argentina (Jujuy).



Descriptive notes. 13–14 cm. Moderately long-tailed yellow-finch, bill short and with slight curve on culmen; wings much shorter than otherwise similar *S. uropigyalis*. Male has yellow face with narrow darker eyeline, contrasting grey hindcrown and nape; upperparts solid grey to tail base; yellow of face continues to throat and centre of breast, with side of breast and flanks grey, grey extending to vent and isolating yellow crissum; upperwing greyish, grey shoulder (lesser upperwing-coverts) may be yellow-washed when plumage fresh, yellow edging present on on outer greater and median coverts, also outer secondaries, and primaries (creating yellow flash on folded wing), tertials edged pale grey or whitish; tail grey, yellow edges at base of rectrices; iris dark brown; bill dark bluish-grey; legs pinkish. Female is similar to male, but duller yellow on face and underparts, more brownish-grey on upperparts, flanks paler. Juvenile is still duller than female, pale brownish above, wings edged cinnamon, dull buff throat and breast; immature like female, but orange-yellow base of lower mandible. Voice. Song pleasing and melodic, notes repeated relatively quickly and switching to another series of repeated notes, "chwip-chwip tuup pik-pik-pik-pik tp chipa chwip-chwip chupip chupip chupip tzp tzp pik-pik-pik...", rather like that of a siskin (*Carduelis*); songs may last for many seconds, but rather variable in length, as well as in degree of complexity in terms of number of phrases used. Flight calls include doubled "clep-clep" or "chuck-chuck" during foraging, also a mellow "huit"; other calls include short snarls and chatters, alarm a short "tret".
Habitat. Mosaic of agriculture, grassy patches and highland shrubs on slopes at higher elevations of Andean slopes, below Altiplano and true *puna* grassland zone; not infrequently found near dwellings adjacent to agricultural areas. At 2500–3800 m.
Food and Feeding. No details of diet; probably seeds. Forages on ground, often in open dirt areas near grassland or agriculture, also in sandy or rocky places near areas of scattered shrubs. Found in small single-species flocks of up to 20 individuals; sometimes in mixed-species flocks with *S. uropigyalis*, as well as sierra-finches (*Phrygilus*). Roosts communally, both at breeding cliffs and under bridges, roosting holes sometimes used in middle of day as a refuge from heat.
Breeding. Fledglings recorded in May in Bolivia (Cochabamba). Apparently moderately colonial. Nests in hole in earthen bank. No other information.
Movements. Appears to be sedentary.
Status and Conservation. Not globally threatened. Fairly common to locally uncommon. Adapts well to Andean-style agriculture, and found close to small villages, so not adversely affected by low-impact anthropogenic disturbances. The range of this species does not include any national parks or other protected areas.
Bibliography. Armani (1985), Fjeldså & Krabbe (1990), Hennessey *et al.* (2003), Mazar Barnett, Clark *et al.* (1998), Pearman (1989), Ridgely & Tudor (1989).

228. Greater Yellow-finch
Sicalis auriventris

French: Grand Sicale **German**: Goldbauch-Gilbammer **Spanish**: Chirigüe Grande
Other common names: Yellow-billed Yellow-finch

Taxonomy. *Sycalis auriventris* R. A. Philippi [Krumwiede] and Landbeck, 1864, cordilleras of Santiago, Chile.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). What originally appeared to be an isolated population of *S. lebruni* was recently discovered in EC Argentina, in Sierra de la Ventana (S Buenos Aires); later suggested to be some form of present species; however, nesting habits are quite different from both species (see page 434); further investigation needed. Monotypic.
Distribution. Andes of Chile from Antofagasta S at least to Araucania region, also in Magallanes (Sierra Baguales), and Argentina from at least Mendoza (probably farther N) S to Santa Cruz (Sierra Baguales).

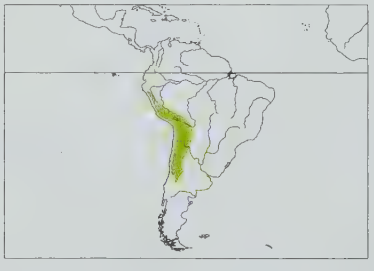


Descriptive notes. 14·5–15 cm; 50–59 g. A pot-bellied, long-bodied yellow-finch with very long wing, showing very long primary projection; longish bill with straight culmen. Male is largely yellow on head, lores slightly darker, slightly paler upper and lower eye-crescents; upperparts yellow with slight olive wash, rump bright yellow (in worn summer plumage shows pencil-thin streaks on mantle); yellow below, brighter than upperparts, with grey restricted to small area on rear flanks; upperwing brownish, olive-yellow wash on shoulder, greyish or silvery edging on greater upperwing-coverts and flight-feathers (edges wear quickly, leaving largely dull brown wing by summer); tail brown with yellow edges; iris dark brown; bill blackish, lower mandible often paler and bluer; legs pinkish. Female is very dull, brownish-grey and unremarkable-looking: plain face, but with pale eye-crescents; most have very restricted yellow, on lower breast and belly and most noticeably on base of tail, otherwise largely unicolored brownish-grey, paler, dull yellowish on throat, and underparts slightly paler than upperparts; back may show some indistinct narrow streaking, and in fresh plumage wings have pale buff fringes, and ear-coverts wash yellow; distinguished from greyish and dull females of *S. olivascens* by much longer wing, longer bill and straighter culmen. Juvenile is similar to female, but with indistinct streaking on breast, and pale cinnamon or warm brown tips on upperwing-coverts (creating two pale wingbars), pale edges on secondaries, lacks yellow at bases of rectrices; immature male duller than adult, more greenish-yellow below, may resemble *S. olivascens*, but longer wing than that species; immature female similar to adult, but more noticeably streaked above, yellow on belly quite restricted, tail with restricted yellow at bases of outer rectrices. Voice. Song an unmusical quavering warble with nasal or buzzy quality, lasting 2–3 seconds, usually notes strung together such that it is difficult to differentiate individual ones, "twiita twiita twet chwet-chwet cho-zheepa". Flight call a soft, nasal "huuit".
Habitat. In much of Chile occupies highest, harshest, driest and rockiest alpine terrain available. Common near houses or villages, often using rocky crevices in buildings for nesting or roosting. Habitat choice varies somewhat with latitude; in Patagonia found much lower down and in moister and grassier sites than the rocky, bare-earth *bofedal* wetland edges preferred in N portion of range. At 2500–4500 m; down to 800 m in Patagonia.
Food and Feeding. Seeds apparently a major component of diet. Forages on ground, both on flat ground and on rocky slopes. In pairs or small flocks; flocks larger early in spring, and particularly when late snowfalls occur, at which time this species concentrates in available patches of foraging habitat.
Breeding. In Santiago region of Chile season Dec–Feb, with juveniles present as early as late Dec and into Feb; may breed slightly later in far S of range. Nest placed in hole or crevice in rocky cliff face or bank, or similar cavity in adobe building or rock wall. Clutch 3 eggs, cream-coloured with chestnut spotting. No other information.
Movements. Appears to be partially migratory, but details require confirmation. S from Santiago breeding areas become uninhabitable during winter owing to high winds, deep snow cover and cold, and birds in this part of range probably migrate N. Downslope movements also occur, and these quite noticeable during late-spring snowstorms, when large flocks found at slightly lower elevations than typically used for breeding.
Status and Conservation. Not globally threatened. Can be common or even abundant locally; uncommon in extreme S of range. Full distribution probably not completely understood.
Bibliography. Armani (1985), Canevari *et al.* (1991), Cozzani *et al.* (2008), Dunning (2008), Fjeldså & Krabbe (1990), Johnson & Goodall (1967), Ridgely & Tudor (1989).

229. Greenish Yellow-finch
Sicalis olivascens

French: Sicale olivâtre **German**: Olivbrust-Gilbammer **Spanish**: Chirigüe Oliváceo

Taxonomy. *Emberiza olivascens* d'Orbigny and Lafresnaye, 1837, La Paz, Bolivia.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Present species may form a superspecies with *S. lebruni*; previously considered conspecific, but differs significantly in plumage, shape, structure and vocalizations. Four subspecies recognized.
Subspecies and Distribution.
S. o. salvini (C. Chubb, 1919) – N Peru from La Libertad S to Huánuco.
S. o. chloris Tschudi, 1846 – W & S Peru (Ancash S to Tacna) and N Chile (Arica–Parinacota S to Coquimbo).
S. o. olivascens (d'Orbigny & Lafresnaye, 1837) – SE Peru (Cuzco and Puno) and W & C Bolivia S to NW Argentina (Salta and Jujuy S to N La Rioja).
S. o. mendozae (Sharpe, 1888) – W Argentina from S La Rioja S to Mendoza and San Luis.



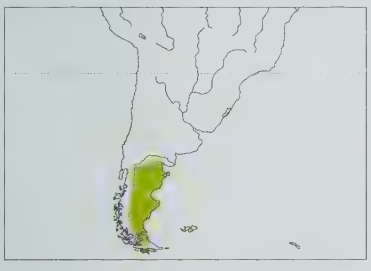
Descriptive notes. 13·5–14 cm; 17·5–24·2 g. A pot-bellied and stocky yellow-finch with relatively short tail, and thick-based, short bill with slightly curved culmen. Male nominate race has greenish-yellow head, lores slightly darker, bright pale yellow eye-crescents; upperparts greenish-grey, rump greenish-yellow; yellow below, brighter than upperparts, with green-vested appearance on breast and flanks; upperwing brownish, greenish shoulder and greenish and grey edging on greater upperwing-coverts and flight-feathers, off-white edges of tertials (edgings wear quickly, leaving largely duller brown wing by summer);

tail brown with yellow edges; iris dark brown; bill mostly greyish, black tip; legs dusky to pink-flesh. Differs from *S. lutea* and *S. auriventris* mainly in less bright appearance, having greenish wash on breast and head. Female is dull, brownish-grey and unremarkable-looking; yellow sometimes restricted to centre of breast and belly, often nearly lacking, and sometimes more extensive, reaching to throat (variable extent of yellow on underparts may be due to feather wear), some also have slight greenish wash above eye, head otherwise largely greyish-brown with distinct pale eye-crescents; in fresh plumage, wing has pale buff fringes and ear-coverts a wash of yellow; some are as greyish and dull as female of *S. auriventris*, but differ from latter in much longer wing, longer bill and straighter culmen. Juvenile is similar to female, but has pale buff tips on upperwing-coverts, pale buff edges on secondaries, and indistinct streaking on breast; immature male similar to female, but underpart feathers tipped buff. Race *chloris* is like nominate, but with shorter tail, larger bill, duller yellow below; *salvini* is similar to previous, but smaller, and with relatively smaller bill; *mendozae* also is is similar, but smaller and duller, with more olive-washed underparts. VOICE. Song 2–4 seconds in duration, a series of rough trills that tend to descend in frequency (or change abruptly to slightly different frequency), sometimes interspersed with more slowly delivered notes that suggest song of House Sparrow (*Passer domesticus*), "chet-chet-chet trrrrrrrrrrr" or "trrrrrrrrrr pzip-tzhip-tzhip zrrrrrruuuuuurrrrr"; lower-pitched trills can at time be reminiscent of voice of a highland furnariid. Call a harsh "tzup" or a sweet "tiip".
Habitat. In N of range found in shrubby *puna*, often on slopes, venturing to edges of villages or highland towns. Farther S associated with dry desert *puna*, particularly near earthen banks or rocky ledges (which provide nesting sites), and found also in extremely arid areas immediately above Absolute Desert zone in Chile. In N Chile and NW Argentina also in highland sites where larger cacti present. At 1500–3800 m.
Food and Feeding. No information on diet; appears to concentrate on foraging for seeds. Forages on ground; in pairs and in flocks of variable size. Possibly daily movements to communal roosts; in N Chile large flocks seen while moving in unidirectional manner during evening, suggesting that they may at times form roosting concentrations.
Breeding. Egg dates Dec–Mar, during wet season, in S Peru, N Chile and N Argentina; fledglings in Jun in Bolivia (Cochabamba), suggesting later breeding season. Tends to be loosely colonial, with several nests in a single bank. Nest made of grasses and hair, one was 8 cm in diameter, placed in crevice or cavity in earthen bank or rocky cliff, sometimes in crack in adobe building or rocky wall; one nest in NW Argentina was at end of tunnel 30 cm deep in earthen cliff. Clutch 4 eggs, whitish, with brown markings concentrated on wide end. No other information.
Movements. Sedentary in much of range. Argentine race *mendozae* partially migratory, most moving N to Salta in winter.
Status and Conservation. Not globally threatened. Common to abundant in most of range.
Bibliography. Armani (1985), Canevari *et al.* (1991), Dunning (2008), Fjeldså & Krabbe (1990), Johnson & Goodall (1967), de la Peña (1987), Ridgely & Tudor (1989), Salvador & Narosky (1984).

230. **Patagonian Yellow-finch**
Sicalis lebruni

French: Sicale de Patagonie **German**: Magellangilbammer **Spanish**: Chirigüe Austral

Taxonomy. *Pseudochloris lebruni* Oustalet, 1891, Misioneros, Santa Cruz, Patagonia, Argentina.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Present species may form a superspecies with *S. olivascens*; previously considered conspecific, but differs significantly in plumage, shape, structure and vocalizations. What originally appeared to be an isolated population of present species was recently discovered in EC Argentina, in Sierra de la Ventana (S Buenos Aires); later suggested to be some form of *Sicalis auriventris*; however, nesting habits are quite different from both species (see page 434); further investigation needed. Monotypic.
Distribution. S Argentina (S from S Rio Negro) and extreme S Chile (from NE Magallanes) S to N Tierra del Fuego.

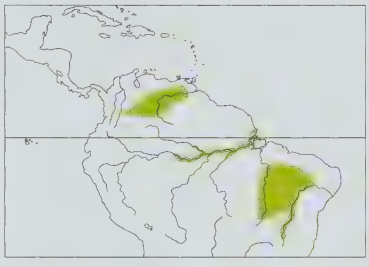


Descriptive notes. 14 cm; 23·1–26·6 g. A relatively large headed yellow-finch with proportionately small and short bill; long-winged, with noticeably long primary extension. Male typically has greenish-yellow forehead and supercilium, greyish hindcrown, grey ear-coverts (some with greenish-yellow wash on rear ear-coverts), narrow but clearly contrasting pale eyering (most noticeable behind and below eye), yellow moustachial and malar area that continues into yellow throat; nape and upperparts pale grey, sometimes spotty yellow wash on lower back and rump; below, yellow of throat separated from yellow of belly by grey fringes on breast feathers, also flanks greyish, crissum off-white; upperwing pattern distinctive, largely greyish, with bright yellow on shoulder continuing as yellow panel on outer greater upperwing-coverts, with primaries and secondaries, including tertials, fringed pale greyish; tail greyish, yellow edges at base of outer rectrices; iris dark brown; bill dark grey, often with light blue-grey on most of lower mandible; legs dull pinkish. Female is dull greyish-brown, with distinctive pale eyering bolder behind and below eye; lesser and median upperwing-coverts with yellow area as on male, but less distinct, and yellow below restricted to belly. Juvenile resembles female, but slightly streaked breast and flanks, warm brown wash on mantle, pale cinnamon edges on greater upperwing-coverts, yellow shoulder and pale eyering already present, primaries tipped white, yellow lower mandible. VOICE. Song relatively fast and harsh, but warbled, lasting 2–4 seconds, "twipa-twipa chup twipa trrrr chuptrrr twipa"; another version is short and quickly delivered paired notes, "chzwi-pa chzwhipa", repeated after an interval longer than song itself. Call a high "tiip".
Habitat. Dry Patagonian steppe, with bunch-grass adjacent to more open flat zones with pebbles and low vegetation, or adjacent to open shrubby zones; road cutting or other dry bank, even if very low, required for nesting. Sea-level to 600 m; higher, to 1200 m, on Argentine Patagonian plateaux.
Food and Feeding. Seeds and small insects. Forages on ground. Most often found in pairs or small flocks of 4–8 individuals, rarely up to 20.
Breeding. Season Nov–Feb. Digs tunnel in earthen bank and builds nest at end of this; gravel pits, road cuts and probably riverbanks often used for tunnel-digging because much of habitat is flat.Clutch 4–6 eggs. No further information available.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon throughout much of its range.
Bibliography. Armani (1985), Canevari *et al.* (1991), Cozzani *et al.* (2008), Dunning (2008), Fjeldså & Krabbe (1990), Johnson & Goodall (1967), Narosky *et al.* (1984), Ridgely & Tudor (1989).

231. **Orange-fronted Yellow-finch**
Sicalis columbiana

French: Sicale à béret **German**: Zwerggilbammer **Spanish**: Chirigüe Frentinaranja
Other common names: Orange-fronted Grass-finch; Venezuelan Yellow-finch (*columbiana*)

Taxonomy. *Sycalis columbiana* Cabanis, 1851, "Porto Cabello"; error = Ciudad Bolívar, River Orinoco, Venezuela.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Three subspecies recognized.
Subspecies and Distribution.
S. c. columbiana Cabanis, 1851 – C Venezuela in delta and basin of R Orinoco, and E Colombia (Meta and Vichada); has bred once in Trinidad.
S. c. goeldii Berlepsch, 1906 – Amazon Basin of Brazil from about R Purus E to lower R Tapajós and S Amapá.
S. c. leopoldinae Hellmayr, 1906 – EC Brazil in S Maranhão, Piauí, W Pernambuco, N & W Bahia, Tocantins and Goiás.



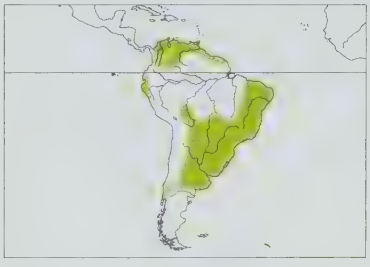
Descriptive notes. 11·5 cm; 11·6–16·1 g. A compact yellow-finch with very short tail and wing, large and rounded head, and a bill large for the bird's size. Male nominate race has yellow head with orange forehead and forecrown, darker lores and short dark eyeline; upperparts olive-yellow, throat and underparts bright yellow, tinge of saffron on breast side and flanks; upperwing entirely greenish-yellow but for dusky centres of tertials; tail dark with wide yellow edging, particularly at base; iris dark; bill horn-brown to blackish above, dull yellowish-grey below; legs yellowish-dusky to dull pink. Differs from similar *S. flaveola* in smaller size, contrasting orange forehead not extending to rear crown, short dark eyeline. Female is olive-brown above, whitish below, with pale yellowish breastband, pale yellowish rear flanks and crissum; head brownish with darker lores, sometimes faint yellowish wash on supercilium, crown darker; mantle and back greyish-brown, contrasting greenish-yellow wings (upperwing-coverts, as well as edges of primaries and secondaries), greenish lower back and rump; tail feathers with greenish edging. Juvenile is similar to female, but slightly streaked on breast, and wings buff-fringed, rather than greenish-washed; immature male a duller, paler version of adult, some nearly lacking orange tone on forehead, and much duller yellow throughout. Race *goeldii* male has breast washed orange; *leopoldinae* smaller than nominate, with much smaller, weaker bill, brighter forecrown patch, and brighter yellowish-green back, female paler than nominate above and below. VOICE. Song a short and chirpy series of unmusical notes. Call a nasal "zhwit"; flight call described as a soft "chu-re-reet". Flocks sound like large group of House Sparrows (*Passer domesticus*).
Habitat. Shrubby zones in riparian sites, usually adjacent to grassy areas; closely tied to water, such as streams, lakes or ponds. Sea-level to 300 m.
Food and Feeding. No details of diet. Forages on ground, also commonly perches in shrubs and small trees; may obtain some food from arboreal substrates. Found in pairs or small groups; outside breeding season in larger flocks, sometimes with *S. flaveola*.
Breeding. Season Jun–Nov in Venezuela; once in Sept in Trinidad. Nest in Venezuela placed in crevice in wall, another in abandoned nesting burrow of kingfisher (Alcedinidae); clutch 4 eggs. Single nest in Trinidad cup-shaped, made from grass stems and roots, placed in hollow at end of broken branch c. 4 m from ground; contained 3 eggs, whitish-green with brown markings, these concentrated at wide end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally fairly common to common. Recorded once in Trinidad, in 1926: several individuals observed, and nesting confirmed. Single old record from NE Peru (Loreto). In some areas this species is trapped for cagebird trade; losses considered not great enough to pose significant risk to population.
Bibliography. Armani (1985), Dunning (2008), ffrench (1991), Restall *et al.* (2006), Ridgely & Tudor (1989).

232. **Saffron Finch**
Sicalis flaveola

French: Sicale bouton-d'or **German**: Safrangilbammer **Spanish**: Chirigüe Azafranado
Other common names: (Saffron) Yellow Finch; Pelzeln's Finch ("*pelzelni* group"); Pereyra's Yellow-finch ("*S. striata*")

Taxonomy. *Fringilla flaveola* Linnaeus, 1766, no locality = Suriname.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Races form two groups, "*flaveola* group" (nominate and *valida*) and "*pelzelni* group" (*pelzelni*, *brasiliensis* and *koenigi*), these differing dramatically in female and immature plumages and, to lesser extent, in male plumage; also, latter group exhibits strong sexual dimorphism, while "*flaveola* group" does not. These groups may warrant treatment as two separate species; further research required. Disjunct trans-Andean *valida* possibly also a distinct species, meriting detailed assessment. Birds of higher areas of S Bolivia currently included in race *pelzelni*, but may belong in *koenigi*. Proposed taxon *S. striata* (described from Buenos Aires, in Argentina) invalid, based on a specimen regarded as a breeding male of race *pelzelni* in immature plumage. Five subspecies recognized.
Subspecies and Distribution.
S. f. flaveola (Linnaeus, 1766) – N & E Colombia (S to Meta), Venezuela S to R Orinoco (also NW Amazonas), coasts of the Guianas, and Trinidad.
S. f. valida Bangs & T. E. Penard, 1921 – coastal slope in Ecuador (Guayaquil) S to NW Peru (Ancash).
S. f. brasiliensis (J. F. Gmelin, 1789) – E Brazil from Maranhão, Minas Gerais and São Paulo E to Atlantic coast.

S. f. pelzelni P. L. Sclater, 1872 – Bolivia E of Andes (S from S Beni), SE Brazil (S from Mato Grosso and Santa Catarina), Paraguay, E Argentina (S to E Mendoza, La Pampa and Buenos Aires) and Uruguay; recently also in Chile (Los Ríos and Los Lagos; possibly introduced).
S. f. koenigi Hoy, 1978 – NW Argentina (Salta and Jujuy).
Introduced (probably nominate race) in Panama, Jamaica, Puerto Rico and Hawaiian Is.



Descriptive notes. 13·5–15 cm; 12–23·4 g. A medium-sized and well-proportioned yellow-finch with rather short wing and tail, and relatively large bill. Male nominate race has head yellow, slightly more orange forehead and forecrown (on some orange wash extends to throat and face); upperparts only slightly greener, mantle with obscure streaking (visible only in very close inspection); below, entirely lemon-yellow and unpatterned; upperwing looks largely greenish-yellow owing to greenish-yellow coverts, and edging of primaries and secondaries, tertials dark with narrower greenish-yellow edges; tail dark with broad yellowish edging; iris dark brown; bill dusky above and on tip, most of lower mandible yellowish; legs dull flesh-coloured to dusky brown. Female is similar to male, but less vibrant in colour and with reduced orange on crown (slight differences in coloration obvious when sexes seen together), and with much less yellow on central abdomen. Juvenile has greyish head with slightly darker eyeline, dark-streaked light brown upperparts, rump olive-yellow, flight-feathers and rectrices edged yellowish-olive, throat and underparts greyish with light streaking, crissum yellow; immature similar, but with broad yellow breastband; adult plumage acquired in second year. Races differ mainly in plumage: *valida* is darker than nominate, more reddish on forecrown, and greenish above extending to nape, bill heavier, legs pinkish; *pelzelni* is smaller-billed, longer-winged, and relatively shorter-tailed than nominate, plumage much less bright, has slight saffron wash on forehead (seldom extensive), yellowish face, rest of head greenish, back very much greener and with distinct fine narrow streaks, yellowish edging of flight-feathers and wing-coverts narrower (dark centres more evident), duller yellow below, some males with ill-defined streaking on underparts, female is entirely unlike nominate, greyish-brown and streaked throughout above, brownish wings with paler edgings on coverts, dull greenish edges on flight-feathers (but tertials edged pale greyish-brown), greenish edges at bases of rectrices, pale malar area contrasting with narrow submoustachial stripe, throat plain whitish-buff, underparts off-white, finely streaked breast and flanks, dull greyish-horn lower mandible; *brasiliensis* male is brighter yellow than previous race, with orange wash on crown, bill longer and more laterally compressed; *koenigi* is similar to last, but bill shorter and not so compressed. Voice. Song lively and pleasant, notes spaced enough to give calm and pleasing whistled nature, "zwhit, cheew, tzuup, cheew, peepa pew, tzuup, chew..."; much variation, but song always pleasing and made up largely of sweet-sounding notes, sometimes with a few harsher notes, and, unlike most congeners, not suggesting a trill or chatter. Typical call an upslurred "whip", also a short "tuup".
Habitat. Wide variety of habitats, usually semi-open with scattered trees or shrubs, including open dry forest, savanna, thorn-scrub, *chaco* woodlands, edges of marshes and waterbodies, gallery-forest edge, roadside scrub, second growth, agricultural areas; also lawns in towns and cities. Usually below 1000 m; to 2000 m in dry intermontane valleys of Bolivia.
Food and Feeding. Seeds, also small arthropods. Forages on ground, often on lawns in urban areas. Found in pairs and in small flocks.
Breeding. Season late May to Nov in Venezuela, Apr–Jan in Trinidad, Oct–Feb in E & S of range ("*pelzelni* group"), possibly later in Bolivia (fledging in May in Cochabamba); typically two broods per season. Males often sings from conspicuous branch, post or powerline. Nest a bulky semi-sphere of dry grasses, lined with softer material, including hair, placed in palm frond or in cavity, e.g. pipe, roof eave or nestbox, in Trinidad almost always in abandoned nest of Yellow Oriole (*Icterus nigrogularis*); in S & E ("*pelzeni* group") usually builds within old stick or mud nest of furnariid, commonly old nest of Rufous Hornero (*Furnarius rufus*), Firewood-gatherer (*Anumbius annumbi*) or thornbird (*Phacellodomus*), sometimes in artificial structure such as city light fixture. Clutch 2–4 eggs, creamy with purplish-brown markings; "*pelzelni* group" commonly 4 eggs, cream-coloured or pale greenish with brown and grey speckling throughout; no information on incubation and nestling periods. Nests often parasitized by Shiny Cowbird (*Molothrus bonariensis*), at least in Argentina. Reports that juveniles of first brood may nest within season in which they hatched likely erroneous.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common to abundant throughout its very large range. Recently found in SC Chile (Los Ríos and Los Lagos), but unclear whether this due to natural colonization or artificial introduction. Introduced successfully to West Indies, first in Jamaica in 1820s, and in Puerto Rico probably c. 1960; now well established in both, and particularly common and widespread in Jamaica; also recorded in Cuba. Introduced quite successfully to Hawaii. First reported in Panama in 1951, presumably following introduction or escape from captivity. Widely kept and popular as a cagebird.
Bibliography. Armani (1985), Canevari *et al.* (1991), Dunning (2008), ffrench (1991), Fjeldså & Krabbe (1990), Harrison (1973), Hoy (1978), Marcondes-Machado (1982b, 1988b, 1988c, 1997), Palmerio & Massoni (2009), de la Peña (1987), Raffaele *et al.* (1998), Ridgely & Tudor (1989), Ridgway (1901), Storer (1989b), Wetmore *et al.* (1984).

PLATE 62 ➤

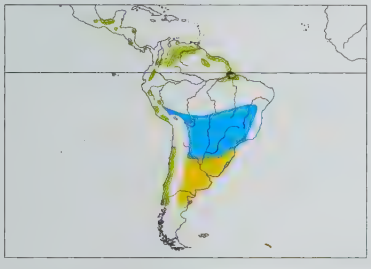

ssp bogotensis
ssp luteola
233
ssp luteiventris
ssp lucaris
234
235
ssp herbicola
236
237
PLATE 62
inches 2
cm 5
238
ssp platensis
ssp olivascens
239
ssp catamarcana
240
variants
242
243
241
244
245
246

233. Grassland Yellow-finch

Sicalis luteola

French: Sicale des savanes **German**: Kurzschnabel-Gilbammer **Spanish**: Chirigüe Sabanero
Other common names: Striped/Yellow-breasted Yellow-finch, Yellow Grass-finch; Montane Yellow-finch (*bogotensis*); Misto/Southern Yellow-finch (*luteiventris*); Northern Yellow Finch (*chrysops*)

Taxonomy. *Emberiza luteola* Sparrman, 1789, no locality = Suriname.
Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). This species previously considered conspecific with *S. raimondii* owing to similarities in plumage, but the two occur sympatrically in coastal S Peru and behave as good biological species. Has been suggested that races may constitute up to three separate species, nominate, *flavissima* and *chapmani* forming one species, *chrysops*, *mexicana*, *eisenmanni* and *bogotensis* another, and *luteiventris* a third; others suggest that only two main groups are involved, *luteiventris* being a separate species and all other races being conspecific. A detailed study of geographical plumage variation, vocalizations and genetics is needed. Eight subspecies currently recognized.
Subspecies and Distribution.
S. l. mexicana Brodkorb, 1943 – C Mexico (Pacific slope in Puebla and Morelos).
S. l. chrysops P. L. Sclater, 1862 – S Mexico (Caribbean slope in Veracruz and Chiapas), S Guatemala (Sacatepéquez), and Mosquitia region of E Honduras and NE Nicaragua.
S. l. eisenmanni Wetmore, 1953 – NW Costa Rica (Guanacaste) and C Panama (Coclé).
S. l. luteola (Sparrman, 1789) – Colombia (lower elevations of W Andes, and valleys of R Cauca and R Magdalena), Venezuela (Falcón, Monagas and Bolívar), Guyana and adjacent N Brazil (R Branco region).
S. l. bogotensis Chapman, 1924 – Andes of Venezuela and E range in Colombia S through highlands of Ecuador to S Peru (Arequipa).
S. l. flavissima Todd, 1922 – Suriname S to mouth of R Amazon (Brazil).
S. l. chapmani Ridgway, 1899 – lower R Amazon in Brazil (C Pará).
S. l. luteiventris (Meyen, 1834) – breeds in S Brazil (Santa Catarina and Rio Grande do Sul), Uruguay, lowlands of N & C Argentina (Santiago de Estero and Corrientes S to Chubut) and C Chile (S Coquimbo S to Valdivia); winters N to S Peru (Cuzco and Puno), C & E Bolivia (La Paz, Beni and lowland Santa Cruz), C Brazil (Mato Grosso E to Bahia).
Introduced (nominate race) in Lesser Antilles.



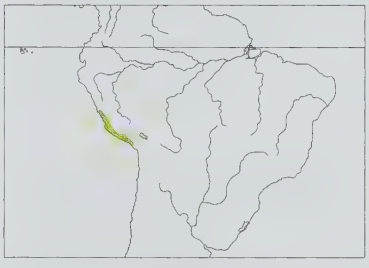
Descriptive notes. 9·8–12·5 cm; 14·6–17·9 g. A small, compact yellow-finch with short and rounded bill, moderately long wings and distinctly notched tail. Male nominate race has olive crown with fine dark streaks, largely greyish-olive face with distinct yellowish eyering and yellow supercilium, and also much yellow on side of neck; nape and upperparts olive-brown with heavy dark streaking (in fresh plumage, two whiter lines of streaks on mantle), rump contrastingly olive-yellow; upperwing and tail brownish with pale brownish edgings; throat and malar region bright yellow, underparts yellow, extensively washed olive on side of breast and upper flanks, belly slightly paler yellowish; iris dark; bill greyish or pinkish-grey, darker culmen; legs dull pink to dusky. Female is similar to male, but duller overall, pale brown above with dark streaks from crown to back, dull yellow below, dark malar stripe, yellow facial markings less conspicuous, side of head and side of body strongly washed olive, throat and breast sometimes buff. Juvenile is similar to female, but upperpart feathers edged buffy (can look scaly on freshest-plumaged juvenile, more streaked on older individual), stronger malar stripe, finely streaked breast, belly even duller yellow. Race *flavissima* is larger and longer-winged than nominate, with more curved bill, contrasting unstreaked yellowish rump, female has yellowish throat; *chapmani* is similar to previous, but with even larger bill, much more strongly curved culmen, brighter green upperparts with very narrow streaking, brighter yellow underparts; *bogotensis* is larger than nominate, with head yellower and less contrasting, darker on mantle and scapulars, dull greenish-olive rump, sometimes a pale patch near end of outer pair of rectrices; *chrysops* is brighter than last; *mexicana* and *eisenmanni* are similar to previous; *luteiventris* is rather dull above, rump greener and less contrasting than on nominate, wing edgings stronger and more greyish-yellow (creating paler panel on folded secondaries), sometimes two wingbars, less bright yellow below, olive wash on breast less prominent and less extensive. Voice. Song, from perch and in flight, a canary-like series of trills, each at slightly different frequency from previous one, and with different cadence, duration 3 seconds to more than 10 seconds; flight song longer than perched song, and during intense singing when female present song escalates and towards end trills more like electronic buzz in quality. In Suriname, song much slower and not sounding so much like a series of trills. Call in flight an explosive disyllabic "pit-tchew!"; also gives churring note in Panama.
Habitat. Grasslands and agricultural areas, also grassy edges of marshes and other wetlands. Prefers taller-grass habitats, rather than short grass. In Panama found in savanna with scattered bushes and low trees in sandy soil. In Chile, Argentina and Uruguay often in empty lots within towns or villages, so long as grass and other vegetation taller than c. 1 m. Sea-level to 2500 m in S of range, to 3300 m in Andean portion of distribution. Recorded at sea-level in S Peru (Ica).
Food and Feeding. Seeds, probably also arthropods. Forages mostly on ground. Feeds on seedheads of grasses by flying up and alighting on them, causing stem to bend down, and then extracting seed while braced on ground. Singly, in pairs and in small groups; sometimes in larger flocks.
Breeding. Season Feb–Jun, but may breed in all months, in N of range, and males in breeding condition in Jun in Panama and in May in Colombian highlands; in S (race *luteiventris*) breeds late Aug/Sept–Feb, with up to three broods in a season. In some places may be loosely colonial. Nest a bulky cup of woven grass, placed on ground; in S (*luteiventris*), nest semi-spherical and comprised of dry grass, with softer lining of feathers, hair or soft grass, placed on ground in thick clump of grass or other vegetation. Clutch in N of range 2–3 eggs; in S tends to be of 3–5 eggs, white with pale blue wash and spotted with grey or brown throughout, spots concentrated at wide end.
Movements. Resident in N & W of range. S populations (*luteiventris*) mostly migratory, some birds making post-breeding flight N as far as S Peru, Bolivia and C Brazil; however, N limits of breeding range and S limits of wintering range of this race are unclear; resident in Chile; large flocks of this yellow-finch seen in Santa Cruz (Bolivia) only in austral winter.
Status and Conservation. Not globally threatened. Common to abundant in S cone of South America; fairly common to uncommon and more local in N of range. Race *mexicana* rare and local; *chrysops* very rare in Guatemala. In West Indies, nominate race introduced in Barbados in c. 1900 and subsequently spread to other islands in Lesser Antilles; now uncommon and somewhat local on Antigua, Guadeloupe, Martinique, St Lucia, St Vincent and Grenada, as well as Barbados, and vagrant on Mustique (in Grenadines). Popular as a cagebird.
Bibliography. Armani (1985), Chapman (1924), David *et al.* (2009), Dunning (2008), Fjeldså & Krabbe (1990), Griscom (1932), Guth (1971), Herrera & Vidoz (2009), Jaramillo (2003), Johnson & Goodall (1967), Koepcke (1963), Olrog (1963), de la Peña (1987), Raffaele *et al.* (1998), Restall *et al.* (2006), Ridgely & Tudor (1989), Ridgway (1899, 1901), Rui de Camargo (1995), Salvador & Salvador (1986), Wetmore (1953), Wetmore *et al.* (1984).

234. Raimondi's Yellow-finch

Sicalis raimondii

French: Sicale de Raimondi **German**: Grauflanken-Gilbammer **Spanish**: Chirigüe de Raimondi

Taxonomy. *Sycalis raimondii* Taczanowski, 1874, vicinity of Lima, Peru. Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). This species previously considered conspecific with *S. luteola* owing to similarities in plumage, but the two occur sympatrically and behave as good biological species. Monotypic.
Distribution. Pacific slope in S Peru from Lima S to extreme N Tacna.



Descriptive notes. 12·5 cm; one female 15·8 g. A small and compact yellow-finch with short rounded bill, moderately long wings and notched tail. Male has largely greyish-olive face, distinct yellowish eyering and yellow supercilium; crown streaked brownish-olive, nape greyish and lightly streaked (or unstreaked); upperparts greyish-olive and indistinctly streaked dark (in fresh plumage, two paler lines of streaks on mantle), rump unstreaked greenish with yellow wash; upperwing brownish, feathers edged pale grey (forming pale panel on folded wing), tail dusky, feathers edged pale greyish-yellow; below, entirely yellow, brightest on throat (which contrasts with greyish-olive face), and washed grey on flanks, with belly paler off-white to yellowish; iris dark; bill greyish-blue, or pinkish-grey with darker culmen; legs dull dusky pink. Female is similar to male, but duller overall, face browner, with pale buff supercilium and off-white eyering, upperparts duller and browner, particularly on rump; dull yellow below, strongest on throat and belly, distinctly grey on breast, also has narrow and indistinct darker malar stripe. Juvenile and immature undescribed. Voice. Song a dry chatter or reedy rattle, "tchitchitchitchitchi". Calls include dry "djer-djer-djer" and rising "kewee?".
Habitat. Arid rocky hillsides, dry grasslands and pastures, at 200–2500 m; sometimes in areas with large cacti and Lomas vegetation. Not found in arable land.
Food and Feeding. No information on diet. Forages on ground. Found in small groups during breeding season; in non-breeding period in flocks of 100–1000 individuals.
Breeding. Nests in stony gorges; apparently colonial. No other information. Unlike closely related *S. luteola*, appears not to have an aerial display.
Movements. Field observations suggest shifts in abundance depending on local patterns of fog and rainfall, but no quantified data. In maritime ranges of Arequipa, present in all months, and most common Dec–Jul, but not known to breed there. May form large flocks (hundreds of individuals) for a period of time, and then disperse.
Status and Conservation. Not globally threatened. Locally common in larger flocks, but these ephemeral. No evidence of major population decreases. Has fairly extensive range.
Bibliography. Armani (1985), Bond (1951a), Dunning (2008), Fjeldså & Krabbe (1990), Hughes (1970), Koepcke (1963, 1970), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

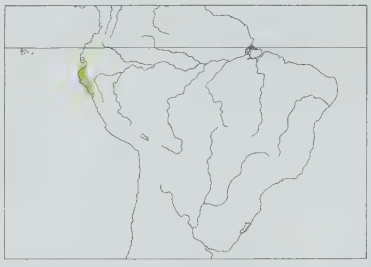
235. Sulphur-throated Finch

Sicalis taczanowskii

French: Sicale de Taczanowski **Spanish**: Chirigüe de Taczanowski
German: Taczanowskigilbammer
Other common names: Sulphur-breasted Finch, Sulphur-throated Yellow-finch

Taxonomy. *Sycalis taczanowskii* Sharpe, 1888, Tumbes, Peru. Molecular-genetic data suggest that genus is most closely related to the "hooded" group of sierra-finches (*Phrygilus atriceps*, *Phrygilus punensis*, *Phrygilus gayi* and *Phrygilus patagonicus*); also, that it belongs within the tanager family (Thraupidae). Until relatively recently this species was placed in a monotypic genus, *Gnathospiza*, but in many ways it seems to be merely a large-billed member of present genus, and perhaps closest to *S. raimondii* and *S. luteola* on basis of plumage features. Monotypic.
Distribution. SW Ecuador (SW Guayas, El Oro and Loja) and NW Peru (lowlands of Tumbes, Piura, Lambayeque and N La Libertad).
Descriptive notes. 12 cm. A stocky, short-tailed dull-plumaged finch with disproportionately large bill with strongly rounded culmen, and tiny-looking eye. Has dull grey-brown head, slightly streaked on crown and nape, face greyish with yellow wash, yellow strongest on supraloral area and eye-crescents; sometimes a pale patch on side of neck; upperparts dull grey-brown with darker streaking, rump unstreaked greyish; tail feathers brownish, extensively edged yellow, yellow strongest and widest at base; upperwing with narrow greyish-buff wingbars, yellowish edging on primaries; throat and malar region strongly tinged yellow, underparts pale greyish-brown, flanks with narrow dark streaking; iris dark; bill dull

On following pages: 236. Wedge-tailed Grass-finch (*Emberizoides herbicola*); 237. Lesser Grass-finch (*Emberizoides ypiranganus*); 238. Duida Grass-finch (*Emberizoides duidae*); 239. Great Pampa-finch (*Embernagra platensis*); 240. Pale-throated Pampa-finch (*Embernagra longicauda*); 241. Coal-crested Finch (*Charitospiza eucosma*); 242. Black-masked Finch (*Coryphaspiza melanotis*); 243. Pileated Finch (*Coryphospingus pileatus*); 244. Red-crested Finch (*Coryphospingus cucullatus*); 245. Crimson-breasted Finch (*Rhodospingus cruentus*); 246. Yellow Cardinal (*Gubernatrix cristata*).



horn with pinkish tone; legs pale pink. Sexes alike. Immature is similar to adult, but weakly streaked on breast and lacks yellow on face and throat. Voice. Song unrecorded. Calls include thin "tzzzz" and "tur", as well as warbling phrases with scratchy character.
Habitat. Desert scrub and areas of low trees, also extremely dry and barren areas where vegetation nearly absent; sea-level to 300 m.
Food and Feeding. No details of diet; large bill size suggests that it feeds on large seeds. Forages while on ground. Feeds in large flocks, sometimes of hundreds of individuals.
Breeding. No information.
Movements. Largely resident. Appears to stay in general region where it breeds, but somewhat nomadic or erratic within desert habitat when not breeding; forms large flocks during non-breeding season, but not known to be migratory.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Common within its limited range in Peru. Rare and erratic in Ecuador, where absent during years of rain; recent report from SW Esmeraldas, in N Ecuador.
Bibliography. Armani (1985), Montalvo (2009), Restall *et al.* (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

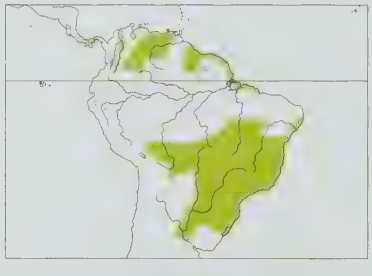
Genus *EMBERIZOIDES* Temminck, 1822

236. **Wedge-tailed Grass-finch**

Emberizoides herbicola

French: Grand Tardivole **German**: Keilschwanzammer **Spanish**: Coludo Colicuña
Other common names: Wedge-tailed Ground-finch, Azara's Grass-finch

Taxonomy. *Sylvia herbicola* Vieillot, 1817, Paraguay.
Molecular data indicate that genus is sister to *Embernagra*, and both appear to belong in tanager family (Thraupidae). Sometimes treated as conspecific with *E. ypiranganus*; until recently considered conspecific with *E. duidae*. Races fall roughly into two groups, "*sphenurus* group" (*sphenurus*, *hypochondriacus*, *lucaris* and *apurensis*) N of R Amazon, and single-species "*herbicola* group" (nominate race) in S; groups differ in plumage and voice, and in playback experiments nominate does not react to songs from *apurensis*, suggesting that more than one species may be involved; geographical limits of some races require confirmation.Race *lucaris* may be similar enough to be subsumed into *hypochondriacus*; further study required. Proposed race *floresae*, described from Panama (Cerro Flores, in E Chiriquí), appears to be based on an immature specimen, and is treated as a synonym of *hypochondriacus*. Five subspecies recognized.
Subspecies and Distribution.
E. h. lucaris Bangs, 1908 – SW Costa Rica (Térraba region).
E. h. hypochondriacus Hellmayr, 1906 – W & C Panama.
E. h. sphenurus (Vieillot, 1818) – locally in Colombia, S Ecuador and N Peru, and in Venezuela (except W lowlands and Cerro Duida), the Guianas, and NE Brazil (S to N Maranhão).
E. h. apurensis Gilliard, 1940 – lowland W Venezuela (Guárico, Portuguesa, Barinas and Apure).
E. h. herbicola (Vieillot, 1817) – E Bolivia (Beni, La Paz, Santa Cruz and Chuquisaca), C, E & S Brazil (Mato Grosso E to Pernambuco, S to Rio Grande do Sul), Paraguay, N Argentina (Formosa and Misiones S to Entre Ríos and N Santa Fe) and N Uruguay (Rivera).



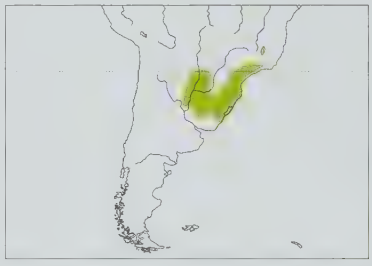
Descriptive notes. 20–20·3 cm; 21–36·6 g. A medium-sized finch with thickset body, but relatively slim appearance owing to very long and pointed tail, and with moderately deep-based bill with slightly curved culmen; tail feathers lanceolate, and inner two pairs very long and sharply pointed, giving tail a forked shape in some views, but quickly become abraded, leaving only pointed shafts. Nominate race has face plain pale brownish, dull paler supraloral streak and pale lores, diffuse whitish eyering; crown finely streaked blackish, nape largely unstreaked; upperparts boldly streaked blackish, blackish streaks roughly the same in width as brown edging; rump unstreaked, uppertail-coverts narrowly streaked; upperwing brownish, feathers widely edged bright olive-green; tail feathers dark-centred, edged greyish-brown; throat greyish-white, underparts creamy white, flanks and vent buff; iris dark brown; bill largely yellow to yellow-orange, blackish culmen; legs brownish-yellow to dull pinkish. Sexes alike. Juvenile is similar to adult, but upperparts suffused with rusty yellow, and face and underparts suffused yellow, streaked on breast. Races differ in size and in plumage, nominate largest, with palest face, and least broad streaking above: *lucaris* is most similar to nominate in plumage, but noticeably more rusty above than it and all other races; *hypochondriacus* is more yellowish-brown on upperparts than previous, and has blackish-grey ear-coverts; *sphenurus* resembles last, but is larger, buffier below, with restricted streaking on breast side and dark shaft streaks on undertail-coverts; *apurensis* is like last, but with greyish face, darker greyish-brown with blacker streaking above, and whiter below, finely streaked on flanks. Voice. Song of nominate race sweet and pleasant, a melodious double whistle, the first upwardly inflected, the second downwardly inflected, "jewléé, jewlóóó"; a longer, more complex dawn song starts and ends with short rough notes and contains sweeter notes in middle, "chk chk teu jeulóó chk chk". Call "tsik" or "chik". Rather different are songs of *sphenurus* and *apurensis*, respectively "ch,ch,ch,r,r,ree-chwee,ye" and "tit-tit-zur-rreeeet"; dawn song in Venezuela shorter, "t'chill'ip". In Panama (*hypochondriacus*) two song types, a buzzy "tsiritsitzeew" or "tzit-zeereea" and a sweet "tit-leeoo" or "tleedee" repeated at intervals. More work needed on geographical variation in song and its possible taxonomic significance.
Habitat. Damp to well-drained grasslands and meadows, usually with isolated shrubs; requires taller older grass (sensitive to overgrazing). Also savanna habitats, particularly in S of range (nominate race). Sea-level to 1500 m.
Food and Feeding. Few details available; diet apparently seeds and arthropods. Forages on ground, or near ground in tall grasses. Sometimes follows army ants (Formicidae). Singly and in pairs.
Breeding. Season Nov–Jan in S (nominate race); fledglings in Nov and Jun in Venezuela (*apurensis*). Dawn song of nominate usually accompanied by jerky flight display. In Argentina cup-shaped nest of dry grasses, placed in dense tuft of grass; clutch 3 eggs, white with blackish marks, these denser around wide end. In Brazil (Serra do Cipó National Park, in Minas Gerais) two nests were lined with floral peduncles of *Leiothrix* cf. *spiralis* (Eriocaulaceae), built at base of *Lagenocarpus tenuifolius* (Cyperaceae); one contained 2 eggs, and the other two nestlings. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common; possibly less common N of R Amazon than S of it. No significant threats known.
Bibliography. Armani (1985), Canevari *et al.* (1991), Di Giacomo & Di Giacomo (2006), Dunning (2008), Eisenmann & Short (1982), Fjeldså & Krabbe (1990), Graham *et al.* (1980), Griscom (1924), Hennessey *et al.* (2003), Klicka *et al.* (2007), Restall *et al.* (2006), Ridgely & Tudor (1989), Tobias *et al.* (1997), de Vasconcelos (2000), Wetmore *et al.* (1984).

237. **Lesser Grass-finch**

Emberizoides ypiranganus

French: Petit Tardivole **German**: Ypirangaammer **Spanish**: Coludo Chico
Other common names: Lesser Ground-finch, Grey-cheeked Grass-finch

Taxonomy. *Emberizoides macrourus ypiranganus* H. von Ihering and R. von Ihering, 1907, Campos de Jordão, Serra de Itatiaya and Ypirangana, São Paulo, Brazil.
Molecular data indicate that genus is sister to *Embernagra*, and both appear to belong in tanager family (Thraupidae). Sometimes treated as conspecific with *E. herbicola*, with which it was formerly confused. Monotypic.
Distribution. Paraguay (largely E of R Paraguay), NE Argentina (E Formosa, E Chaco, NE Santa Fe, Corrientes and E Entre Ríos), SE Brazil (S Minas Gerais, S São Paulo, SW Rio de Janeiro and S Paraná S to Rio Grande do Sul) and N & C Uruguay.



Descriptive notes. 20 cm; 18·5–22 g. A medium-sized finch with thickset body, though relatively slim appearance owing to very long and pointed tail, and with moderately deep-based bill with slightly curved culmen; tail feathers lanceolate, and inner two pairs very long and sharply pointed, giving tail a forked shape in some views, but quickly becomes abraded, leaving only pointed shafts. Has plain greyish face with darker lores and paler supercilum, narrow whitish eyering; greener or browner crown contrasts with grey face and is finely streaked blackish, nape largely unstreaked; upperparts with bold blackish streaks roughly equal in width to dull brown or greenish-brown edgings, rump to uppertail-coverts narrowly streaked; tail feathers dark-centred and edged greyish-brown; upperwing brownish, feathers widely edged bright green; throat white, underparts pale greyish-white, buff flanks, flanks and vent streaked; iris dark brown; bill largely yellow-orange, blackish culmen; legs brownish-yellow to dull pinkish. Sexes alike. Juvenile is similar to adult, upperparts suffused with buffy yellow, face and below suffused yellow, and breast streaked. Voice. Song, often from concealed perch in vegetation, also from prominent perch, rarely in flight, a harsh monotonous chatter, "ch-ch-ch-ch-ch..." or "wet-wet-wet...", usually notes doubled towards end of song, e.g. "ch, ch, ch, ch, ch, ch-ch, ch-ch, ch-h...". Call "tse".
Habitat. Moist grassland to swampy meadows and marsh, including sedge (Cyperaceae) marsh; found also in drier grassland, including grassy patches adjacent to shrubs. Sea-level to 900 m.
Food and Feeding. No information on diet. Forages on ground, usually in grass and difficult to see. Singly and in pairs.
Breeding. Season Nov–Jan. Little known. Rarely performs aerial song display. Two nests described from Brazil (Serra do Cipó National Park, in Minas Gerais), each a relatively deep cup, some dried leaves of *Panicum loreum* at base, lined with floral peduncles of *Leiothrix* cf. *spiralis*, placed 12–14 cm above ground at base of *Lagenocarpus tenuifolius*; in Argentina nests 7–70 cm above ground, e.g. in midst of clump of *Paspalum intermedium* grass, one nest had external diameter 6·5–7 cm, internal diameter 4–4·5 cm, external height 6 cm and internal depth 5 cm. Clutch 2–3 eggs, white with few reddish, brown or black spots at broad end. No other information.
Movements. Presumably sedentary.
Status and Conservation. Not globally threatened. Uncommon to fairly common throughout range.
Bibliography. Armani (1985), Costa *et al.* (2008), Di Giacomo (1998), Dunning (2008), Eisenmann & Short (1982), Klicka *et al.* (2007), Ridgely & Tudor (1989), Tobias *et al.* (1997), Webster & Webster (1999).

238. **Duida Grass-finch**

Emberizoides duidae

French: Tardivole du Duida **German**: Duidaammer **Spanish**: Coludo del Duida
Other common names: (Mount) Duida Ground-finch

Taxonomy. *Emberizoides duidae* Chapman, 1929, Cerro Duida, 4400 feet [c. 1340 m], Amazonas, Venezuela.
Molecular data indicate that genus is sister to *Embernagra*, and both appear to belong in tanager family (Thraupidae). Until recently considered conspecific with *E. herbicola*. Monotypic.
Distribution. Cerro Duida (Amazonas), in S Venezuela.



Descriptive notes. 22 cm. A stocky finch with thickset body, looking relatively slim owing to very long and pointed tail, and with moderately deep-based bill with slightly curved culmen; tail feathers lanceolate, and inner two pairs very long and sharply pointed, giving tail a forked shape in some views, but quickly abrades, leaving only pointed shafts. Has rather plain dark brownish face with darker lores, contrasting whitish supraloral stripe and narrow whitish eyering; forehead blackish, crown brown with widely blackish streaking (looking black more than brown); mantle and scapulars olive, boldly streaked blackish, rest of upperparts cinnamon-brown, boldly streaked blackish, streaks similar in width to visible background colour;

tail feathers dark-centred, edged brown; upperwing brownish, widely edged yellow-green; throat whitish-buff, pale brownish breastband, buff flanks and white belly, flanks and vent streaked; iris dark brown; bill largely yellowish, blackish culmen; legs brownish. Sexes alike. Juvenile is streaked on breast, and white of underparts replaced by buffy. VOICE. No information.
Habitat. Savanna habitats in upper tropical and subtropical zone; 1300–2100 m.
Food and Feeding. No information.
Breeding. No information.
Movements. Presumed sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Tepuis EBA. Not known in life, but only from a handful of specimens. Has tiny global range, restricted to a single mountain. Although its habitats are secure at present, and mostly inaccessible to humans, any future changes in land use or in climate could lead to its becoming threatened. Efforts should be made to find this species and to document its biology and ecology and its current population level.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Chapman (1929), Eisenmann & Short (1982), Hilty (2003), Klicka *et al.* (2007), Restall *et al.* (2006), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

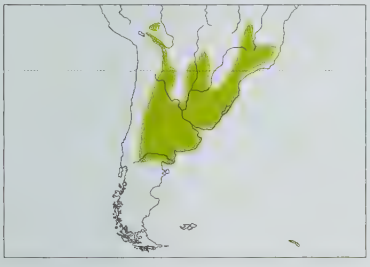
Genus *EMBERNAGRA* Lesson, 1831

239. Great Pampa-finch

Embernagra platensis

French: Embernagre à cinq couleurs **German**: Pampaammer **Spanish**: Coludo Verdón
Other common names: Red-billed Pampa-finch; Olive Pampa-finch (*olivascens*)

Taxonomy. *Emberiza platensis* J. F. Gmelin, 1789, Buenos Aires, Argentina.
Molecular data indicate that genus is sister to *Emberizoides*, and both appear to belong in tanager family (Thraupidae). This species sometimes placed in *Emberizoides*. Western "*olivascens* group" may merit elevation to species rank; in Argentina, nominate race may be sympatric with *gossei* in Córdoba, but no details available. Four subspecies recognized.
Subspecies and Distribution.
E. p. olivascens d'Orbigny, 1839 – SE Bolivia (La Paz, Cochabamba and W Santa Cruz S to E Potosí and W Tarija), W Paraguay, and NW Argentina (Salta and Jujuy E to C Formosa, S through Córdoba).
E. p. catamarcana Nores, 1986 – C Catamarca, in NW Argentina.
E. p. gossei C. Chubb, 1918 – WC Argentina (Mendoza, San Juan and San Luis).
E. p. platensis (J. F. Gmelin, 1789) – lowlands of Beni, in N Bolivia; C & E Paraguay, E Argentina (E Formosa, Chaco and Misiones S to Río Negro), SE Brazil (S from Minas Gerais) and Uruguay.



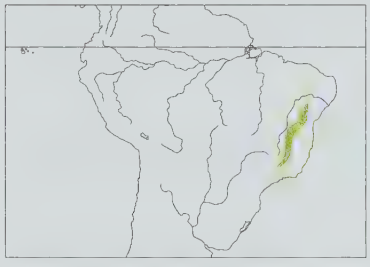
Descriptive notes. 20·5–23 cm; 45–47 g. A long-tailed and short-winged finch of medium size, with thick yet long bill. Nominate race has grey head, with darker lores and face (creating somewhat masked look), from nape a green suffusion invades the grey, blending into grass-green upperparts, mantle and back varying from finely to distinctly streaked; tail feathers dusky with broad grass-green edging, greenish central feathers; upperwing widely edged grass-green and appearing largely concolorous with back, except for broad blackish centres of tertials; grey of face continues to underparts, with slightly paler central throat, then darkening on breast and flanks, with belly and vent off-white, rearmost underparts often with cinnamon-brown wash; iris dark brown; bill orange, black culmen; legs usually dull pinkish, feet often duller and duskier. Sexes similar. Juvenile is rather different from adult, strongly washed yellow on face and throat, strong face pattern of yellow supercilium contrasting with darker cap and cheek, crisp whitish crescent below eye, entire upperside pale brownish with prominent dark streaking, off-white to yellowish below, crisp streaking on breast and upper flanks, bill dusky. Race *olivascens* is larger than nominate, has thicker bill with more strongly curved culmen, lacks streaking above, has buff-brown wash on flanks and rear underparts, has much more extensive and brighter orange coloration on bill (dark restricted to basal ridge of culmen), legs bright yellow to orange; *gossei* is larger than previous, has paler grey throat and breast, more greyish-green upperparts; *catamarcana* has clearer grey chest and greyer head than preceding two, also more yellowish on upperparts and has whiter belly. VOICE. Song c. 1 second in duration, a musical series of 3–5 notes of generally high frequency, last note often longer, louder and strongly frequency-modulated, "gledit, gledit, gléeeeuuu" or "pzt–tcheew" or "chip–ptleeéé"; when final note rising, reminiscent of part of Brown-headed Cowbird (*Molothrus ater*) song. Song of *olivascens* may be more complex, longer and lower in frequency. Call a buzzy "tziip"; alarm call a buzzy "tzip, tzip, tzip".
Habitat. Grassland with scattered shrubs, also grassland at edge of marshes. In E of range (nominate) prefers moist sites, avoiding dry grasslands. In W & N much more likely to occupy habitats with larger shrub component, away from damp sites, but still with noticeable grass component. Sea-level to 2500 m. In areas of sympatry with *E. longicauda*, present species tends to occur in more humid parts and at lower elevations, sometimes in cultivation.
Food and Feeding. Feeds on mix of seeds and arthropods, latter being more important during breeding period. Forages while on ground. Sometimes follows army ants (Formicidae). In pairs and family groups
Breeding. Egg dates span Oct–Dec, later in NW part of range; fledglings recorded Nov–Mar. Nest a cup of dry vegetation, sticks and twigs, lined with softer and finer material, placed 30 cm to 1·5 m from ground in pampas grass (*Cortaderia selloana*), thick grasses or dense shrub. Clutch 2–4 eggs, white with ochre and blackish markings, these concentrated around wide end. Often parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common. Appears to adapt well to agriculture so long as some tall grass present on outside of farm fields, and often perches on and sings from fence posts.
Bibliography. Armani (1985), Beltzer (1990), Canevari *et al.* (1991), Contreras (1980), Di Giacomo & Di Giacomo (2006), Dunning (2008), Fjeldså & Krabbe (1990), Hayes (2003), Hennessey *et al.* (2003), Klicka *et al.* (2007), Mattos & Sick (1985), Montalti *et al.* (2005), Nores & Yzurieta (1986), de la Peña (1987), Ridgely & Tudor (1989), Storer (1989b), de Vasconcelos (2000).

240. Pale-throated Pampa-finch

Embernagra longicauda

French: Embernagre du Brésil **German**: Langschwanzammer **Spanish**: Coludo Gorjipálido
Other common names: Buff-throated Pampa-finch, (Pale-throated) Serra-finch

Taxonomy. *Embernagra longicauda* Strickland, 1844, South America.
Molecular data indicate that genus is sister to *Emberizoides*, and both appear to belong in tanager family (Thraupidae). Monotypic.
Distribution. Highlands of C Bahia, C Minas Gerais and extreme SW Espírito Santo, in E Brazil.



Descriptive notes. 21·5 cm. A slim and very long-tailed and short-winged finch of medium size, with stout and long bill. Has grey head with darker lores and eyeline, contrasting pale supraloral spot, well-defined white crescent above and below eye; upperparts plain greenish-grey; upperwing widely edged grass-green (looks much brighter than back); tail feathers dusky with broad grass-green edging, greenish central feathers; throat white, contrasting greyer breast and slightly browner flanks, with belly and vent off-white, often a warm buff wash on undertail-coverts; iris dark; bill yellow to orange-yellow, black culmen; legs greyish to flesh-orange or even dusky, feet often more olive. Sexes similar. Juvenile is different from adult, strongly washed yellow on face and throat, strong face pattern of yellow supercilium contrasting with darker cap and cheek, prominent whitish crescent above and below eye, brownish above with strong streaking throughout, warm brown wash on wings, tail dull brown, underparts grey with yellowish wash, crisp streaking on breast, bill dusky. VOICE. Song a loud "tsi, tsoweee", repeated at intervals of 4–5 seconds. Call a buzzy "tziiup".
Habitat. *Serra* habitat in highlands of E Brazil, in dry savannas, *campos* grasslands, grassy fields with a few scattered palms (e.g. *Allagoptera*) and ground bromeliads; 900–2100 m. In areas of sympatry with *E. platensis*, present species tends to occur in more arid parts and at higher elevations.
Food and Feeding. Little known. Forages on ground. During breeding season commonly found in family groups, typically of 4 individuals.
Breeding. Little known. Apparently at least Oct–Dec. Nest found in Oct in Minas Gerais, a cup lined with *Leiothrix* cf. *spiralis* peduncles, built 38 cm above ground inside clump of *Panicum loreum*; contained 2 eggs, white with small brown dots and paler blotches at wide end. Fledged young seen foraging in company of their parents. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to locally fairly common. Has fairly small and fragmented range. Confined to E Brazil, where it occurs in Serra do Espinhaco (interior C Bahia and Minas Gerais); recently discovered in some isolated ranges in surrounding region, including Serra da Mombuca (Minas Gerais) and also in Serra do Caparaó, in adjacent Espírito Santo. Possibly more widespread in surrounding ranges than previously thought. Has suffered some habitat loss through agricultural expansion; on other hand, deforestation may create additional habitat suitable for this species. Recorded in at least eight protected areas.
Bibliography. Alves *et al.* (2009), Anon. (2010c), Butchart & Stattersfield (2004), de Freitas & Rodrigues (2008), de Freitas, de Vasconcelos & Rodrigues (2009), Hoffmann *et al.* (2009), Klicka *et al.* (2007), Machado *et al.* (1998), Mattos & Sick (1985), O'Brien (1968), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000), de Vasconcelos (2000), de Vasconcelos & de Araujo Silva (2003), de Vasconcelos *et al.* (2003).

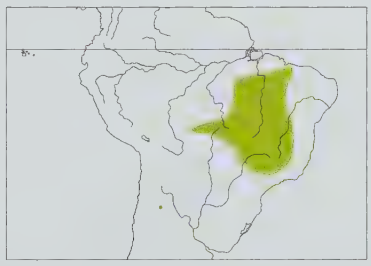
Genus *CHARITOSPIZA* Oberholser, 1905

241. Coal-crested Finch

Charitospiza eucosma

French: Charitospize charbonnier **Spanish**: Monterita Crestada
German: Weißwangen-Zwergkardinal

Taxonomy. *Charitospiza eucosma* Oberholser, 1905, Fazenda Valo [= Geral do Valo], near frontier of Minas Gerais, Bahia, Brazil. Originally named *Fringilla ornata*, but that name invalid, as preoccupied. Probably belongs in tanager family (Thraupidae), and thought likely to belong in the group that includes *Diuca*, *Lophospingus*, *Paroaria* cardinals and a few others. Monotypic.
Distribution. EC Brazil from SE Pará, S Maranhão and NC Piauí, S to SE Mato Grosso, NW São Paulo and W Minas Gerais; recently found in extreme NE Bolivia (N Santa Cruz) and N Argentina (Tafí del Valle, in Santiago del Estero).



Descriptive notes. 11·5 cm. Small plump-bodied finch with relatively long triangular bill with straight culmen and gonys, and with distinctive thin crest. Male has top of head, including crest (often held flat), lores, anterior cheek, chin and throat black, contrasting silvery-white patch on ear-coverts and area behind eye, this pale patch gradually darkening to blue-grey nape; upperparts, including upperwing-coverts, pale blue-grey like nape, greater upperwing-coverts often paler than lesser and median coverts (forming silvery-grey wingpanel); flight-feathers black, small white patch towards base of inner primaries (visible both on perched and on flying bird), tertial edges pale blue-grey; tail blackish, white bases of outer rectrices (obvious in flight); black of throat extends down as pointed bib on breast; lower breast, belly and flanks pale buffy cinnamon, often darker and with chestnut tone on breast, undertail-coverts buffy cinnamon; iris dark brown; bill blue-grey, dark culmen; legs pinkish-grey. Female is much duller than male, largely brown above and pale buffy cinnamon below, crest brownish and poorly developed; face has slightly paler area on cheek, but this not prominent (a "ghost" pattern of male), throat usually whitish, and often a

faint darker malar stripe; flight-feathers black, contrasting with brownish coverts, tail blackish with noticeable white at base of outer rectrices; legs dull pinkish. Juvenile apparently undescribed. Voice. Song pleasant and loud, but tempo resembles that of Red-eyed Vireo (*Vireo olivaceus*), whistled phrases lasting c. 1 second and separated by longer intervals of 1·5–2 seconds, phrases sweet and ringing, often repeated notes, e.g. "turichup...cheerycheery...herichup...tweewtweew...tweechew...". Call an inconspicuous thin high-pitched "tip"; flight call a more muffled "tzip", given at frequent intervals; alarm a buzzy, nasal "phaap".
Habitat. *Cerrado* habitat with grass, and scattered shrubs and low trees, also *caatinga* habitats; grassy savanna. Appears to gather in greater concentrations in patches of *cerrado* which have recently been burnt. Sea-level to 1200 m.
Food and Feeding. Presumably seeds and insects. Forages while on ground, often in patches of bare earth; will also forage in low shrubs. Inconspicuous. Generally in pairs and in small flocks.
Breeding. Nest found in late Oct in *cerrado* of Brasília. Nest a shallow cup with external diameter 6·8 cm, height 3·3 cm, located 1·21 m above ground on horizontal fork of young *Aspidosperma tomentosum* (Apocynaceae); contained 2 eggs, blue-green with many brown markings. No other information.
Movements. Appears to perform local movements tied to rainfall patterns, as well as following habitats created by fire succession.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon and local. Has moderately small global population likely to be declining owing to habitat loss caused by conversion of *cerrado* to agriculture, as well as effects of trapping for cagebird trade. One historical record from NE Argentina (Misiones). Often considered a fire specialist, as its numbers at localities increase after fire. Surveys needed in order to document population size, and protection of *cerrado* urgently required.
Bibliography. Anon. (2010c), Armani (1985), Borges & Marini (2008), Butchart & Stattersfield (2004), Cavalcanti & Alves (1997), Herrera & Maillard (2007), Klicka *et al.* (2007), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

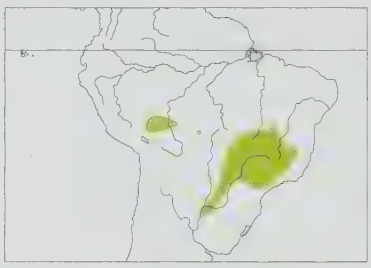
Genus *CORYPHASPIZA* G. R. Gray, 1840

242. **Black-masked Finch**

Coryphaspiza melanotis

French: Coryphaspize à joues noires **Spanish**: Cachilo Enmascarado
German: Schwarzkopfammer
Other common names: Black-eared Finch

Taxonomy. *Emberizoides melanotis* Temminck, 1822, Ipanema, São Paulo, Brazil.
This species most likely belongs in tanager family (Thraupidae); aspects of plumage, tail shape, juvenile plumage and song suggest that it may be related to *Embernagra* and *Emberizoides*. Two subspecies recognized.
Subspecies and Distribution.
C. m. marajoara Sick, 1967 – Marajó I (mouth of R Amazon in Pará), in N Brazil.
C. m. melanotis (Temminck, 1822) – extreme SE Peru (Madre de Dios), E Bolivia (La Paz and Beni), C & EC Brazil (E Mato Grosso and Mato Grosso do Sul E to Minas Gerais and São Paulo), E Paraguay, and NE Argentina (Corrientes).



Descriptive notes. 13·5 cm; 15·6–15·8 g. A relatively thickset finch, with rather long and graduated tail, stout thick-based bill with gently curved culmen. Nominate race somewhat variable, especially on upperparts; has forehead and central crown black, very broad white supercilium widest immediately before eye and tapering somewhat to blunt point on side of nape; lores and area below eye rearwards to behind ear-coverts black (forming complete black mask), contrasting strongly with white throat; nape greyish, mantle and upper back greyish-olive with blackish streaks, lower back and rump greyish; upperwing greenish, marginal coverts yellow, inner greater upperwing-coverts greyish, tertials with greyish edging; some birds show feathers of mantle, scapulars, tertials and outer greater upperwing-coverts chestnut-brown with pale edges and ill-defined dark brown central streak; tail blackish, central rectrices grey, outer feathers with large white tips on inner web (obvious in flight), outer edge of outermost rectrix white; white below, sometimes tinged creamy-buff, spur of black on side of breast, blackish patches or streaking on flanks; yellowish wing-linings; iris dark; upper mandible black, lower mandible bright yellow; legs dull pink. Sexes similar. Juvenile is greyish-brown above and streaked throughout, wings only slightly more greenish than back, wing-coverts with dark centres and brown edgings, crown and face streaked, lacks black mask and white supercilium, instead havaing yellowish wash on lores and superciliary area, yellowish throat and breast, breast obscurely streaked brown, rest of underparts whitish, white tips of outer rectrices much reduced and central rectrices more olive-coloured, bill dull blackish above and horn-coloured below. Race *marajoara* is slightly smaller than nominate, with broader, blacker streaking on back. Voice. Song high-pitched and insect-like, a set of paired notes so closely spaced as to sound like one frequency-modulated note, "tziieeep", repeated at intervals of c. 2 seconds; sometimes slightly different phrase types used consecutively, "tziieep...tsi-tsip...zz-tzzz...". Call a high-pitched "tsiip".
Habitat. Tall-grass habitats with scattered low shrubs; requires relatively open grassland, and is absent if shrub component too high. Found also on edges of seasonally flooded *campo limpo* and *campo sujo* in Minas Gerais (Brazil). In Beni (Bolivia) occupies areas of tussocky grass 50–125 cm tall with scrubby mounds. In Paraguay, observed in *campo sujo* comprising pristine tussocky grasses with small areas of bare ground, scattered bushes and yata'i palms (*Butia*). To 1200 m.
Food and Feeding. No information on diet. Foraging on ground under tall grass; sometimes forages in more open areas at edge of grassland or on bare earth. Usually in pairs; during non-breeding season may form larger flocks within the grassland.
Breeding. No information. Season probably Sept–Dec.
Movements. Resident.
Status and Conservation. VULNERABLE. Uncommon to rare, and very local, and decreasing. Has suffered extensive habitat loss, and likely to be in rapid decline. Main continuing threats are overgrazing, burning of grasslands, and large-scale tree-planting. Throughout most of this species. range, suitable grasslands are being destroyed at rapid rate by intensive cattle-ranching, mechanized agriculture, afforestation, invasive grasses, excessive use of pesticides and annual burning; since 1950, alteration and destruction of *cerrado* has increased and only a small fraction of this habitat now remains. In Bolivia, burning of grassland a significant problem, often caused by uncontrolled fires. This species is protected by law in Paraguay. It occurs in Brasília and Serra da Canastra National Parks (Brazil), Mbaracayú Forest Nature Reserve and Isla Yacyreta Private Reserve (Paraguay) and Beni Biological Station (Bolivia).
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Dunning (2008), de Freitas, Chaves & dos Santos (2009), Graham *et al.* (1980), Lopes *et al.* (2010), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

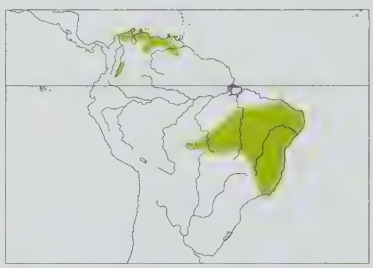
Genus *CORYPHOSPINGUS* Cabanis, 1851

243. **Pileated Finch**

Coryphospingus pileatus

French: Araguira gris **German**: Graukronfink **Spanish**: Soldadito Capirotado
Other common names: Grey Pileated-finch

Taxonomy. *Fringilla pileata* Wied, 1821, Barra da Vareda, Rio Pardo, southern Bahia, Brazil.
Molecular data strongly indicate that genus belongs in tanager family (Thraupidae) and is sister to a group containing *Lanio*, Fulvous-crested Tanager (*Tachyphonus surinamus*), *Trichothraupis* and *Eucometis*. Present species sometimes considered conspecific with *C. cucullatus*; hybrids between the two reported in Brazil. Three subspecies recognized.
Subspecies and Distribution.
C. p. brevicaudus Cory, 1916 – N Colombia (Santa Marta Mts) and N Venezuela from Zulia E, including Margarita I, to Sucre and S to N Bolívar.
C. p. rostratus A. H. Miller, 1947 – upper Magdalena Valley, in Colombia.
C. p. pileatus (Wied, 1821) – C & E Brazil from C Mato Grosso E to S Maranhão and Ceará, S to Goiás, E Minas Gerais and Rio de Janeiro.



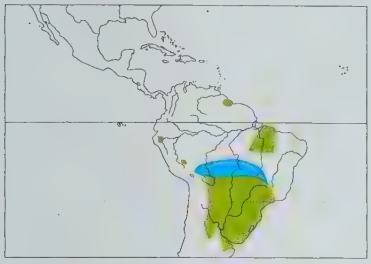
Descriptive notes. 13·5 cm; 12–18 g (Venezuela). A compact finch with relatively short tail, short crest, and longish bill with curved culmen. Male nominate race has black crown and crest (tends to be kept flat) with bold red stripe down centre of crown, face entirely grey, noticeable white crescents above and below eye; nape and upperparts entirely greyish, upperwing and tail more blackish-grey; throat white, underparts whitish, dull greyish wash on sides and flanks; iris dark; upper mandible blackish, lower mandible horn to greyish; legs dark grey. Female dull greyish-brown above, and off-white below with buff-grey flanks; lacks black and red on crown, but has whitish eye-crescents as in male. Juvenile like female but slightly more olive, and streaked below. Race *brevicaudus* has shorter tail than nominate, also paler loral area; *rostratus* similar to nominate, but has noticeably longer bill and relatively short tail. Voice. Somewhat repetitive song similar to those of some *Poospiza*, a series of spaced notes, often with repetitions of two, and frequent changes to slightly different phrase types, notes themselves loud and rich whistles with muffled or ringing quality, not sweet whistles, e.g. "phwee chup chup twee chup juup chewe phwee chup chup..."; one song type repeats same note with slightly different accent every few notes, "chwee chwee chwee chw chwee chwee chwee..."; sometimes also a simple repetition of two note types which alternate, "chwee teew chwee teew chwee teew...". Call a sharp "twiip!" or slightly lower-pitched "phfft".
Habitat. Low arid woodlands, usually open woodlands, and dry scrub; also shrubby borders of moister forest, grassy roadsides, second growth, and hedges; sea-level to 1000 m.
Food and Feeding. No details of diet. Forages on ground, usually in dry areas adjacent to shrubbery; may forage also within shrubs and low vegetation. Forms small flocks, primarily in non-breeding season.
Breeding. Breeds during wet season, Apr/May–Oct/Nov, in N Venezuela, precise timing dependent on onset of rainy season (also, years of high rainfall produce higher numbers of juveniles than dry years); moult begins in earnest in Aug, suggesting that breeding activity largely completed by then. Full-grown juveniles in Jan, suggesting breeding Oct–Dec, in upper Magdalena Valley (Colombia). No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Common or fairly common throughout most of range. Has rather large range, and what appears to be a stable population.
Bibliography. Armani (1985), Burns & Racicot (2009), Cornet (1999), Hilty & Brown (1986), Klicka *et al.* (2007), McCarthy (2006), Miller (1947), Restall *et al.* (2006), Ridgely & Tudor (1989), Tarroux & McNeil (2003).

244. **Red-crested Finch**

Coryphospingus cucullatus

French: Araguira rougeâtre **German**: Haubenkronfink **Spanish**: Soldadito Crestirrojo
Other common names: Red-pileated Finch

Taxonomy. *Fringilla cucullata* Statius Müller, 1776, Cayenne, French Guiana.
Molecular data strongly indicate that genus belongs in tanager family (Thraupidae) and is sister to a group containing *Lanio*, Fulvous-crested Tanager (*Tachyphonus surinamus*), *Trichothraupis* and *Eucometis*. Present species sometimes considered conspecific with *C. pileatus*; hybrids between the two reported in Brazil. Race *fargoi* slightly more greyish in S of range than in N, and S population described as a separate race, *araguira*, but differences considered trivial. Three subspecies recognized.
Subspecies and Distribution.
C. c. cucullatus (Statius Müller, 1776) – Guyana, Suriname and NE Brazil (E Pará).
C. c. fargoi Brodkorb, 1938 – extreme S Ecuador (S Zamora-Chinchipe), NW & SE Peru (upper Marañón Valley and Urubamba Valley), Bolivia (La Paz, S Beni, Cochabamba, Santa Cruz, Chuquisaca and Tarija), W Paraguay and N Argentina (S to La Rioja, San Luis, La Pampa and N Buenos Aires).
C. c. rubescens (Swainson, 1825) – C & S Brazil (S from S Mato Grosso, S Goiás, W Minas Gerais and São Paulo), E Paraguay, NE Argentina E of R Paraná, and Uruguay.
Also present (race unclear) during austral winter, from N Bolivia E to EC Brazil (NW Minas Gerais).



Descriptive notes. 13·5 cm; 11–18 g. A compact finch with relatively short tail, short crest tending to be held flattened, and longish bill with curved culmen. Male nominate race has black crown and crest with bold red stripe down crown centre, dull greyish face with noticeable white crescents above and below eye, often browner on ear-coverts; nape and upperparts entirely warm brown, upperwing and tail more blackish than upperparts; throat red, becoming bolder red on breast, and duller reddish throughout rest of underparts, except for greyish-washed reddish flanks; iris dark brown; upper mandible blackish, lower mandible paler horn to pale bluish-grey; legs brownish. Female lacks black and red on crown, is dull brown above, paler below, with reddish wash strongest on breast and rump; has whitish eye-crescents like those of male. Juvenile is like female, but slightly more olive in colour and streaked below. Race *rubescens* is like nominate, but has smaller and more slender bill, and underparts richer red; *fargoi* is duller red on underparts, also has duller brown (less reddish) upperparts than nominate. VOICE. Somewhat repetitive song similar to that of some *Poospiza*, a series of two alternating loud and rich whistles, cleanly delivered, though with ringing quality, not sweet whistles, e.g. "chwee teew chwee teew chwee teew..."; some versions slightly faster, but seemingly nearly always two alternating notes, and generally a simpler song than that of *C. pileatus*. Call a sharp "twiip!" or slightly lower-pitched "phfft".
Habitat. Dry shrubby areas, sometimes adjacent to riparian sites, taller tropical forest, grassland and even edges of villages or towns, and parks and gardens; also savannas, agricultural areas, second growth, and *chaco* woodland and *espinal* (thorny woodland) thickets. Typically in younger second growth and disturbed sites. Sea-level mainly to 1400 m; to 3100 m in dry valleys of Bolivia.
Food and Feeding. No information on diet. Forages on ground, both in open dirt areas and beneath shrubs and other vegetation; may also forage in low shrubs. Usually observed singly or in pairs; may form small flocks in non-breeding season.
Breeding. Season mainly Nov–Feb. Nest cup-shaped, made of small twigs, fine vine stems and incorporating dry grasses, lichens, leaf veins and spider webs, lining includes leaves and fine dry fibres, placed 1·5–1·8 m above ground in well-hidden area with dense foliage, such as in vine thicket, along trunk of tree where many branchlets attached, or in trifurcation of branch in shrub. Clutch 2–3 eggs, white and unmarked. No other information.
Movements. Mostly resident. During austral winter, some S birds apparently move N, extending somewhat N of breeding range in Bolivia and C Brazil.
Status and Conservation. Not globally threatened. Common to abundant in heart of range; uncommon in Ecuador, rare in Suriname. Historical records from French Guiana, but no recent reports from that country. Has large range, and population shows no signs of marked declines. This species may benefit greatly from areas of forest giving way to second growth, and perhaps even from agricultural expansion in native grasslands.
Bibliography. Alessio *et al.* (2005), Armani (1985), Bosche (1989), Burns & Racicot (2009), Canevari *et al.* (1991), Dorn (1980a), Hennessey *et al.* (2003), Klicka *et al.* (2007), McCarthy (2006), de la Peña (1980, 1987), Restall *et al.* (2006), Ridgely & Tudor (1989), Stahl (1999), Storer (1989b), Wetmore (1926).

Genus *RHODOSPINGUS* Sharpe, 1888

245. Crimson-breasted Finch

Rhodospingus cruentus

French: Rhodospingue ponceau **German**: Purpurkronfink **Spanish**: Soldadito Carmesí
Other common names: Crimson Finch, Crimson Finch-tanager

Taxonomy. *Tiaris cruentus* Lesson, 1844, Guayaquil, Ecuador.
Molecular data strongly indicate that genus belongs in tanager family (Thraupidae), and is sister to a group containing many members of *Tachyphonus*. Monotypic.
Distribution. W Ecuador (W Pichincha and Esmeraldas) S along coastal slope and plain to NW Peru (S to Piura and S Lambayeque).



Descriptive notes. 11 cm; average 11·6 g. A small finch with short-tailed appearance, and long and slender bill with rather straight culmen and gonys. Male has blackish head, including nape and side of face down to just above malar area, bright red coronal patch in middle of crown (can be raised like a short crest); upperparts, including upperwing and tail, blackish; throat red, this colour increasing in intensity to crimson-red on breast, and then less intense red on lower breast and belly; vent and undertail-coverts often whitish with pink wash, sometimes with dark centres on undertail-coverts; in fresh plumage has olive feather tips on back, nape and sometimes face; iris dark brown; upper mandible blackish, often blue grey cutting edges, lower mandible blue-grey; legs dark greyish. Female is very different from male, extremely dull in colour and unmarked, suggesting a female *Sporophila* but with longer and straighter bill; essentially pale brownish above, including head, upperparts, wings and tail, and buffy or pale yellowish on supercilium, face and underparts, with brownish-washed flanks. Immature is like female, young male often with orange wash on breast. VOICE. Song a buzzy "tsee-tzztzz" or "chwzzzzz" repeated at intervals of 1·5–2 seconds; can be reminiscent in quality of song of *Volatinia jacarina*. Call a sharp "tchip" or a descending "tseer".
Habitat. Understorey of dry forest and desert scrub, also forest borders. Dry scrub and low woodland adjacent to tall-grass areas; also agricultural areas with grass patches and shrubby thickets. Sea-level to 750 m.
Food and Feeding. Seeds; probably also small arthropods, at least during breeding period. Forages both on ground and while clinging to grass stems to extract seeds; more arboreal during breeding season, and more terrestrial during non-breeding season. Singly and in pairs; outside breeding season forages in flocks, often with *Sporophila* seedeaters.
Breeding. Recorded Jan–Apr, during rainy season. Nest typically placed in bush or shrub, towards outer end of branch, often in forks and in midst of bunch of leaves, average 140 cm (49–400) above ground level; nest built by both sexes, an untidy mass of dead grass and other plant stems, lined with finer plant matter, diameter c. 5 cm, depth c. 4·5 cm. Clutch 2–4 eggs (mean 3·21); incubation by female, 10–12 days; nestling period 7–9 days. Hatching success 67–86%, fledging success 55–73%.
Movements. Some evidence for local movements; presence and/or numbers in a given area change depending on rainfall, and time of year. Flocks with seedeaters and other finches in dry season, moving between good foraging areas.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Fairly common to locally common through much of its range. Although this species has only a moderately sized range, its global population is seemingly large, with no evidence of major declines. Forest clearance may be creating additional habitat for it.
Bibliography. Armani (1985), Burns & Racicot (2009), Marchant (1958, 1960), Muller (1967), Ortiz-von Halle (1990), Paynter (1971), Restall *et al.* (2006), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schild (1998), Schulenberg *et al.* (2007).

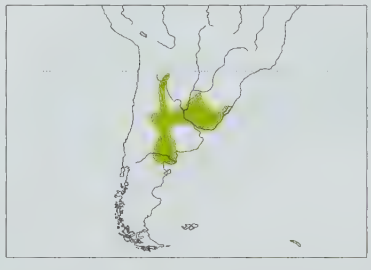
Genus *GUBERNATRIX* Lesson, 1837

246. Yellow Cardinal

Gubernatrix cristata

French: Commandeur huppé **German**: Grünkardinal **Spanish**: Gobernador Crestado

Taxonomy. *Coccothraustes cristata* Vieillot, 1817, Corrientes, Argentina.
Genus has sometimes been placed with the cardinals (Cardinalidae), but morphological data suggest that this is unwarranted; considered probably part of the tanager group (Thraupidae), but precise taxonomic position and closest relatives remain to be determined; molecular studies required. This species has hybridized with *Diuca diuca* in the wild, perhaps suggesting that it belongs in the tanager clade with *Diuca*, *Paroaria* and others. Monotypic.
Distribution. N & C Argentina (Salta, S Formosa and Corrientes S to E La Pampa and N Río Negro), extreme SE Brazil (S & W Rio Grande do Sul) and Uruguay.



Descriptive notes. 20 cm; 46–50·8 g. A well-proportioned but hefty-bodied finch with pointed crest, and often relatively small-looking bill curved on culmen, giving it a somewhat rounded appearance. Male has black crest beginning on central crown, a bold and wide yellow supercilium contrasting with black lores mask and eyestripe, and noticeable yellow crescent below eye; face otherwise greenish-yellow, with bright yellow submoustachial and malar area bordering black throat; upperparts greenish with narrow darker central streaks, tail feathers blackish with bold yellowish edging, outer rectrices mostly yellow; upperwing blackish, median upperwing-coverts tipped yellow (creating broad yellowish upper wingbar), greater coverts with yellowish edges and tips (creating yellowish wingpanel), flight-feathers heavily edged greenish (giving them an overall greenish look), and tertials edged bright yellow; black of throat ends squarely on upper breast; rest of underparts yellow, with greenish wash on breast and flanks, undertail-coverts bright yellow and usually unmarked; iris dark brown; bill black, grey base of lower mandible; legs black. Female is similar in pattern to male, but differs in coloration: supercilium whitish, turning yellowish behind eye, cheek greyish, lower eye-crescent white, moustachial and malar area white; has throat black (like male), but underparts dominated by olive flanks and breast, with yellow restricted to lower breast, belly, vent and undertail-coverts; upperparts duller, more olive-green, but neatly streaked, and wing edgings olive-green except for white fringes of tertials. Juvenile apparently undescribed. VOICE. Male song, often from near top of larger tree, loud, comprised of three or four syllables repeated in patterns, "wir-wit-chu wir-wit-chu twiit wit-chu tiit wit-chu tiit"; resembles that of Golden-billed Saltator (*Saltator aurantiirostris*) in strength and quality of notes, but longer and more varied. Call a low "tsip".
Habitat. Needs old growth-patches of algarrobo (*Prosopis*) forest, or other larger tree species in *espinal* forest (thorny woodlands). Absent from areas that are too degraded or young, and absent from strictly *pampas* grassland habitats. Sea-level to 700 m.
Food and Feeding. Seeds; possibly also small arthropods. Forages for seeds on ground. The fact that it is often found in *Prosopis* woodland suggests that it may take either insects attracted to this tree or the seeds; fieldwork needed to assess how closely this species is tied to *Prosopis*. Forages in pairs and in family groups.
Breeding. Season Oct–Jan. Nest a large cup-shaped structure made from small twigs and dry grass, lined with moss and fibres, placed 2·5–3 m above ground on branch of small tree or shrub. Clutch 2–3 eggs, pale blue-green with blackish spots, blotches and scrawls throughout entire surface. No other information.
Movements. Resident.
Status and Conservation. ENDANGERED. CITES II. Rare and local. Estimated global population 1500–3000 individuals in 2007. Has declined rapidly, mainly because of trapping for the cagebird market combined with extensive habitat loss. In Uruguay, where previously a common species throughout, now estimated that only 300 individuals remain, concentrated in NW (R Uruguay basin); in Argentina, where formerly widespread and common, populations in NW (e.g. in Salta) appear to have disappeared entirely; in SE Brazil, where always far fewer records, the species may well be extinct. Remaining populations now small and fragmented. Current stronghold, with healthiest populations, probably in SC Argentina. Some of habitat loss suffered by this species is due to wood extraction for furniture-making, as well as charcoal; afforestation programmes have involved the planting of exotic eucalypts (*Eucalyptus*), and such plantations are not accepted as a habitat by this species. In Argentina, occurs in Sierra de las Quijadas and Lihué Calel National Parks and Chancaní Provincial Reserve; recorded also in El Palmar National Park, but possibly now extinct there. Captive-breeding programmes are being established In Uruguay and S Brazil, largely with birds seized from poachers.
Bibliography. Anon. (2010c), Armani (1985), Bertonatti & Guerra (1997), Butchart & Stattersfield (2004), Canevari *et al.* (1991), Dinger (2010), McCarthy (2006), Mikulaschek (1987), Naggatz (1996a, 1996b, 1997), Ortiz (2008), de la Peña (1987), Ridgely & Tudor (1989), Stattersfield & Capper (2000), Wetmore (1926).

PLATE 63


inches 2
cm 5
248
249
247
ssp *baeri*
250
ssp *xinguensis*
252
ssp *gularis*
251
ssp *cervicalis*
ssp *splendens*
♂
253
ssp *jacarina*
♀
♂
♀
♂
254
♂
♀
255
♂

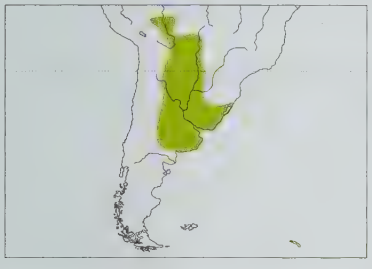
Genus *PAROARIA* Bonaparte, 1832

247. Red-crested Cardinal

Paroaria coronata

French: Paroare huppé **German**: Graukardinal **Spanish**: Cardenilla Crestada
Other common names: Brazilian Cardinal

Taxonomy. *Loxia coronata* J. F. Miller, 1776, no locality = Rio Grande do Sul, Brazil.
Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. dominicana*. Monotypic.
Distribution. E Bolivia (Santa Cruz, locally also S Beni), S & SE Brazil (SW Mato Grosso and S Rio Grande do Sul), W & C Paraguay, N Argentina (S to N Mendoza, C La Pampa and C Buenos Aires) and Uruguay. Introduced to Hawaiian Is.



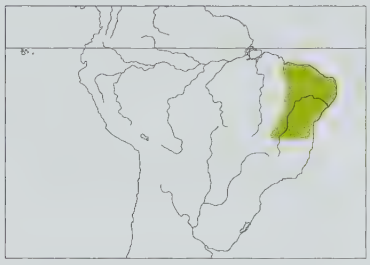
Descriptive notes. 19 cm; 29·5–44 g. A medium-sized passerine with striking red or reddish head and long erectile crest (can be raised to look shaggy, or flattened to look more pointed); bill rather thick and relatively short. Almost entire head red, including crest, ear-coverts, malar region and throat, the red extending down centrally onto mid-breast, creating red "bib"; area of white extends from breast side up to side of neck and side of nape, completely outlining lower border of red head; nape otherwise pale lead-grey, speckled with white on side, grey colour continuing onto upperparts from mantle to rump; upperwing and tail darker, more blackish-grey, feathers edged with similar grey colour to that of upperparts; below, snowy white from bottom of red bib to undertail-coverts, some grey on rear flanks; iris dark brown; bill horn-coloured to blue-grey, dark culmen and tip; legs blackish. Sexes alike. Juvenile is similar to adult, but head and crest dull orange with brownish wash, crown feathers often dark-centred, grey of upperparts washed pale brown, bill darker, with contrasting pinkish gape area. Voice. Song sweet, melodious and slowly delivered, often a repetitive series of alternating notes before other notes added in, generally sounds slow and lazy, "tchew tweet chuu tweet chuu chwiit tuup tweet chuu tweet chuu..." or "weerit, churit, weer, churit"; another song type, given at low volume, very hurried and rather complex, a speedy nasal warble mixed in with sharply frequency-modulated notes. Calls include nasal "phwiit" and "chwup".
Habitat. Varied semi-open habitats, from forest edge to scrub-forest, *chaco* woodlands, *espinal* habitats (thorny woodlands), shrubby zones, agricultural areas, parks, towns and cities, as well as thickets adjacent to marshes and swamps, lakes or rivers. In open country of the Pampas region, often a conspicuous inhabitant of introduced ornamental trees in parkland around *estancia* (farm) headquarters, or other buildings. Sea-level to 500 m.
Food and Feeding. Takes variety of foods, from seeds and berries to insects, also young shoots, and fruit fallen on ground. Forages usually on ground, also in low trees and shrubs. In pairs and small groups; in larger flocks in non-breeding period.
Breeding. Season Sept–Mar. Nest cup-shaped, made from fibres and fine stems, lined with rootlets and hair, placed 1·9–5 m from ground in branches of shrub or tree. Clutch 2–4 eggs, greenish with evenly spread brown markings, or sometimes markings more ochre or even blackish. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common to abundant; often the most common and conspicuous species in the local avifauna. Has large range and is under no immediate threat. Introduced in Hawaii, where present on the major islands; has thrived in Hawaiian lowlands and appears not to have had any negative effects on native landbirds. Commonly trapped for cagebird trade, but this apparently has not adversely influenced its populations. Widely held in captivity, and escapees frequent in and near various centres of population away from natural range, such as Santiago (Chile) and Lima (Peru); some of these may eventually establish free-living populations.
Bibliography. Armani (1985), Bancroft (1982), Canevari *et al.* (1991), Dávalos & Porzecanski (2009), Dinger (2010), Klicka *et al.* (2007), de la Peña (1987), Ridgely & Tudor (1989), Schmid (1975), Storer (1989b), Wetmore (1926), Yuen (1975).

248. Red-cowled Cardinal

Paroaria dominicana

French: Paroare dominicain **German**: Dominikanerkardinal **Spanish**: Cardenilla Dominica
Other common names: Brazilian/Dominican/Pope Cardinal

Taxonomy. *Loxia dominicana* Linnaeus, 1758, Brazil.
Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. coronata*. Monotypic.
Distribution. NE Brazil from S Maranhão, Piauí and Ceará S to E Goiás and N Minas Gerais.
Descriptive notes. 18 cm; 33·2 g. A medium-sized sturdy, thickset passerine with flat crown, rounded peak on rear crown, and somewhat pot-bellied look; bill rather thick and relatively short. Has head including ear-coverts, malar region and throat red, the red extending down centrally onto mid-breast, creating red "bib"; patch of white extends from breast side up to side of neck and side of nape, surrounding lower border of red; nape otherwise blackish, speckled with white at side; mantle and back black with greyish streaking, scapulars contrastingly grey, lower back, rump and uppertail-coverts grey, tail dark grey; upperwing black (again contrasting with grey scapulars), primaries, secondaries and tertials crisply edged white; below, snowy white from bottom edge of bib to undertail-coverts, some grey wash on rear flanks; iris orange-brown; upper mandible blackish; lower mandible horn-coloured; legs greyish. Sexes alike. Juvenile is similar to adult, but head dull orange with brownish wash. Voice. Song sweet, melodious and somewhat repetitive, interspersed with distinctive set of paired notes, "weeet-chup" (first note ascending, second short and descending), e.g. "teew chweet weet-chup chweet teew weet-chup...", generally similar to song of *P. cristata* but more quickly delivered, not lazy-sounding; another song type a very hurried and rather complex warble. Call an inflected "chWUP!".



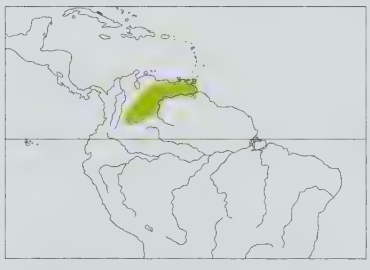
Habitat. Light *caatinga* woodland and similarly open dry scrubby areas of dry forest; adapts well, can be found also in villages, parks and edge of agricultural areas. Sea-level to 1200 m.
Food and Feeding. Vegetable and insect items. Forages on ground; in pairs and in family groups.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Previously considered Near-threatened, but appears to be more numerous than was realized. Fairly common to common. Extended its range during 1970s, colonizing S Bahia and parts of Minas Gerais. Has fairly large range, and exhibits no significant negative trends in population.
Bibliography. Armani (1985), Dávalos & Porzecanski (2009), Klicka *et al.* (2007), Oren (1982), Restall (1974), Ridgely & Tudor (1989), Sick (1993), da Silva & Oren (1990).

249. Masked Cardinal

Paroaria nigrogenis

French: Paroare masqué **German**: Maskenkardinal **Spanish**: Cardenilla Enmascarada
Other common names: Black-eared Cardinal

Taxonomy. *Nemosia nigro-genis* Lafresnaye, 1846, mouth of the Orinoco, Venezuela.
Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. baeri*, *P. gularis* and *P. capitata* (all four have sometimes been placed in a separate genus, *Coccopsis*). Previously considered conspecific with *P. gularis*, but appears not to be genetically close enough to it to warrant such treatment. Monotypic.
Distribution. E Colombia (Arauca S to N Meta) and N Venezuela in *llanos* along R Orinoco basin (Cojedes S to Barinas and W Apure, E to Delta Amacuro and N Bolívar); also Trinidad.



Descriptive notes. 16·5 cm; 23·6 g. A medium-sized passerine, relatively slim and with flat crown, short, rounded occipital crest; bill longer than it is deep, and with culmen gently curved. Has forehead and crown red, lores and ear-coverts black, malar region and throat red, red of throat continuing to upper breast as a red "bib"; area of white extending from breast side up to side of neck and side of nape, completely surrounding lower border of red; nape and upperparts, including upperwing and tail, entirely blackish; below, snowy white from bottom of red bib to undertail-coverts, white flanks; iris intense orange; upper mandible blackish, lower mandible horn-coloured; legs blackish. Sexes alike. Juvenile is similar to adult, but head dull orange with brownish wash. Voice. Song described as series of whistled phrases, "ptchiu wheet pt pt chiu chiieuw wheet chiu chiieer wheet pt pt chiu". Call a sharp "tchep" or soft "chuep".
Habitat. Various open and moist habitats, including wet savanna, and edges of gallery forest near water; also in mangroves in Trinidad. Sea-level to 300 m.
Food and Feeding. Diet appears to be a mix of seeds, vegetable matter, fruit and insects; will also take handouts and bread crumbs. Forages usually on ground, sometimes in areas with much human presence, e.g. parks, car parks, boat mooring areas and the like; also in shrubs. Generally in pairs; in flocks at abundant food sources.
Breeding. Season Jun–Nov in Venezuela (Guárico) and breeds in Sept in Trinidad. Nest a shallow cup made from fine stems and bark, lined with softer material, decorated externally with spider webs, placed in fork of branch c. 3 m above water's surface in swamp. Clutch 2 eggs, pale cream with olive-brown markings, these most heavily concentrated around wide end; no information on incubation and nestling periods. Known to be parasitized by Shiny Cowbird (*Molothrus bonariensis*).
Movements. Appears to be sedentary.
Status and Conservation. Not globally threatened. Fairly common to common, particularly in *llanos* of Venezuela; common in larger swamps in Trinidad. Has large range, moderate abundance within this, and no evidence of marked population declines. Popular as a cagebird. Individuals found in unusual places, such as in city centres and the like, are probably escapees from captivity.
Bibliography. Armani (1985), Dávalos & Porzecanski (2009), ffrench (1991), Hilty (2003), Klicka *et al.* (2007), Restall *et al.* (2006).

250. Crimson-fronted Cardinal

Paroaria baeri

French: Paroare de Baer **German**: Blutstirnkardinal **Spanish**: Cardenilla Frentirroja
Other common names: Xingu Cardinal (*xinguensis*)

Taxonomy. *Paroaria baeri* Hellmayr, 1907, River Araguaya, Goiás, Brazil.
Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two

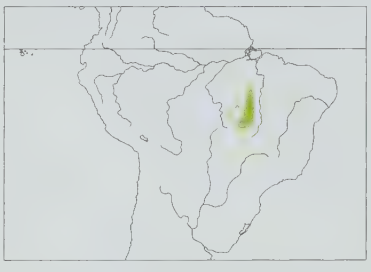
On following pages: 251. Red-capped Cardinal (*Paroaria gularis*); 252. Yellow-billed Cardinal (*Paroaria capitata*); 253. Blue-black Grassquit (*Volatinia jacarina*); 254. Buffy-fronted Seedeater (*Sporophila frontalis*); 255. Temminck's Seedeater (*Sporophila falcirostris*).

genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. nigrogenis*, *P. gularis* and *P. capitata* (all four have sometimes been placed in a separate genus, *Coccopsis*). Individual with plumage intermediate between this species and *P. gularis* photographed in Barreira do Campo, in Pará, suggesting rare instance of naturally occurring hybridization; this putative hybrid resembles *P. nigrogenis*. Has been proposed that race *xinguensis* merits elevation to full species rank, but available evidence thus far inconclusive; further research needed. Two subspecies recognized.

Subspecies and Distribution.

P. b. xinguensis Sick, 1950 – upper R Xingu (S Pará and N Mato Grosso), in EC Brazil.

P. b. baeri Hellmayr, 1907 – NE Mato Grosso, W Tocantins and W Goiás, in EC Brazil.



Descriptive notes. 16·5 cm. A medium-sized passerine, relatively slim and with rounded crown; bill longer than it is deep, and gentle curve of culmen and gonys. Nominate race has largely black head, contrasting crimson-red forehead and forecrown, with throat and submoustachial region also crimson-red, surrounded by black down onto breast; neck and nape entirely blackish; upperparts, including upperwing and tail, blackish; below, snowy white from lower edge of bib to undertail-coverts, flanks also white; iris reddish-orange; upper mandible blackish, lower mandible whitish-horn with small dark tip; legs blackish. Sexes alike. Juvenile is similar to adult, but red areas of head dull orange with brownish wash. Race *xinguensis* is similar to nominate, but throat black, isolating red submoustachial area. Voice. Song rather vigorous, includes a series of descending, harsh whistles, "chewk-chik-chewk-chewk". Calls include harsh "tshrik" and nasal "phht".

Habitat. Riverside forests; to 400 m.

Food and Feeding. Little known. Forages low in shrubs, near the water; may perch on floating vegetation while foraging.

Breeding. No information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Fairly common. Has small range, within which seems to be moderately common, and no evidence of marked population declines.

Bibliography. Armani (1985), Dávalos & Porzecanski (2009), Dornas (2008), Klicka *et al.* (2007), Ridgely & Tudor (1989), Sick (1993).

251. **Red-capped Cardinal**

Paroaria gularis

French: Paroare rougecap **German**: Schwarzkehlkardinal **Spanish**: Cardenilla Capirroja
Other common names: Bolivian Cardinal (*cervicalis*)

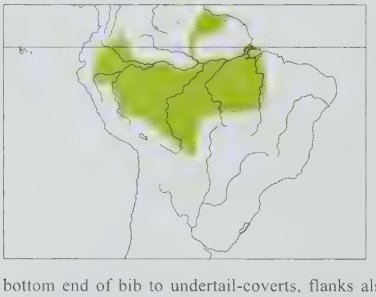
Taxonomy. *Tanagra gularis* Linnaeus, 1766, Cayenne, French Guiana.

Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. nigrogenis*, *P. baeri* and *P. capitata* (all four have sometimes been placed in a separate genus, *Coccopsis*); appears to be closest to last of those. Previously considered conspecific with *P. nigrogenis*, but appears not to be genetically close enough to it to warrant such treatment. Has been proposed that race *cervicalis* be afforded full species rank, but more work needed to determine what degree of reproductive isolation, if any, exists; further, specimens from S part of range of nominate have reduced black around eyes, suggesting that variation possibly clinal. Two subspecies recognized.

Subspecies and Distribution.

P. g. gularis (Linnaeus, 1766) – E Colombia (S Meta S to Amazonas), E Ecuador and E Peru, S Venezuela (W Amazonas and S Bolívar), the Guianas, and Amazonian lowlands of NC Brazil (including R Negro and mouth of R Amazon).

P. g. cervicalis P. L. Sclater, 1862 – NE Bolivia (Pando, E La Paz, Beni, E Cochabamba and Santa Cruz) and adjacent Brazil (W Mato Grosso).



Descriptive notes. 16·5 cm; 20·8–32 g. A medium-sized passerine, relatively slim and with flat crown and rounded peak on rear crown, in essence a short "mane" (often not visible); bill longer than it is deep, and with gentle curve on culmen and gonys. Nominate race has most of head red, black lores and postocular area, chin and moustachial and malar region also red, throat black, black continuing to upper breast; band of white extending from breast side up to side of neck and side of nape, outlining red rear of head; lower nape and entire upperparts, including upperwings and tail, blackish; below, snowy white from bottom end of bib to undertail-coverts, flanks also white; iris reddish-orange; upper mandible blackish, lower mandible yellowish with small dark tip; legs blackish. Sexes alike. Juvenile is similar to adult, but head dull orange with brownish wash. Race *cervicalis* is similar to nominate, but lacks black around eye. Voice. Song a hesitating, repetitive series of warbles, "cheeber wee? cheeber wee? cheeber", described also as a sweet whistled "suwee chu". Calls include wheezy "rhee?" and "chew", as well as a chatter while in flight.

Habitat. Shrubbery and dense edge areas around lakes, ponds, *cochas* (artificial lagoons), and slow-moving rivers, including black-water rivers; also *várzea* (seasonally flooded) grasslands. Sea-level to 400 m.

Food and Feeding. Vegetable items ranging from seeds to berries, also arthropods. Forages mostly on ground; sometimes while perched on floating vegetation on ponds and lakes. Found in pairs and family groups.

Breeding. Nest constructed from dry grasses and twigs, with softer lining, placed in fork of branch in isolated bush or small tree overhanging water. Clutch commonly 2 eggs, dirty white spotted evenly with sepia and dark brown. In Amazonian watersheds, nests may be lost if water levels rise significantly. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Fairly common to common, and often conspicuous. Said to be very common in interior of Guyana, but rare in Suriname; possibly only a vagrant in French Guiana. Has large range and large population size; appears not to be suffering any major decline.

Bibliography. Armani (1985), Buzzetti & Silva (2005), Dávalos & Porzecanski (2009), Eason (1992), Eason & Stamps (1993, 2001), Ingels *et al.* (2003), Klicka *et al.* (2007), Restall *et al.* (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Sick (1993).

252. **Yellow-billed Cardinal**

Paroaria capitata

French: Paroare à bec jaune **German**: Mantelkardinal **Spanish**: Cardenilla Piquigualda

Taxonomy. *Tachyphonus capitatus* d'Orbigny and Lafresnaye, 1837, Corrientes, Argentina.

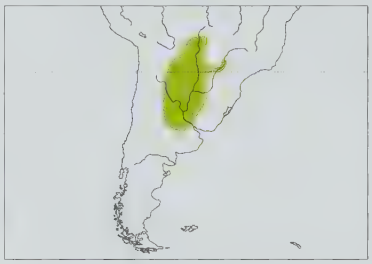
Recent molecular-genetic research indicates that genus belongs in the tanager family (Thraupidae), forming a clade with, among others, *Cissopis* and *Schistochlamys*; curiously, members of latter two genera are similar in some plumage features and in bill shape to some members of present genus. This species may form a superspecies with *P. nigrogenis*, *P. baeri* and *P. gularis* (all four have sometimes been placed in a separate genus, *Coccopsis*); appears to be closest to last of those. Race *fuscipes* weakly differentiated; species perhaps better treated as monotypic. Two subspecies tentatively recognized.

Subspecies and Distribution.

P. c. capitata (d'Orbigny & Lafresnaye, 1837) – S Brazil (SW Mato Grosso) and adjacent Bolivia (E Santa Cruz) S through Paraguay to N Argentina (E Salta, Formosa and Corrientes S to W Cordoba and N Buenos Aires) and extreme NW Uruguay.

P. c. fuscipes J. Bond & Meyer de Schauensee, 1939 – E Tarija, SE Bolivia.

Introduced (nominate race) in Hawaiian Is.



Descriptive notes. 16·5 cm; 17–24·5 g. A medium-sized, rather slim passerine with rounded crown and somewhat rounded tail; bill longer than it is deep, and with gently curved culmen and relatively fine and pointed tip. Nominate race has entire head, including moustachial and malar region and chin, red, throat black, black narrowing to a point on upper breast; band of white extending from breast side up to side of neck and side of nape, completely outlining red at rear of head; lower nape and entire upperparts, including upperwing and tail, blackish; below, snowy white from end of black bib to undertail-coverts, sometimes a small blackish wedge on rear flanks; iris reddish; bill bright orange-yellow; legs pinkish-orange. Sexes alike. Juvenile is similar to adult, but head dull orange with brownish wash. Race *fusciceps* barely differs from nominate, supposedly has slightly longer bill and more brownish leg colour, but these characters variable. Voice. Song a melodious repetition of 2–3 notes in set pattern, e.g. "tweew wiit-teew, tweew wiit-teew, tweew wiit-teew..."; some songs more quickly delivered, with more twangy-sounding notes. Call a nasal "pheew?".

Habitat. Marshes with shrubs or woody vegetation, flooded grasslands adjacent to shrubs or woody vegetation, and shores of lakes, ponds and rivers; found also at edge of towns, villages, and borders of moist pastures or wet meadows. Sea-level to 500 m.

Food and Feeding. Food includes vegetable matter such as seeds, young shoots and berries, also insects; highly adaptable, and in areas near humans may feed on refuse and even scraps left by people. Forages largely on ground, but also in vegetation. In pairs and family groups or in small flocks; larger flocks in non-breeding season.

Breeding. Season Sept–Mar. Nest cup-shaped, made from fibres and lined with short rootlets and hair, placed 1·4–3·6 m from ground in branches of shrub or tree. Clutch 3–4 eggs, greenish-ochre or creamy with darker ochre or greyish markings spread throughout. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Generally common. Has a substantial range, and no evidence of population declines. Introduced in Hawaii c. 1930, and present on the larger islands. Commonly kept as a cagebird and trapped for this purpose; effect of trapping appears to be minimal.

Bibliography. Almeida Accordi & Barcellos-Silveira (2005), Armani (1985), Butler (1903), Canevari *et al.* (1991), Collins (1976), Dávalos & Porzecanski (2009), Klicka *et al.* (2007), de la Peña (1987), Rattigan (1921), Ridgely & Tudor (1989), Storer (1989b), de Vasconcelos, Werneck & de la Peña (2006), Wetmore (1926).

Genus *VOLATINIA* Reichenbach, 1850

253. **Blue-black Grassquit**

Volatinia jacarina

French: Jacarini noir **German**: Jacariniammer **Spanish**: Semillero Volatinero
Other common names: Blue-black Seedeater

Taxonomy. *Tanagra jacarina* Linnaeus, 1766, north-eastern Brazil.

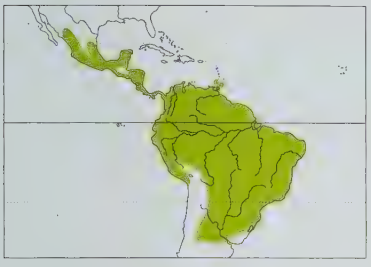
Genus sometimes subsumed in *Geospiza*, but the two appear entirely unrelated. Recent molecular-genetic data indicate that present genus belongs in the tanager family (Thraupidae) and is basal to a clade that includes *Lanio*, *Tachyphonus* and *Ramphocelus*, among others. Proposed race *atronitens* (described from Campeche, in SE Mexico) is synonymized with *splendens*. Three subspecies generally recognized.

Subspecies and Distribution.

V. j. splendens (Vieillot, 1817) – Mexico (S from S Sonora, Sinaloa, Durango, S Tamaulipas and E San Luis Potosí) and Belize S through most of Central America to Colombia, Venezuela, the Guianas and the Amazon Basin; also Trinidad, Tobago and Grenada.

V. j. peruviensis (Peale, 1848) – W Ecuador, W Peru and NW Chile.

V. j. jacarina (Linnaeus, 1766) – S & E Brazil (S from Mato Grosso and Maranhão) S to SE Peru, E Bolivia, Paraguay and N Argentina (S to Mendoza, Córdoba and N Buenos Aires).



Descriptive notes. 8·7–10·9 cm; 8–12 g. Tiny passerine, having longish conical bill with slightly and evenly curved culmen. Male nominate race has head, neck, upperparts and underparts black with dark blue iridescence (in fresh plumage, often narrow brown tips of feather); flight-feathers and tail matt black (lacking iridescence), upperwing-coverts and tertials iridescent like body; patch of white on axillaries and underwing-coverts and at bases of remiges (normally visible only during display), rest of underwing black; iris brown; upper mandible blackish, lower mandible mostly pale grey to horn-coloured; legs grey to greyish-flesh or plumbeous-horn. Female is warm brown, darker above than below, crown, mantle and back very indistinctly streaked, nape and hindneck unstreaked, rump and uppertail-coverts plain warm brown, lacking contrast with back; wings and tail brown, median and greater upperwing-coverts edged brown or buff-brown, paler tips forming two indistinct wingbars, tertials also edged buffy; outer tail feathers tipped buff when fresh; warm buff below (sometimes a cinnamon wash on breast), breast with loose streaks forming distinct streaked breastband that continues to flanks, contrasting with unstreaked throat and belly. Juvenile resembles female, but with darker wings and tail, and coarser and more extensive streaking on underparts; through first winter young male gains blackish feathers in patchy manner throughout body and head, creating patchy calico pattern of streaky brown and black, which is distinctive. Race *splendens* has reduced or little white on axillaries; *peruviensis* is similar to previous, but has more white on axillaries, flight-feathers brownish (instead of blackish), also retains brown immature male plumage for longer time than other races. Voice. Song an emphatic metallic "eee-slick", or "bzeé-eep", or buzzy "b-zeer", often given during flight display just before alighting.
Habitat. Shrubby weedy fields and open thickets, field edges, grassy fields and roadsides, in lowlands; less common in foothills. Sea-level to 2600 m, perhaps even higher in El Salvador.
Food and Feeding. Diet mostly seeds, especially of grasses (in genera *Paspalum* and *Panicum*); also a few insects and berries, and *Cecropia* protein corpuscles. Forages on ground; also picks seeds from grass-heads. In pairs during breeding; at other times in flocks, sometimes large ones, and often associated with other seed-eaters.
Breeding. Season Apr–Oct in whole range, also Nov in NC Venezuela; late May or early Jun to late Aug in El Salvador; sometimes two or three broods raised in a year. Monogamous; extra-pair copulations common. Solitary, but nests often close together and territories small. During display, male "jumps" from perch, flapping wings six times or more, exposing white in underwing, and vocalizes just before landing; may jump several times in a minute. Nest built by both sexes, a small, thin-walled cup of fibres and grasses, lined with finer rootlets and spider webs, placed within 1·2 m of ground in grass of low bush. Clutch 3 eggs, sometimes 2, bluish-white with brownish or purplish spots, these concentrated at larger end; no information on incubation period; chicks fed by both parents, nestling period c. 9 days.
Movements. Apparently sedentary; may move to lower areas from high elevations.
Status and Conservation. Not globally threatened. Generally common to abundant. Often very common, breeding in high densities, at optimum sites. Does well at edges of fields in agricultural areas.
Bibliography. Aguilar *et al.* (2008), Alderton (1963), Almeida & Macedo (2001), Barnard (1956), Carvalho, C.B.V. & Macedo (2002), Carvalho, C.B.V. *et al.* (2006, 2007), de Carvalho, C.T. (1957a), Dias *et al.* (2009), Doucet (2002), Dunning (1993b), Fandiño-Mariño & Vielliard (2004), Grant, Grant & Petren (2000b), Howell & Webb (1995), Klicka *et al.* (2007), Maia & Macedo (2011), Marcondes-Machado (1988a), Miller *et al.* (1957), Murray (1982), Raffaele *et al.* (1998), Ridgely & Tudor (1989), Ridgway (1901), Russell (1964), Santos *et al.* (2009), Selander & Giller (1959), Stiles & Skutch (1989), Storer (1989b), Weathers (1986), Webber (1985), Wetmore *et al.* (1984), Wilczynski *et al.* (1989).

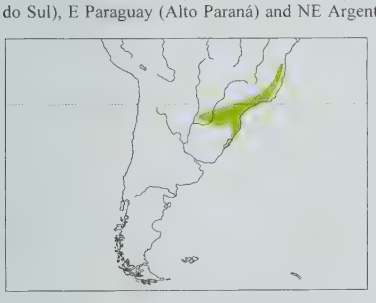
Genus *SPOROPHILA* Cabanis, 1844

254. Buffy-fronted Seedeater

Sporophila frontalis

French: Sporophile à front blanc **German**: Riesenpfäffchen **Spanish**: Semillero Frentiblanco
Other common names: Buffy-throated Seedeater

Taxonomy. *Callirhynchus frontalis* J. Verreaux, 1869, Cayenne; error = Rio de Janeiro, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Monotypic.
Distribution. SE Brazil (from also S Bahia, Espírito Santo and SE Minas Gerais S to N Rio Grande do Sul), E Paraguay (Alto Paraná) and NE Argentina (Misiones).



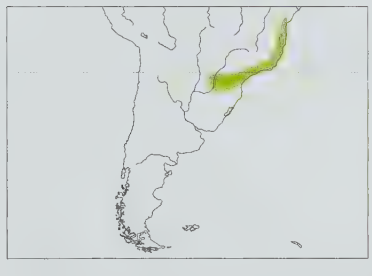
Descriptive notes. 12·5 cm; 19·8–21 g. Large seedeater, the largest of genus, with short, deep and strongly rounded bill. Male has head greyish, contrasting creamy and flaring eyebrow behind eye, sometimes a large creamy supraloral patch (supraloral patches do not meet on forehead); upperparts, including upperwing and tail, olive; median and greater upperwing-coverts tipped buffish (forming well-defined bold wingbars), outer primaries with buffish bases (buff "handkerchief" on folded wing); throat and submoustachial area white, contrasting distinctly with darker grey malar stripe and side of face; olive breastband, olive continuing to flanks, otherwise underparts whitish, becoming buffy on undertail-coverts; iris dark; bill orange to dull horn-coloured, often duskier on culmen; legs dull flesh-coloured to blackish. Female lacks grey head and creamy forehead and supercilium of male, is olive throughout, with contrasting buffy-olive wingbars; more evenly pale olive below, lacking white throat of male. Immature male is similar to female, but with whiter throat, indistinct pale postocular supercilium, wingbars brighter buff; some males said never to acquire "normal" adult plumage, these dull-coloured males referred to as having "taquara" plumage. Voice. Song explosive and far-carrying, unmusical and grating, "jeje jet" or "cheh-cheh-chew!"; one less repetitive version starts with a short burst and ends with a thin high-pitched note, "tchp-chiita-tziiip". Female, too, apparently sings (recorded in captivity). Call a sharp "tchew!", repeated at intervals.
Habitat. Lower growth of humid forest, as well as forest edge and shrubby and overgrown clearings adjacent to forest; requires presence of bamboo (*Guadua* and *Chusquea*). At 100–1500 m.
Food and Feeding. Feeds on various grass seeds, especially of bamboo; when seeding bamboo not available, may take larger insects (as suggested by this seedeater's well-developed rictal bristles). Particularly adapted to feeding on bamboo, often of larger-seeded *Guadua*; larger bill of this species suggests overall preference for this genus over *Chusquea*, but will take seeds of latter. In Brazil, commonly feeds on *Merostachy* bamboo, and in Intervales State Park was very abundant while *Merostachys neesii* seeding. Arboreal; forages above ground or while perched on vegetation. In Brazil, may gather in groups of several hundred in Serra do Órgãos when bamboo in mast; in Intervales State Park has been observed to forage with *Haplospiza unicolor* in mixed-species flocks, searching for bamboo seeds towards end of a masting event.
Breeding. Breeding thus far recorded only during bamboo masting events, specifically those involving *Guadua* species. No other information.
Movements. Nomadic in search of seeding bamboo, but remains in general area of distribution throughout year.
Status and Conservation. VULNERABLE. Uncommon to rare, and everywhere irregular. Global population estimated to be in range 2500–9999 individuals, and likely to be declining. Very patchily distributed. In Brazil, most records from Rio de Janeiro, and relatively few in rest of species' range; several recent records in Bahia, including many observed in 2006 in bamboo thicket near Una Biological Reserve; rare in rest of Brazilian range, and no confirmed records from Rio Grande do Sul since 19th century. Only one record from Paraguay, at turn of 19th–20th century; in Argentina, single records from Iguazú in 1978 and Obraje Esmeralda in 1993. Formerly common locally in Brazil, and flocks of sometimes thousands of individuals (perhaps representing high percentage of global population) reported at several localities between 1880s and early 1980s. Since end of 19th century has undergone rapid decline as a result of deforestation, this further exacerbated by the species' clear dependence on bamboo; in addition, trapping for the cagebird trade has had a significant impact on its numbers. Protected under Brazilian law, and occurs regularly in Tijuca, Serra dos Órgãos and Itatiaia National Parks, Serra do Mar, Desengano and Ilha do Cardoso State Parks, and Ubatuba Experimental Station; in Argentina, has occurred in Esmeralda Provincial Park. Main threat is the continuing and rapid clearance of Atlantic Forest, which has resulted in intervals between major bamboo flowerings and this species' breeding attempts becoming longer; its nomadic habits would suggest that existing reserves do not afford adequate protection. Also, trapping for the pet trade is a serious problem; at times, lots of 100–200 individuals of this seedeater have been on sale in Rio de Janeiro.
Bibliography. Anon. (2010c), Areta *et al.* (2009), Armani (1985), Butchart & Stattersfield (2004), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Partridge (1964), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000), de Vasconcelos (2002).

255. Temminck's Seedeater

Sporophila falcirostris

French: Sporophile de Temminck **German**: Falzschnabelpfäffchen **Spanish**: Semillero Picudo

Taxonomy. *Pyrrhula falcirostris* Temminck, 1820, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Monotypic.
Distribution. Extreme E Paraguay and NE Argentina (Misiones) and SE Brazil (from S Bahia S on coastal slope to São Paulo and Paraná.



Descriptive notes. 11 cm. Typical seedeater with distinctive bill shape, having narrow and angular upper mandible bending over lower mandible that is at least twice as wide as upper one, with marked bend along cutting edge. Male is almost entirely grey, with white bases of primaries (forming patch on folded wing), and paler belly becoming nearly whitish on vent; iris dark; bill yellow, some males (possibly non-breeding) have duller yellow with dark upper mandible; legs dull brownish to dark grey. Female is dull and nondescript olive-brown above, paler below, lacking any distinctive features; some have marked two-tone appearance on underparts, with belly and undertail-coverts rusty in coloration; bill is horn-coloured above, with yellower mandible. Immature male is like female, some retaining brown plumage, becoming territorial and acquiring bright yellow bill like that of adult male; in captivity, young males keep female-like plumage for many years before becoming grey, and possible that males remain in this plumage until a bamboo masting episode, at which time increased hormonal flow brings on breeding plumage (further study required). Voice. Song can be melodious, but ends with dominating high buzzy trill with electrical tone of a cicada (Cicadidae) stridulation, "ztztztztzt-zt-tzi" or "tsi, si, si, si...tsirrrrrr"; may begin with trill and end with staccato high-pitched notes, "tststststststst ti ti"; some songs slower and more sibilant. Calls include high-pitched descending "tziiip", softer "tslit" and "eet", and disyllabic "ee-eet".
Habitat. Secondary woodland and edge of forests where an abundance of bamboo in understorey; bamboo specialist (*Guadua* and *Chusquea*), but will also accept overgrown edge habitats with giant sedge (*Hypolytrum*). Sea-level to 1200 m.
Food and Feeding. Diet mostly bamboo seeds, sometimes seeds of giant sedge; occasionally insects. Prefers bamboo species in genus *Guadua*, but will take *Chusquea* seeds; appears not to feed on *Merostachys* or *Chusquea tenella*. In NE Argentina up to three species of bamboo used, but seeding occurs en masse and is ephemeral. Will forage also on giant sedge (*Hypolytrum*), possibly as a back-up food supply when bamboo not widely available. Relatively arboreal, perching on vegetation while feeding, rather than foraging on ground; particularly adapted to feeding on seeding bamboo, and usually perches on bamboo while foraging. Also sallies for insects at times. Usually in mobile flocks.
Breeding. Nest found in mid-Aug in Argentina (Iguazú), and birds singing and on territory in Jul in E Paraguay. One nest, built by female, was a cup-shaped structure made from moss, placed 5 m up

in ñandipá tree (*Sorocea ilicifolia*) not too distant from a waterfall; other nests found had external diameter c. 4 cm, built in tree or in sapling. No other information.
Movements. Nomadic, moves around to find seeding bamboo and then concentrates in areas where it is occurring; can then disappear for years from those sites while no bamboo seeding there.
Status and Conservation. VULNERABLE. Rare, sometimes uncommon. Generally rarer than sympatric *S. frontalis*, conversely, during masting events in S of range, in Argentina, may be frequent while that species still extremely rare. Appears to have small and rapidly declining global population. In Brazil, recent records concentrated in Rio de Janeiro and São Paulo, with fewer in Bahia (recent records from three sites), Espírito Santo (1940, 2003–2004 and undated), Minas Gerais (a 1936 specimen) and Paraná (2001–2004, and a 1930 specimen). Recent records in Argentina from Iguazú and from R Paraná in S Misiones; Paraguayan records from Canindeyú (Salto do Guaira in 1977, and Mbaracayú in 1995) and Caaguazú (Caazapá in 1995). Numbers of this seedeater are declining as a result of deforestation, combined with trapping for the cagebird trade; habitat loss exacerbated by its very specific habitat requirements. Continuing clearance of Atlantic Forest has led to even longer periods between nesting attempts, as bamboo flowering and seeding events even more widely scattered; this species' nomadic habits suggest that existing reserves probably inadequate for its protection. Relatively scarce in trade, but this almost certainly is because of its rarity, rather than lack of demand. Legally protected in Brazil. Has occurred in Una and Tinguá Biological Reserves, in Desengano, Serra do Mar, Ilha do Cardoso, Jacupiranga, Intervales, Ilhabela, Pico do Marumbi and Serra da Graciosa State Parks, in Itatiaia National Park, in Juréia-Itatins and Guaraguaçu Ecological Stations and in Ubatuba Experimental Station (all in Brazil); in Paraguay it occurs in Mbaracayú Forest Nature Reserve and Caaguazú National Park, and in Argentina has been found in Iguazú National Park.
Bibliography. Anon. (2010c), Areta *et al.* (2009), Armani (1985), Butchart & Stattersfield (2004), Canevari *et al.* (1991), Castelino (1990), Klicka *et al.* (2007), Madroño & Esquivel (1995), Meyer de Schauensee (1952a), Navas & Bó (1988a), Ouellet (1992), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000).

PLATE 64 ➤

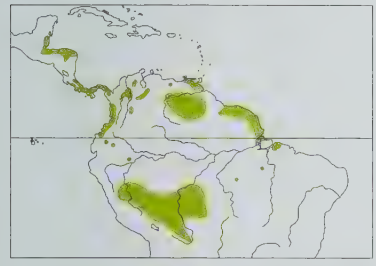

inches 2
cm 5
256
ssp longipennis
ssp schistacea
257
ssp whiteleyana
ssp plumbea
258
ssp corvina
ssp ophthalmica
259
ssp bogotensis
ssp intermedia
260
261
ssp torqueola
ssp sharpei
ssp melanocephala
262
ssp morelleti
ssp mutanda
263
ssp collaris

256. Slate-colored Seedeater

Sporophila schistacea

French: Sporophile ardoisé **German**: Schieferpfäffchen **Spanish**: Semillero Pizarroso

Taxonomy. *Spermophila schistacea* Lawrence, 1862, Lion Hill, Canal Zone, Panama.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Present species thought to be highly variable, and has recently been suggested that it be treated as polymorphic, rather than polytypic; further research desirable. Birds from Belize to Nicaragua sometimes separated as race *subconcolor*, but this form is probably best considered a variant of nominate. Three subspecies currently recognized.
Subspecies and Distribution.
S. s. schistacea (Lawrence, 1862) – Belize and N & E Honduras through NE Nicaragua, Costa Rica and Panama to N Colombia and W slope of E Andes.
S. s. incerta Riley, 1914 – Pacific slope of Andes from W Colombia (Caldas) S to N Ecuador (S to Pichincha, also in Napo).
S. s. longipennis C. Chubb, 1921 – W, N & E Venezuela (E slope of Andes S from Mérida, Monagas E to Delta Amacuro, and Bolívar), Colombia (E slope of E Andes S to Meta), the Guianas, Brazil (Roraima, Amapá, N Pará and S Amazonas), N & E Peru (Loreto and Huánuco S to Madre de Dios) and NW Bolivia (Beni and Cochabamba).



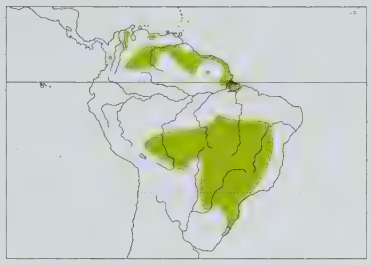
Descriptive notes. 10·6–11·1 cm; 12–13·7 g (Brazil and Peru). Small passerine with large bill. Male nominate race has slate-grey head, upperparts, breast and flanks, white eyering, and white malar stripe which expands on side of neck; bases of inner primaries white, lesser and median upperwing-coverts tipped white; belly and undertail-coverts white; iris dark; bill yellow-orange; legs dark grey. Female is olive-brown, paler below, with creamy buff on central belly; bill brownish. Juvenile resembles female. Race *incerta* is larger than nominate, with thicker bill, white malar patch almost entirely lacking; *longipennis* is like nominate, but slightly paler and more evenly coloured, male with very little or no white malar, female more olivaceous, with little white at base of primaries. Voice. Song variable, often begins with sharp notes and buzzes and ends with high-pitched lisping trill; other versions include sweet lower-pitched whistles interspersed within high-pitched trills; some more melodious with introductory series of more complex whistles, but ending on high-pitched trill. Call a high-pitched note.
Habitat. Edge of humid evergreen forest, second growth and plantations, especially where bamboo present. Recorded up to 1000 m, occasionally 2000 m.
Food and Feeding. Apparently feeds primarily on grass seeds, especially bamboo (e.g. *Chusquea simpliciflora*). Recently observed also to be using rice as a food source. Forages on ground and on inflorescences. Generally seen singly or in pairs; sometimes in small groups.
Breeding. Not well known. Nests in Feb and Jun–Sept (mostly Jul and Aug) in Panama, and Jun in Venezuela (middle R Orinoco region). Nest a thin-walled cup of rootlets and hair, placed 2–4 m above ground in small tree or spiny palm, in Panama 4–5 m up in thorny vine or bamboo. Clutch 3 eggs, greyish-white, dotted and blotched darker; incubation by female, female does most of brood-feeding; no information on duration of incubation and nestling periods.
Movements. Seemingly eruptive and nomadic. A specialist on seeding bamboo, an ephemeral resource; populations shift, being sometimes common at a locality, then disappearing completely. Sporadic in occurrence; appears in small groups to breed where bamboo is seeding.
Status and Conservation. Not globally threatened. Status not well known. Rare to uncommon, but eruptive; can be locally common in some years, and absent in others. Also purportedly recorded in S Mexico, where two specimens said to have been collected in Oaxaca, but origins of these appear questionable.
Bibliography. Armani (1985), Binford (1989), Dunning (1993b), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Meyer de Schauensee (1952a), Neudorf & Blanchfield (1994), Ouellet (1992), Restall (2009), Ridgely & Tudor (1989), Ridgway (1901), Stiles & Skutch (1989), Stutchbury *et al.* (1996), Wetmore *et al.* (1984).

257. Plumbeous Seedeater

Sporophila plumbea

French: Sporophile gris-de-plomb **German**: Graupfäffchen **Spanish**: Semillero Plomizo

Taxonomy. *Fringilla plumbea* Wied, 1830, Campo Geral of inner Brazil = boundary between Bahia and Minas Gerais, eastern Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Three subspecies recognized.
Subspecies and Distribution.
S. p. colombiana (Sharpe, 1888) – S Chocó, lower Magdalena Valley and Santa Marta Mts, in N Colombia.
S. p. whiteleyana (Sharpe, 1888) – NW, N & C Venezuela (Sierra de Perija; Carabobo and Aragua; Bolívar and W Amazonas), *llanos* of E Colombia, the Guianas, and N Brazil (Roraima, and Amapá E to mouth of R Amazon).
S. p. plumbea (Wied, 1830) – extreme SE Peru (Pampas del Heath), N Bolivia (Pando, Beni, Santa Cruz and La Paz), Brazil S of Amazon (Mato Grosso E to Piauí and C Bahia, S to Paraná and N Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).
Descriptive notes. 10·5–11 cm; 8·8–12 g. Tiny passerine with thick bill approximately as long as it is deep, with distinctly rounded culmen. Male nominate race is lead-grey above, pale lower half of eyering, indistinct streaking on crown and upperparts (except rump); tail feathers blackish, very narrow greyish-olive fringes and warmer buffy tips; upperwing blackish, upperwing-coverts and tertials edged olive-grey (more olive-brown on tertials), primaries with well-demarcated white bases (on folded wing forming small square-shaped white panel not extending to outer two primaries); chin and base of malar tract whitish, surrounding lower mandible (white surround can be quite noticeable in the field); feathers around base of lower mandible whitish, fading to pale grey throat and breast (paler than upperparts), becoming paler lead-grey on belly to undertail-coverts and almost whitish on vent; underwing grey, whitish linings; iris dark; bill and legs black. Female is typical of genus, dull and nondescript, lacking any distinctive features, brownish above and paler buffy brown below, becoming whitish on vent; dark bill with paler horn-coloured lower mandible or base of it. Juvenile is like female, but entire bill horn-coloured; immature male duller grey than adult, with olive tone, and more restricted white around bill base. Race *whiteleyana* is similar to nominate, but male has more contrasting white lower eye-crescent, and more obvious white around base of bill; *colombiana* male is paler grey, with more extensive white on face, entirely white throat. Voice. Sweet song like that of a canary (*Serinus*) or siskin (*Carduelis*), two whistles that sweep up in frequency ("sweet sweet"), followed by more complex and extended set of varied notes and trills, or "juii–juii, jewluh-jehluh, dejewlp-dejewlp"; reported as sometimes including vocalizations of other species, e.g. Great Kiskadee (*Pitangus sulphuratus*) and tody-tyrants (*Todirostrum*). Females in captivity known to sing. Call a loud "jep".



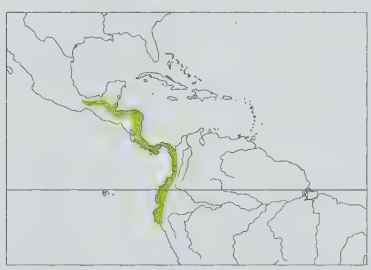
Habitat. Wet savanna and moist tropical grasslands; requires tall grass, and usually found near water or moist habitats; also edge of low forests near grassland, open *cerrado* habitats, edge of riparian habitat, and buriti palm (*Mauritia flexuosa*) groves. Sea-level to 600 m; to 1400 m in Venezuela and 1500 m in Colombia.
Food and Feeding. Forages largely on grass seedheads; seeds of *Andropogon* grasses recorded in diet. Forages on ground or while perched on grass stems. Found singly and in small flocks; will form flocks with other seedeaters.
Breeding. Birds in breeding condition during Nov and Dec in S Brazil. No other information.
Movements. Little known; possibly migratory in S part of range, as it disappears from those sites in austral winter.
Status and Conservation. Not globally threatened. Fairly numerous, but local and patchy in distribution. Rare in Peru. In Venezuela, most records from S Bolívar. In Brazil, few records S of Paraná.
Bibliography. Armani (1985), Belton (1974, 1985), Fontana *et al.* (2010), Graham *et al.* (1980), Hennessey *et al.* (2003), Klicka *et al.* (2007), McCarthy (2006), Meyer de Schauensee (1952a), Militello & Chebez (2009), Ouellet (1992), Restall *et al.* (2006), Ridgely & Tudor (1989), Sick (1993), Vignini (1985).

258. Variable Seedeater

Sporophila corvina

French: Sporophile variable **German**: Mohrenpfäffchen **Spanish**: Semillero Variable
Other common names: Black Seedeater, Northern Variable Seedeater

Taxonomy. *Spermophila corvina* P. L. Sclater, 1860, Playa Vicente, Oaxaca, Mexico.
Formerly referred to as *S. aurita*, but type of this name is unidentifiable as it originates from Canal Zone of Panama, where nominate race and *hicksii* interbreed. Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. americana*, *S. murallae* and *S. intermedia*, and has been treated as conspecific with the first two; *S. intermedia* was not thought to belong to this group until seen to hybridize with present species in two different regions of Colombia. From Colombia, proposed race *anchicayae* (described from R Anchicayá, in Valle) is a hybrid between race *hicksii* of present species and race *bogotensis* of *S. intermedia*, and *chocoana* (from Nuquí, in Chocó) is considered inseparable from *hicksii*. Four subspecies recognized.
Subspecies and Distribution.
S. c. corvina (P. L. Sclater, 1860) – S Mexico (S Veracruz and N Oaxaca), Guatemala and Belize S on Caribbean slope to Costa Rica and W Panama.
S. c. hoffmanni Cabanis, 1861 – Pacific slope of Costa Rica and extreme W Panama.
S. c. hicksii (Lawrence, 1865) – Pacific slope of Panama (except extreme W) E through Canal Zone to W Colombia (Córdoba S to Cauca).
S. c. ophthalmica (P. L. Sclater, 1860) – lowlands W of Andes from SW Colombia (Nariño) S to NW Peru (La Libertad).



Descriptive notes. 9·6–11·5 cm; 9·5–12·5 g. Tiny passerine with thick bill approximately as long as it is deep, with distinct rounded culmen. Male nominate race is entirely black, except for white patch at base of primaries, and sometimes a white stripe on mid-line of belly; iris dark brown; bill and legs blackish. Female is brown on head and upperparts to lower back, paler warm buff on rump and uppertail-coverts; upperwing and tail feathers dark brown with warm olive-brown edges, diffuse whitish bases on primaries (indistinct whitish panel on folded wing); paler and buffier below, palest on throat, contrasting narrow brownish breastband; bill dark grey. Juvenile is similar to female; immature male brownish like female, but blackish wings and tail, and extensive and patchy black feathering on breast, crown, face and back. Races differ mainly in plumage of male, only nominate almost all black: *hicksii* has contrasting white rump variably barred with black, well-marked white panel at base of folded primaries, chin black, narrow white band on lower throat continuing as larger white spur on side of neck and surrounding black chin (sometimes with forward extension to malar tract), contrasting broad black breastband, rest of underparts white with variable black splotching on lower breast and especially flanks, thighs blackish (some have black chin area more extensive, extreme examples with entire neck side

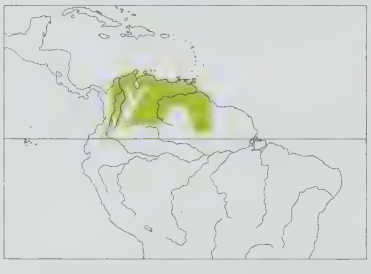
On following pages: 259. Grey Seedeater (*Sporophila intermedia*); 260. Wing-barred Seedeater (*Sporophila americana*); 261. Caqueta Seedeater (*Sporophila murallae*); 262. White-collared Seedeater (*Sporophila torqueola*); 263. Rusty-collared Seedeater (*Sporophila collaris*).

to throat and malar black, these also with white primaries much reduced, rump nearly entirely black); *hoffmanni* is like previous, but throat always all black, and white neck-collar often lacking; *ophthalmica* also resembles *hicksii*, but has narrower black breastband, larger white wing patch, and usually a white lower eye-crescent. Voice. Song a prolonged warble, accelerating from breezy start into a jumble of notes, a sweet, rapid, buzzy "tsiwee tsiwee tsiwee, chee chee chee, twee tweet wee twee, chirr chirr chirr chirr". Call "chiwee" or "tsiwee", or harsher "chur".
Habitat. Inhabits scrub; also forest-edge thickets, weedy fields and roadsides. Occurs from sea-level up to c. 1500 m.
Food and Feeding. Feeds primarily on seeds (*Solanum*, *Paspalum*, *Amaranthus*, *Panicum*, *Spoarbolus*, *Carex*, and *Chaetochloa*), also on berries, and insects. Young fed primarily with grass seeds. Usually forages for grass seeds while on the stem; typically, alights on stem and bends it down to the ground, allowing easier access to seeds. May also forage on ground. In pairs and small groups; often with other seedeaters.
Breeding. Season May–Oct (usually Jul and Aug) in C Panama (Canal Zone) and eggs being incubated in Mar in NW (Bocas del Toro); timing varies from year to year, depending on rainfall, as the species waits for rain to spur grass growth. Nest built by female, a thin-walled cup, placed 0·8–6 m (rarely 9 m) above ground in fork of branch of tree or shrub, woven into branches for support. Clutch 2 eggs, rarely 3, pale greyish with darker grey and brown blotching, this often concentrated at wide end; incubation by female, period c. 12 days; no information on nestling period.
Movements. Resident, with some local movements.
Status and Conservation. Not globally threatened. Fairly common to common in most of range; common to abundant in many parts. Has large range, and no evidence of any no large-scale declines in population.
Bibliography. Binford (1989), Dunning (1993b), Gross (1952), Hilty (2003), Howell & Webb (1995), Klicka *et al.* (2007), McCarthy (2006), Meyer de Schauensee (1952a), Miller *et al.* (1957), Olson (1981d), Ouellet (1992), Ridgway (1901), Russell (1964), da Silva (1999), Stiles (1996), Stiles & Skutch (1989), Weathers (1997), Wetmore *et al.* (1984).

259. **Grey Seedeater**
Sporophila intermedia

French: Sporophile intermédiaire **German**: Einfarbpfäffchen **Spanish**: Semillero Intermedio

Taxonomy. *Sporophila intermedia* Cabanis, 1851, Puerto Cabello, Venezuela.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. corvina*, *S. americana* and *S. murallae*; was not thought to belong in this group until seen to hybridize with *S. corvina* in two different regions of Colombia. Race *insularis* appears to be broadly sympatric with nominate and exhibits constant differences in plumage and biometrics; has recently been proposed as representing a cryptic species; further research required. Proposed race *anchicayae* (described from R Anchicayá, in Valle, in Colombia) is a hybrid between race *bogotensis* of present species and race *hicksii* of *S. corvina*. Proposed race *agustini* (San Agustin, Huila, Colombia) not reliably separable from *bogotensis*, and better merged therein. Three subspecies recognized.
Subspecies and Distribution.
S. i. intermedia Cabanis, 1851 – N & E Colombia (Caribbean coast, lower Magdalena Valley, and *llanos* in E), N Venezuela and Guyana, and N Brazil (Roraima).
S. i. bogotensis (Gilliard, 1946) – W Colombia on W slope of W Andes (E to Cauca Valley).
S. i. insularis (Gilliard, 1946) – Venezuela N of R Orinoco; Trinidad.

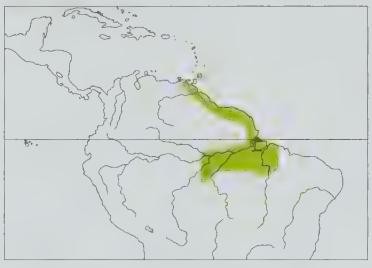


Descriptive notes. 11 cm; 11–16 g. Tiny passerine with thick bill approximately as long as it is deep, with distinctly rounded culmen. Male nominate race has head to neck and entire upperparts medium-grey with blue cast, very indistinct streaking on crown, mantle and back; upperwing and tail blackish, upperwing-coverts and tertials with grey fringes (of same darkness and colour as back), white primary bases (not extending to outer three primaries) forming well-marked white panel on folded wing; belly, vent and undertail-coverts whitish, contrasting with darker grey breast, wing-linings whitish; iris dark brown; bill pinkish-orange; legs blackish. Female is nondescript, buffy brown on crown and nape to lower back, upperwing and tail the same, face also buffy brown but paler and warmer than crown; below, warm pale cinnamon on throat and breast, this colour extending to flanks, but contrasting with paler buffy belly to undertail-coverts; bill blackish. Juvenile resembles female; immature male becomes progressively greyer. Race *insularis* is similar to nominate, but larger, with longer bill, longer tarsus, pale patch on side of neck, and white rump band; *bogotensis* is darker than nominate, has whitish patch on side of neck like previous, larger white primary patch, and grey band across foreneck. Voice. Song a simple and deliberate "gee-gee-gee-gee"; mimicry reported in a song type that begins with "gee-gee-gee..." and extends to rapid succession of mimicked voices of other bird species, also frog (Anura) calls and sound made by squeaky gate. Call "tseep?".
Habitat. Grassland and open shrubby clearings in tropical zone, to 2300 m in Colombia; lower, to 1200 m, in Venezuela. Also in overgrown lots within urban areas, so widely adaptable. In Trinidad in second growth and open areas, mostly low-lying, and in forest edges and foothills.
Food and Feeding. Feeds on seeds of the grass *Panicum*, as well as forbs; also nectar and small arthropods, mainly in dry season, when seeds difficult to come by. Obtains seeds by clinging on stem and reaching forwards or downwards to eat from seedheads. Makes short aerial sallies to catch flying insects. Singly and in pairs; in small flocks outside breeding season.
Breeding. Season May–Oct (rarely slightly earlier and later) in Venezuelan *llanos* and Jun–Sept in Trinidad, thus can breed for much of year, but avoids Dec–Mar dry season. Nest a flimsy cup, made mainly from rootlets and fibres, lined with finer fibres, placed 2–6 m above ground in branch fork of small tree. Clutch 2–3 eggs, cream-coloured with irregular dark brown markings. No other information.
Movements. Resident; appears to make only local movements.
Status and Conservation. Not globally threatened. Common to very common and widespread on mainland; scarce to uncommon in Trinidad. Popular as a cagebird in Trinidad, and numbers there declining, perhaps because of both indiscriminate trapping and habitat destruction.
Bibliography. Armani (1985), Dunning (2008), ffrench (1991), Gilliard (1946), Hilty (2003), Hilty & Brown (1986), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Restall (2002), Restall *et al.* (2006), Ridgely & Tudor (1989), Ridgway (1901), da Silva (1999), da Silva & O'Neill (1986), Stiles (1996), Thomas (1996).

260. **Wing-barred Seedeater**
Sporophila americana

French: Sporophile à ailes blanches **German**: Wechselpfäffchen **Spanish**: Semillero Aliblanco
Other common names: Southern Variable Seedeater

Taxonomy. *Loxia americana* J. F. Gmelin, 1789, Cayenne, French Guiana.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. corvina*, *S. murallae* and *S. intermedia*, and has been treated as conspecific with the first two; *S. intermedia* was not thought to belong to this group until seen to hybridize with *S. corvina* in two different regions of Colombia. Within this group, present species thought to be sister to *S. murallae*. Two subspecies recognized.
Subspecies and Distribution.
S. a. americana (J. F. Gmelin, 1789) – NE Venezuela (Sucre S to Delta Amacuro) E to the Guianas and N Brazil (Amapá and NE Pará); also Tobago.
S. a. dispar Todd, 1922 – middle and lower R Amazon from Manacapurú on N bank and R Juruá on S bank E to Santarém (Brazil).

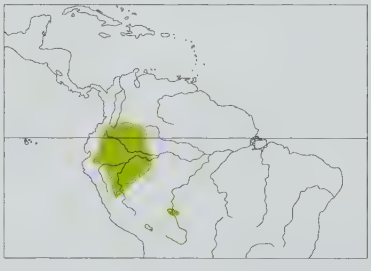


Descriptive notes. 10–11 cm; 10–14 g. A relatively stocky seedeater with large, short and deep bill. Male nominate race has black head contrasting with white band across side of neck running from side of nape to join white submoustachial and throat; upperparts black, variably whitish rump speckled with black; tail black; upperwing black, median and greater upperwing-coverts tipped white (creating two distinct wingbars, lower one usually broader), white at primary bases (forming rectangular white patch on folded wing); below, chin to undertail-coverts white, variable greyish wash on flanks, usually a broken narrow black breastband (some may have only dark wedges on breast sides, with apices towards mid-line of breast); iris dark brown; bill and legs black. Female is nondescript, buffy brown on crown and nape to lower back, upperwing and tail similar in colour to upperparts, face somewhat paler and warmer than crown; below, warm pale cinnamon on throat and breast, this colour extending to flanks, but contrasting with paler buffy belly to undertail-coverts; bill and legs blackish-brown. Juvenile is like female, but with more of a ginger wash below; immature male has body like juvenile, contrasting blackish wings and tail. Race *dispar* larger, with larger white wing patch, and rump more obviously spotted white, female duller overall, being greyish to brownish above and dull whitish below. Voice. Song pleasant and musical, although nasal, and generally lasting for several seconds; consists of rapid trills and twittering sounds accented by pure whistles, sometimes tapering off to a chatter. Call "cheeeu!". Also gives repetitive but pleasant "titty-ootaw", perhaps a call note.
Habitat. Forest edge and second growth, often near mangrove swamps. Lowlands, mainly on coastal plain, to 50 m; also on grassy river islands.
Food and Feeding. Feeds on seeds of grasses, sedges (Cyperaceae) and weeds, with preference for *Paspalum* and *Panicum maximum*; also takes fruits and flower buds, and possibly some insects. Has been observed to forage on *Cecropia* fruit, and also on Müllerian bodies (containing glycogen) from vegetative structures on these trees. Clings to plant stems to reach seeds; forages also in trees. In pairs and small flocks.
Breeding. Recorded in Jan. Nest resembles that of *S. intermedia*, made of stems and tendrils, lined with fine black fibres that create "wreath" around rim; one nest was in crotch of branch c. 1·2 m up cocoa tree (*Theobroma cacao*), another was c. 13·5 m up immortelle tree (*Erythrina poeppigiana*). Female builds nest and incubates. No further information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon to rare; probably most common in Guyana. A 1934 report of nominate race from Chacachacare I (off NW Trinidad) considered of doubtful validity. In Guyana, and probably elsewhere, this species is under strong pressure from songbird-trapping activities of local people.
Bibliography. Armani (1985), Dorn (1980b), ffrench (1991), Griscom & Greenway (1941), Klicka *et al.* (2007), McCarthy (2006), Meyer de Schauensee (1952a), Ouellet (1992), Restall *et al.* (2006), Ridgely & Tudor (1989), Stiles (1996), Stuart (2000), de Vasconcelos (2004).

261. **Caqueta Seedeater**
Sporophila murallae

French: Sporophile du Caqueta **German**: Caquetapfäffchen **Spanish**: Semillero de Caquetá

Taxonomy. *Sporophila murallae* Chapman, 1915, La Muralla [= Morelia], 600 feet [c. 180 m], Caquetá, Colombia. Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. corvina*, *S. americana* and *S. intermedia*, and has been treated as conspecific with the first two; *S. intermedia* was not thought to belong to this group until seen to hybridize with *S. corvina* in two different regions of Colombia. Within this group, present species thought to be sister to *S. americana*. Monotypic.
Distribution. SE Colombia (in upper R Amazon region), E Ecuador and NE Peru, also adjacent W Brazil; recently recorded NE Bolivia (N Beni).



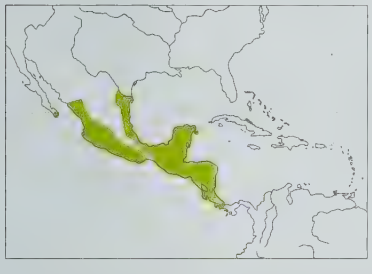
Descriptive notes. 10 cm. A relatively stocky seedeater with short, deep bill. Male has black head contrasting with white band across side of neck running from side of nape to join white submoustachial and throat, short black malar stripe; upperparts black, variably whitish rump speckled with black (on some rump entirely black); tail wholly black; upperwing black, median and usually greater coverts tipped white (two narrow but distinct white wingbars; on some individuals lower bar absent), white at primary bases (forming rectangular white patch on folded wing); chin to undertail-coverts white, side of breast black, narrow black

breastband (sometimes broken in centre), variable greyish wash on flanks; some individuals have black or greyish chin; iris dark brown; bill and legs black. Female is nondescript, buffy brown on crown, nape, mantle and back, upperwing and tail also buff-brown, face similar but paler and warmer than crown; warm pale cinnamon on throat and breast, this colour extending to flanks, contrasting paler buffy belly to undertail-coverts; almost whitish on centre of belly, vent and sometimes breast centre; bill and legs blackish. Juvenile undescribed. Voice. Song a pleasant warble, not hurried, but relatively quick, "tweet weet twa tweet, tw-weet twaa tweet...", continuing for several seconds. Call "cheeeu!".
Habitat. Lowland riverine scrub, also openings at edge of forest and secondary forest; also pastureland with isolated trees. Tropical zone to 1200 m.
Food and Feeding. Feeds on seeds of grasses and weeds, with preference for *Paspalum* and *Panicum maximum*. Usually in pairs; sometimes associated with other seedeaters.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon, but widespread. Recently recorded for first time in Bolivia. Degradation of primary forest may be helping this species to spread, as it favours forest openings and edge of open secondary forest.
Bibliography. Chapman (1915), Guevara *et al.* (2008), Herrera & Maillard (2007), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Stiles (1996).

262. White-collared Seedeater
Sporophila torqueola

French: Sporophile à col blanc **German**: Braunbürzelpfäffchen **Spanish**: Semillero Cuelliblanco
Other common names: Collared/Cinnamon-rumped Seedeater (*torqueola* and *atriceps* combined); Morellet's/White-collared Seedeater (*sharpei*, *morelleti* and *mutanda*)

Taxonomy. *Spermophila torqueola* Bonaparte, 1850, Cuidad México, Mexico.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Races *sharpei*, *morelleti* and *mutanda* sometimes treated together as representing a separate species; no intermediates known between these and the two remaining races. Five subspecies generally recognized.
Subspecies and Distribution.
S. t. atriceps (Lawrence, 1867) – Pacific lowlands of Mexico from C & S Sinaloa and W Durango S to Nayarit and N Jalisco; S Baja California.
S. t. torqueola (Bonaparte, 1850) – C Mexico from Jalisco and Guanajuato E to Morelos and W Puebla, S to Colima, Michoacán, Guerrero and W & S Oaxaca.
S. t. sharpei Lawrence, 1889 – extreme S USA (lower R Grande Valley, in S Texas) and NE Mexico (Nuevo León and Tamaulipas S through E San Luis Potosí to N Veracruz).
S. t. morelleti (Bonaparte, 1850) – E Mexico (N Veracruz) S on Caribbean slope (including Mujeres I, off NE Quintana Roo), and on Atlantic slope from El Salvador, to extreme W Panama.
S. t. mutanda Griscom, 1930 – S Mexico (S Chiapas) S to El Salvador.

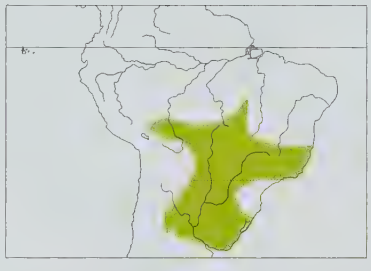


Descriptive notes. 9·5–11·2 cm; 6·3–12 g. Small to tiny seedeater. Male nominate race has blackish-brown head contrasting with white band across side of neck running from side of nape to join whitish submoustachial area and throat; nape and upperparts blackish-brown, contrasting cinnamon rump, white on throat extending as white spur to side of neck (but lacks full collar separating cap from back); upperwing and tail blackish, base of primaries white (creating rectangular white panel on folded wing); below, has well-marked narrow black breastband, with rest of underparts pale cinnamon, palest on belly and continuing to undertail-coverts; iris blackish; bill and legs blackish. Female is very nondescript, entirely buffy brown and unstreaked above, lacking any distinctive pattern, pale cinnamon below, darkest on breast and flanks, paler creamy buff on chin, belly and crissum; bill dark horn-coloured. Juvenile is like female; immature male gradually gains adult pattern, brownish back, wings and tail the last to become black (a black-crowned and brown-backed individual is a young male). Races differ mainly in plumage tones and pattern of male, "*morelleti* group" males tending to have full white hindneck-collar and both sexes having obvious wingbars: *atriceps* male is like nominate, but back browner (rarely blackish), wing patch smaller; *morelleti* has head and side of face black, contrasting white crescent below eye, full white collar across neck side and nape (separating black cap from black mantle), upperparts black, rump greyish or buff-white, bold white wingbars, large white primary patch, noticeably white-edged tertials, wide black breastband separating white throat from white underparts; *mutanda* is similar to previous, but generally some black areas on throat; *sharpei* is variable, male with varying amounts of greyish-olive to greyish-buff on head and upperparts, wing pattern similar to that of *morelleti*, often black flecks on breast and collar, rump greyish-buff, side of neck usually whitish, underparts buff. Voice. Song high-pitched and canary-like, a clear "sweet sweet sweet cheer cheer cheer" or "sweet sweet sweet cheer cheer cheer chee swee swee r r r r r"; variable. Call a double "tick tick", also a soft "che" or "chip".
Habitat. Open grassy areas, pastures, roadsides, weedy fields, moist savanna, and marshlands with tall grasses; often roosts in tall grasses, and sometimes cat-tails (*Typha*) at edges of marshes. Avoids second-growth areas where encroachment of woody vegetation. Sea-level to 2000 m.
Food and Feeding. Eats mainly grass seeds, augmented with a few berries and insects. Will jump into air to catch flying insects. Usually in pairs; outside breeding season in flocks of up to several hundred individuals, often with other seed-eating species.
Breeding. Commences in late Mar/Apr and continues into summer in S Texas; begins in Apr in N Central America. Nest built by female, taking 5–6 days, a thin-walled cup with outer layer of cobwebs, filled with rootlets, fibres and grasses, lined with horsehair if available, or with finer fibres, placed 1–2 m (rarely to 3 m) up, sometimes over running water, in dense shrub or coarse vegetation. Clutch 2–4 eggs, pale blue to greenish with brown or blackish spotting and blotching; incubation by female, period c. 13 days; chicks fed by both parents, nestling period 10–11 days. Rare host of Brown-headed Cowbird (*Molothrus ater*).
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Common to fairly common; abundant in many parts of its range. Has recently colonized S Baja California; unclear whether this is natural or through introduction.
Bibliography. Armani (1985), Arnold (1980), Binford (1989), Dunning (1993b), Eitniear (1997, 2004), Howell & Webb (1995), Meyer de Schauensee (1952a), Miller *et al.* (1957), Ouellet (1992), Ridgway (1901), Rowley (1962), Russell (1964), Selander & Giller (1959), Stiles & Skutch (1989), Wetmore *et al.* (1984), Woodin *et al.* (1999).

263. Rusty-collared Seedeater
Sporophila collaris

French: Sporophile à col fauve **German**: Erzpfäffchen **Spanish**: Semillero Acollarado

Taxonomy. *Loxia collaris* Boddaert, 1783, Angola; error = Rio de Janeiro, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Molecular-genetic data indicate that present species belongs in a clade with *S. luctuosa*, *S. nigricollis* and *S. caerulescens*. Geographical variation possibly partly clinal; in E of range nominate race may form a cline with *melanocephala*, plumage becoming more colourful from N to S; further study needed. Three subspecies recognized.
Subspecies and Distribution.
S. c. ochrascens Hellmayr, 1904 – Bolivia (lowland La Paz, Beni and Santa Cruz) and SC Brazil (N Mato Grosso S to W São Paulo).
S. c. melanocephala (Vieillot, 1817) – SW Mato Grosso S through Paraguay to Argentina (S to La Rioja, Santiago del Estero, Córdoba and C Buenos Aires), also SE Brazil (Rio Grande do Sul) and Uruguay.
S. c. collaris (Boddaert, 1783) – E Brazil from S Goiás, Minas Gerais and extreme SE Bahia S to Rio de Janeiro.



Descriptive notes. 12 cm; 7·5–14 g. A comparatively large and strikingly marked seedeater with relatively long and broad tail; typical short, thick bill with rounded culmen. Male nominate race has black head, white patch above lores and another below eye, broad white partial neck-collar; mantle and back blackish-grey, scapulars with broad paler edges, lower back and rump pale buff, contrasting strongly with blackish back and black tail; upperwing black, primary bases white (forming big bold white patch on folded wing), narrow whitish wingbars; throat white, narrow black breast-band extending to side of neck; below breast-band entire underparts to undertail-coverts pale buffish; some birds in extreme NE part of range essentially black and white, with grey rump, white collar and white underparts; iris dark brown; bill and legs black. Female is duller than male, but with "ghost pattern" of latter: warm brown above and on face, distinct pale patch below eye (as on male), brown wings with two distinct buffy wingbars; below, strikingly whitish throat, contrasting with tawny-buff underparts; bare parts as for male. Juvenile resembles female. Race *melanocephala* is brighter than nominate, neck-collar cinnamon-tawny, rump tawny, wingbars cinnamon, underparts tawny-cinnamon; *ochrascens* is similar to previous, but upperparts olive-grey to brownish, lighter rust-yellow on neck side and underparts, and cream-coloured on lower breast. Voice. Song a rapid warble that ascends and descends, mixed with twittering sounds and often incorporating imitations of other species, e.g. anis (*Crotophaga*), elaenias (*Elaenia*), tody-flycatchers (*Todirostrum*). Call a nasal "ghep" or sharper "tchep".
Habitat. Moist or flooded grassland and shrubby marshland, also open country adjacent to rivers or lakes; generally associated with marshes with tall vegetation. Closely associated in particular with marshes of the giant sedge *Cyperus giganteus*. Sea-level to 500 m.
Food and Feeding. Seeds; also eats insects. Forages largely on grass seeds while seeds still on stem; rarely drops to ground to forage, tending instead to perch on vegetation while feeding. Usually in pairs or small groups.
Breeding. Season early Nov to Apr in Argentina (Formosa) and birds in breeding condition during Nov–Mar and inactive during May in SE Brazil (Rio Grande do Sul), indicating breeding in austral spring–summer. Nest built by female, a cup 5 cm in diameter, made from fine fibres and dry vegetation, attached usually 1·5–2 m above ground to low shrub, often over water. Clutch 2–3 eggs, greenish-blue or whitish-green, with chestnut, brown and grey markings concentrated around wide end; incubation by female, sometimes fed at or near nest by male, period 12–13 days; chicks fed by both parents, nestling period 9–12 days.
Movements. Resident; some local movements.
Status and Conservation. Not globally threatened. Common to fairly common in varied open marshy or wet-grassland habitats. Commonly captured for the cagebird trade.
Bibliography. Armani (1985), Belton (1985), Campagna *et al.* (2010), Canevari *et al.* (1991), Dubs (1992), Facchinetti *et al.* (2008), Kirwan (2007), Kirwan *et al.* (2004), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), McCarthy (2006), Meyer de Schauensee (1952a), Ouellet (1992), de la Peña (1987), Ridgely & Tudor (1989), Sferco & Baldo (1995), Sick (1993), da Silva (1999), Storer (1989b).

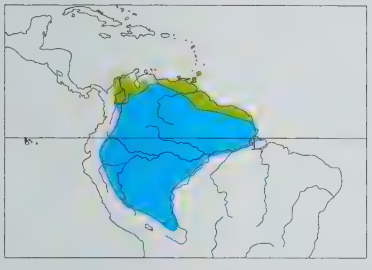

264
265
266
"melanops"
ssp inconspicua
267
ssp vivida
268
ssp yungae
ssp hellmayri
269
270
ssp nigricollis
PLATE 65
inches 2
cm 5
ssp caerulescens
ssp leucoptera
ssp cinereola
271
ssp bicolor
ssp peruviana
272
ssp devronis

264. Lesson's Seedeater

Sporophila bouvronides

French: Sporophile faux-bouvron **German**: Weißbartpfäffchen **Spanish**: Semillero de Lesson

Taxonomy. *Pyrrhula bouvronides* Lesson, 1831, no locality = Trinidad.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. lineola* and has been treated as conspecific. Proposed geographical race *restricta*, known from a single specimen from Magdalena Valley, in Colombia, lies well within range of variation of the species elsewhere and does not merit recognition. Monotypic.
Distribution. Breeds N Colombia (N & E of Andes), W, C & N Venezuela, the Guianas, Trinidad and Tobago. Most migrate S to N Amazonia in Brazil, SE Colombia, E Ecuador, NE Peru and Bolivia (Beni and Santa Cruz).



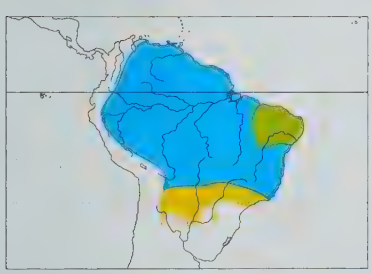
Descriptive notes. 10–11 cm; 8–11 g. Tiny seedeater with thick bill approximately as long as it is deep, with distinct rounded culmen. Male has matt black head to throat, large white triangular patch over lower ear-coverts to submoustachial region; upperparts entirely black, except for narrow band of white on rump; upperwing and tail black, white on primary bases (forming distinct white patch on folded wing); breast white with diffuse black markings, more solid black side of breast, rest of underparts whitish; iris dark brown; bill and legs black. Female is dull and nondescript, olive-brown above, paler below, with no distinctive features; below, buffy on breast, paler creamy on throat, and palest on lower breast to undertail-coverts; upper mandible dark, lower mandible horn-coloured, legs blackish. Juvenile undescribed. Voice. Song begins with a few harsh notes and then changes into melodious notes, "chaw, chee childedee-chea-chea-chea" or "jaaaw, geee, chutchutchutjeet"; in Trinidad and Tobago described as a long rolling trill followed by chattering; song in Venezuela a mechanical trill. Call "chip".
Habitat. Grassy clearings and shrubby areas, often near water in tropical zone. Likes edges of woodland when breeding, also openings in forest. Sea-level to 1000 m.
Food and Feeding. Mostly grass seeds. Forages in typical manner, gripping grass stalk while extracting seeds. May forage also on ground. In flocks outside breeding season.
Breeding. Season Apr–Nov. Territorial; male sings persistently from perches on small trees or larger bushes. Nest a loose cup of dry grasses and rootlets, placed 5–10 m above ground in fork of branch in sapling, or towards outer branches of larger tree. Clutch 2–3 eggs, whitish with many brown and blackish markings; chicks fed by both sexes. No other information.
Movements. Highly migratory. After breeding, most vacate N breeding grounds and spread throughout N Amazonia in non-breeding season, moving as far S as N Bolivia; present in non-breeding quarters Dec–Jun, some returning N earlier (from Apr). Vagrant in extreme E Panama.
Status and Conservation. Not globally threatened. Uncommon to fairly common within breeding range. Locally abundant, e.g. in W Venezuela (parts of SW Portuguesa).
Bibliography. Beebe (1917), ffrench (1991), Herrera & Vidoz (2009), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Restall *et al.* (2006), Ridgely & Tudor (1989), Schwartz (1975), Whitney *et al.* (1994).

265. Lined Seedeater

Sporophila lineola

French: Sporophile bouveron **German**: Diamantpfäffchen **Spanish**: Semillero Overo

Taxonomy. *Loxia lineola* Linnaeus, 1758, Asia; error = Bahia, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Forms a superspecies with *S. bouvronides* and has been treated as conspecific. Monotypic.
Distribution. Breeds in NE Brazil (Maranhão and Piauí E to Rio Grande do Norte and Alagoas); and S of Amazon Basin in SE Bolivia (Tarija, Chuquisaca and Santa Cruz), Paraguay, N Argentina (S to Tucumán, Santiago del Estero and Santa Fe; recently also in Misiones) and S Brazil (C Mato Grosso do Sul E to N Rio de Janeiro, and S to C São Paulo; possibly also Paraná, Santa Catarina and Rio Grande do Sul). Non-breeding visitor throughout N South America N to E Colombia, Venezuela, the Guianas, also E Ecuador, NE Peru and much of Brazil.



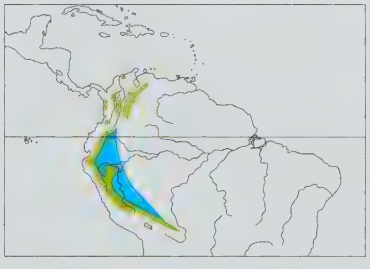
Descriptive notes. 10–11 cm; 7·5–12 g. Tiny seedeater with thick bill approximately as long as it is deep, with distinctly rounded culmen. Male has most of head and throat black, wide white stripe along mid-line of crown, large white triangular patch over lower ear-coverts to submoustachial region, bordered below by black line; upperparts black, narrow band of white on rump; upperwing and tail black, white on primary bases (forming distinct white patch on folded wing); underparts whitish, black thigh; iris dark brown; bill and legs black. Female is dull and nondescript, brownish-olive above, paler below, no distinctive features; buffy on breast, paler creamy on throat, and palest buff on lower breast to undertail-coverts; upper mandible dark, lower mandible horn-coloured, legs blackish. Juvenile undescribed. Voice. Songs differ geographically: in E of range (in *caatinga*) a trill followed by "tuweet" or a few introductory "tic" notes followed by a trill, "dit dit dit drdrdrdrdrdr"; in W & S of range song described as a pleasant resonating and warbling trill, "dididididdee" or "krrrrrrrrr", followed by one or more high-pitched "chip" notes. At times song simplified to a short rattle. Call "check", also a dull trilling "ki-rik" and a strident and repeated whistled "peeu".
Habitat. Breeds at edge of *chaco* woodland, *caatinga*, xeric forests and other patches of forest, both in open areas with grass and in areas adjacent to shrubby forest and second growth. In non-breeding period open grassy savanna, shrubby clearings and semi-open areas with tall grass, often near water. Tropical zone, to 500 m; migrants as high as 1500 m.
Food and Feeding. Largely seeds; prefers grass seeds, and has been seen to feed on *Echinochloa polystachya*, *Paspalum urvillei* and *Paspalum notatum* in NE Argentina. Forages on ground, as well as while clinging to grass stalks and other vegetation. Usually in pairs during breeding period; in small flocks at other times.
Breeding. Has nested in May in NE Brazil (Piauí); season Feb–Mar in NW Argentina; Nov–Apr (peak in Jan) in SE Brazil (São Paulo). Cup-shaped, thin-walled nest made from thin grass roots (including those of exotic species) bound together with spider webs, sometimes made from vegetable fibres, placed c. 0·8–11 m above ground in branch fork in shrub or tree, including exotic species. Clutch 2 or 3 eggs, in São Paulo white with light and dark brown spots and blotches, these often concentrated at large end, in Argentina eggs described as greenish-grey with darker spots; incubation by female, period very short, 10–12 days; chicks fed by both sexes, nestling period 9–13 days. For 63 nests in São Paulo, survival during incubation stage 70% and during nestling stage 56%, with overall nesting success 40%.
Movements. Austral migrant, breeds S of equator, and spends non-breeding period as far N as Venezuela. Present in C & W Amazonas all year, but unclear if a resident population or if individuals from different populations visit at various times of year. Traditionally considered to consist of two populations, one breeding in Argentina, Bolivia, Paraguay and SE Brazil which winters in Peru, Ecuador, Colombia and N Brazil, the other breeding in *caatinga* of Brazil and wintering in Venezuela and the Guianas. In E Brazil (Espírito Santo and Paraná), arrives in Dec to breed and disappears in Mar–Apr; similar timing observed in Argentina, while in NE Brazil there is an influx of breeders from May onwards.
Status and Conservation. Not globally threatened. Fairly common, rather local in occurrence. Uncommon non-breeder in French Guiana. Has relatively large breeding range. No particular habitat problems known; some woodlands in Chaco region and other sections of breeding distribution are being converted to soybean fields, but any effects of this habitat alteration on the species not known. In São Paulo study, factors such as lack of selectivity in choice of nesting tree (many of which were exotic) and utilization of exotic grasses in nest construction (mostly rootlets) allow it to thrive in human-modified habitats.
Bibliography. Areta & Almirón (2009), Armani (1985), Canevari *et al.* (1991), Carrano *et al.* (2002), Dubs (1992), Klicka *et al.* (2007), Marcondes-Machado (1998), McCarthy (2006), Meyer de Schauensee (1952a), de Oliveira *et al.* (2010), Ouellet (1992), de la Peña (1987), Restall *et al.* (2006), Ridgely & Tudor (1989), Schwartz (1975), Sick (1993), da Silva (1995, 1999), Thomas (1996).

266. Black-and-white Seedeater

Sporophila luctuosa

French: Sporophile noir et blanc **German**: Trauerpfäffchen **Spanish**: Semillero Negriblanco

Taxonomy. *Spermophila luctuosa* Lafresnaye, 1843, Bogotá, Colombia.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Molecular-genetic data indicate that present species belongs in a clade with *S. collaris*, *S. nigricollis* and *S. caerulescens*. Monotypic.
Distribution. Andes from W Venezuela S through Colombia, Ecuador and Peru to Bolivia (La Paz, Cochabamba and Santa Cruz).



Descriptive notes. 11 cm; average 12·5 g (Peru). Male has head to breast black, thin but noticeable white crescent below eye; upperparts, including upperwing and tail, black, bases of primaries white (forming bold white patch on folded wing); black of breast stops abruptly and neatly, rest of underparts to undertail-coverts white, some black extending down flanks; wing-linings white, sometimes showing as white stripe at bend of wing; iris dark brown; bill entirely blue-grey; legs blackish. Female is nondescript, warm buffy brown on crown and upperparts, wings and tail also buff-brown like upperparts; below, throat and breast a similar warm buff-brown, hardly contrasting with face, this colour extending to flanks and contrasting with paler buff belly and vent; crissum darker than belly, similar to flanks; bill and legs blackish. Juvenile resembles female; immature male variable, some brownish like female (but sing, and are territorial), others intermediate between brown plumage and black-and-white plumage of adult male. Voice. Song rather unusual-sounding, not melodic, almost reminiscent of an icterid, 2 harsh notes followed by gurgling notes, and sometimes even harsher, shrieking vocalizations like those of a parrot (Psittacidae), "guak-cheeo chpchpchpchpchp". Females sing a temporally restricted and unstructured song, very different from that of male. Calls include nasal "nhhheep" and harsher "phhhp!".
Habitat. Grassy areas at forest edge, also roadside pastures and shrubbery. Subtropical zone on lower Andean slopes at 1200–3100 m, rarely lower, to 300 m.
Food and Feeding. Seeds; appears to some extent to be somewhat dependent on bamboo (*Chusquea*) seeding. Forages in manner typical of genus, clinging to grass stems and feeding on seeds while still on stem; does not eat seeds on ground. Forages sometimes in pairs, more often in small flocks of up to 30 individuals, particularly in non-breeding period; tends to associate with other members of genus.
Breeding. In Colombia males in breeding condition during Sept (Santander and Boyaca) and juveniles present in Apr (Antioquia). Said to be loosely colonial in Venezuela. No other information.
Movements. Little information. Possibly engages in seasonal elevational movements; perhaps to some extent nomadic, wandering in search of seeding grass.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common, and patchy in distribution. Has relatively large range. This species' liking for second-growth edge may lead to its having more habitat as montane forests are disturbed or degraded.
Bibliography. Areta (2009a), Armani (1985), Eitniear (2006a), Hilty (2003), Hilty & Brown (1986), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Meyer de Schauensee (1952a), Ouellet (1992), Plenge (1974), Restall *et al.* (2006), Ridgely & Tudor (1989), Witt (2005).

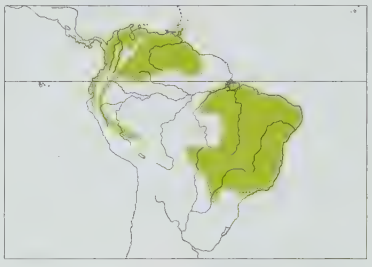
On following pages: 267. Yellow-bellied Seedeater (*Sporophila nigricollis*); 268. Dubois's Seedeater (*Sporophila ardesiaca*); 269. Double-collared Seedeater (*Sporophila caerulescens*); 270. White-throated Seedeater (*Sporophila albogularis*); 271. White-bellied Seedeater (*Sporophila leucoptera*); 272. Parrot-billed Seedeater (*Sporophila peruviana*).

267. Yellow-bellied Seedeater

Sporophila nigricollis

French: Sporophile à ventre jaune **Spanish**: Semillero Ventriamarillo
German: Gelbbauchpfäffchen
Other common names: Black-necked Seedeater; Hooded Seedeater ("*S. melanops*")

Taxonomy. *Pyrrhula nigricollis* Vieillot, 1823, Brazil. Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Molecular-genetic data indicate that present species belongs in a clade with *S. collaris*, *S. luctuosa* and *S. caerulescens*. Possibly conspecific with *S. ardesiaca*. Proposed taxon *S. melanops*, known only from one adult male collected in 1823 on E bank of R Araguaia (extreme WC Goiás), in SC Brazil, is believed to have been a variant of present species or a hybrid between it and a congener. Three subspecies recognized.
Subspecies and Distribution.
S. n. nigricollis (Vieillot, 1823) – S Costa Rica and Panama to N, W & E Colombia and probably E Ecuador, E through Venezuela to Suriname, including S Lesser Antilles (Carriacou, Grenada), and Trinidad and Tobago; EC & E Brazil S to Mato Grosso and São Paulo, extreme E Bolivia (E Santa Cruz) and NE Argentina (Misiones).
S. n. vivida Hellmayr, 1938 – SW Colombia (Nariño) and W Ecuador.
S. n. inconspicua Berlepsch & Stolzmann, 1906 – Peruvian Andes S on W slope to Lambayeque and on E slope to Cuzco.



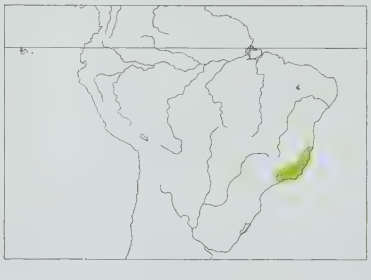
Descriptive notes. 8·5–10·3 cm; 8·5–11·2 g. Typical seedeater, tiny and with thick bill approximately as long as it is deep and with distinct rounded culmen. Male nominate race somewhat variable; has head to nape and down to breast black, upperparts dull olive, inconspicuous darker streaking on back; upperwing and tail brownish, upperwing-coverts and tertials widely fringed olive (like back), edges of rectrices a similar olive colour; below, black of breast stops abruptly and neatly, rest of underparts pale yellowish, often with some blurred spotting on flanks; wing-linings pale yellowish; some birds have olive areas replaced by grey, and underparts whitish; iris dark brown; bill blue-grey; legs blackish. Female is nondescript, warm buffy brown on most of head, nape and mantle to lower back, with wings and tail buff-brown like upperparts; throat and breast a similar warm buff-brown, hardly contrasting with face, this colour extending to flanks and contrasting with paler buff belly and vent; crissum darker than belly, similar to flanks; bill and legs blackish. Juvenile is like female, but more evenly coloured, with warmer, cinnamon wash below; immature male similar to female, but with blackish feathers on face and throat. Race *vivida* is greener above and brighter yellow below than nominate; *inconspicua* is like nominate, but black of hood restricted to foreparts of head, and bib. Voice. Male song, often from tree, "seee seeuu se seeuu seeoo tsr-r-r", somewhat like that of *S. torqueola*, but shorter and rather burry; also described as "sweet", but ending with two buzzy phrases, "seewee-seewee-seewee", etc. Calls include dry "chip" notes.
Habitat. Grassy areas. Found in open *milpas* (fields cultivated rotationally, with fallow periods of several years) and other disturbed areas, mostly agricultural; also weedy old fields. Lowlands to 2500 m, mostly below 2000 m.
Food and Feeding. Diet almost exclusively grass seeds. Often sits on one head of grass and feeds from another, or bends seedhead to ground, where it can be easily reached. Often in small flocks, sometimes containing more than 20 individuals, especially outside breeding period.
Breeding. Season Jul–Sept in Panama; nesting reported throughout year, but varying regionally, in Colombia. Apparently monogamous. Nest a woven cup of grasses and fibres, held together by twigs and spider webs, generally built close to ground (below 1 m), usually in bush or tree. Clutch 2 eggs, occasionally 3, pale greenish-buff with brown spots. No other information.
Movements. Resident and nomadic. Dispersive or nomadic during periods of drought, when grass seeds more difficult to find.
Status and Conservation. Not globally threatened. Locally common; common on Pacific slope throughout range. Although this species is popular as a cagebird, trapping for trade seems not to have led to any significant decreases in its numbers. Proposed taxon *S. melanops* listed as Critically Endangered, but now reckoned to be a variant of present species or perhaps a hybrid; known only from type specimen, dated Oct 1823, from E Brazil; searches in area of type locality, along R Araguaia floodplain, most recently in Dec 2008 to Jan 2009 and Jul 2010, were unsuccessful.
Bibliography. Alderton (1961), Armani (1985), ffrench (1965, 1991), Hilty & Brown (1986), Hirschfeld (2007), Howell & Webb (1995), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Lowen *et al.* (1997), McCarthy (2006), Mees (1968), Meyer de Schauensee (1952a), Ouellet (1992), Restall (2005a), Restall *et al.* (2006), Ridgely & Gwynne (1989), da Silva (1999), Stiles & Skutch (1989), Thomas (1996), Wetmore *et al.* (1984).

268. Dubois's Seedeater

Sporophila ardesiaca

French: Sporophile de Dubois **German**: Duboispfäffchen **Spanish**: Semillero de Dubois

Taxonomy. *Spermophila ardesiaca* A. J. C. Dubois, 1894, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Taxonomic status of present species not clearly understood: seems to be very closely related to *S. nigricollis*, and possibly conspecific, perhaps even a morph; supposed ranges of the two apparently overlap broadly, and they have syntopic breeding distributions; songs reported as essentially identical, suggesting that they are the same species. More research required. Monotypic.



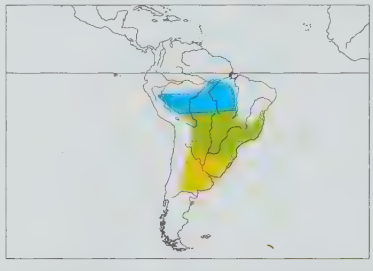
Distribution. SE Brazil in extreme SE Bahia, Espírito Santo, extreme E Minas Gerais and Rio de Janeiro.
Descriptive notes. 11 cm. Male has head to nape and down to breast black, upperparts greyish, inconspicuous darker streaking on back; upperwing and tail brownish, upperwing-coverts and tertials widely fringed greyish (like back); black of breast stops abruptly and neatly, rest of underparts white, often with blurred dark spotting on sides and flanks, wing-linings white; iris dark brown; bill blue-grey; legs blackish. Female is nondescript, warm buffy brown on crown, nape and upperparts, wings and tail similarly buff-brown; below, throat and breast similar warm buff-brown, hardly contrasting with face, this colour extending to flanks and contrasting with paler buff belly and vent; crissum darker than belly, similar to flanks; bill dusky. Juvenile apparently undescribed. Voice. Song a loud and melodious warble with some doubled notes and an accented or different ending, "tweew-tweew, chu-chu, tweeta-cheww-pheeéééé"; apparently similar to, if not identical to, that of local populations of *S. nigricollis*. Call a high-pitched "tiip".
Habitat. Shrubby and grassy clearings, and roadsides; sea-level to 800 m.
Food and Feeding. Diet largely grass seeds. Forages mostly while clinging to grass stem. Found in small flocks, not uncommonly with *S. nigricollis*.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Uncommon to locally common; rather poorly known. Research required in order to confirm this seedeater's taxonomic status, enabling appropriate conservation management to be determined.
Bibliography. Armani (1985), Klicka *et al.* (2007), McCarthy (2006), Ouellet (1992), Ridgely & Tudor (1989), Sick (1962).

269. Double-collared Seedeater

Sporophila caerulescens

French: Sporophile à col double **German**: Schmuckpfäffchen **Spanish**: Semillero Corbatita
Other common names: Screaming Seedeater

Taxonomy. *Pyrrhula caerulescens* Vieillot, 1823, Brazil. Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Molecular-genetic data indicate that present species belongs in a clade with *S. collaris*, *S. luctuosa* and *S. nigricollis*; visual similarity suggests that it may be closest to *S. albogularis*, but latter was not included in that study. Race *hellmayri* formerly known as *ornata*, but that name invalid, as preoccupied. Three subspecies recognized.
Subspecies and Distribution.
S. c. yungae Gyldenstolpe, 1941 – C Bolivia (La Paz, S Beni and Cochabamba).
S. c. caerulescens (Vieillot, 1823) – SE & E Bolivia, SC & SE Brazil S through Paraguay, Argentina (S to Mendoza and La Pampa) and Uruguay.
S. c. hellmayri Wolters, 1939 – S Bahia, in E Brazil.



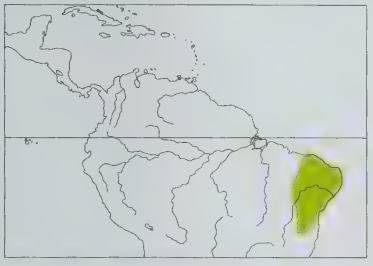
Descriptive notes. 11 cm; 7·4–12·5 g. Typical seedeater, tiny, with thick bill approximately as long as it is deep and with distinct rounded culmen. Male nominate race has crown and face lead-grey, becoming darker, nearly black, on forehead and moustachial region, with crown diffusely streaked, small white crescent below eye, white submoustachial area separating blackish face from blackish upper throat; upperparts, including tail, warmer olive-brown, upperwing plain greyish-olive; lower throat and upper breast white with narrow but bold blackish central breastband, grey of face continuing down to side of breast; otherwise whitish below, grey spotting on flanks; some males have yellowish underparts, apparently a rare but regular variation; iris dark brown; bill yellowish to greyish; legs blackish. Female is nondescript, warm buffy brown on crown, nape and upperparts, wings and tail buff-brown like upperparts; breast a similar warm buff-brown, contrasting with paler throat, darker coloration extending to flanks and contrasting with paler buff belly and vent; crissum darker than belly, similar to flanks; in fresh plumage may have narrow cinnamon-brown wingbars; bill dark, with yellowish-horn lower mandible (bicoloured bill can be a good way to identify females of this species). Juvenile resembles female. Race *yungae* male is paler-headed than nominate, greyish on crown and nape, with blackish restricted largely to lores; *hellmayri* male is distinctive, with black more extensive on forepart of head. Voice. Song loud and varied, composed of variable and jumbled notes, peak sound often half-way or more through song (making ending sound like an afterthought), "jew, jitit-jew-jew, jitit" or "jewle, jewle, jewle, jewle-jéé-jewlo, jewlo-tshrr"; much geographical variation. Captive females also known to sing. Call "tslit" or "tsri".
Habitat. Forest edge, shrubby openings, secondary growth, disturbed *cerrado* habitat, and old-field habitats where some trees or taller shrubbery present; also agricultural areas, towns and roadsides.
Food and Feeding. Diet various grass seeds, including those of introduced forage grasses for cattle. In São Paulo (Brazil) young fed with seeds of the exotic grass *Brachiaria*. Forages both on ground and while perched on vegetation. Usually singly or in pairs; during non-breeding season may forage in small flocks.
Breeding. Season mainly Oct–Feb; Dec–May in SE Brazil, and possibly in all months in N part of range; on average nests later (waiting for seeding of grass to occur) than most other bird species in range. Nest a cup made from dry grass roots and spider webs, walls thin (nest contents visible through side), mean outside diameter 6·7 cm, external height 4·8 cm, placed often less than 50 cm from ground, but sometimes as high as 6 m (averaging 2·4 m), in shrub, short tree or hedge, or shorter vegetation, various plant species used, with apparently no specific preferences. Clutch 3 eggs, 2 in N of range, whitish, cream or palest green with brown, grey and blackish markings, these evenly distributed or sometimes denser around wide end; incubation strictly by female, period 13 days; chicks fed by both sexes, nestling period 12–15 days.
Movements. Incompletely known. Some, perhaps many, populations apparently resident. S populations retreat N in winter; similarly, in N of range more common in austral winter, and in E Peru and across much of C Brazil evidently present only during winter months. Vagrants recorded in NW Brazil (N Amazonas). More work required in order to confirm and describe movements.
Status and Conservation. Not globally threatened. Common to abundant in much of range; generally more numerous than its congeners. Has large breeding distribution. This species' preference for forest edge, second growth and similar areas perhaps means that suitable habitat for it is increasing as forest becomes ever more fragmented. Further, it has adapted well to anthropogenic disturbances and, moreover, it thrives on seeds of grasses introduced for cattle grazing; this adaptability has enabled it to spread into new areas and habitats. This is the most common bird kept in captivity in much of Brazil, and impact of trapping needs to be kept in mind with regard to the species' numerical status.
Bibliography. Alabarce (1987), Armani (1985), Belton (1985), Campagna *et al.* (2010), Coimbra-Filho & Teixeira (1983), Dubs (1992), Francisco (2006), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), McCarthy (2006), Meyer de Schauensee (1952a), Mitchell (1954, 1957), Ouellet (1992), de la Peña (1987), Pereyra (1956), Remsen & Hunn (1979), Ridgely & Tudor (1989), Sick (1993), da Silva (1999), Storer (1989b).

270. White-throated Seedeater

Sporophila albogularis

French: Sporophile à gorge blanche **Spanish**: Semillero Gorjiblanco
German: Weißkehlpfäffchen

Taxonomy. *Loxia albogularis* Spix, 1825, Bahia, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Visual similarity to *S. caerulescens* suggests that it may be closest to that species, but molecular-genetic study of present species not yet undertaken. Monotypic.
Distribution. NE Brazil from Piauí E to Pernambuco and S to N Bahia.



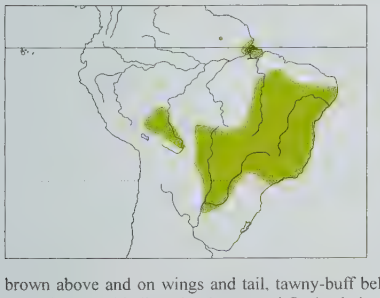
Descriptive notes. 11 cm; 9·7 g. A typically small seedeater, with rather deep-based and thickly rounded bill. Male has crown and face blackish, upperparts dark greyish, upperwing and tail darker, blackish-grey, white flash at bases of primaries; throat and malar region white, white continuing as a half-collar to side of neck below ear-coverts and contrasting strongly with blackish face; distinct and well-defined blackish breastband, rest of underparts whitish, greyish on side of breast, grey wash on flanks; iris dark brown; bill orange-yellow to orange-pink; legs blackish. Distinguished from closely similar *S. caerulescens* by white (not black throat), more greyish (rather than olive-grey) upperparts, and brighter bill colour. Female is nondescript, warm buffy brown on crown, nape and upperparts, wings and tail buff-brown like upperparts; breast a similar warm buff-brown, contrasting whitish throat, darker coloration extending to flanks and contrasting with whitish belly and vent; bill and legs dusky. Juvenile resembles female. Voice. Song a long and persistent quick warble reminiscent of that of a siskin (*Carduelis*); sometimes a mellower, more slowly delivered and more melodious "sweeta sweeta chew-wa tweet-twaa sweeta tweet-cha chuup"; may include mimicry in songs. Call an inflected "chiuuu".
Habitat. *Caatinga* scrub, particularly where near moister sites, and dry woodland borders; 500–1200 m.
Food and Feeding. Diet primarily grass seeds. Forages on ground; sometimes reaches seeds by perching on grass stems. In small groups outside breeding period.
Breeding. Up to four broods per season. Cup-shaped nest of dry grass roots and spider webs, placed low down in shrub. Clutch 2 or 3 eggs, greenish-white with dark spots, some larger and darker, blackish spots near wide end; incubation period c. 13 days. No other information.
Movements. Probably resident. Records from S of range (Minas Gerais and Espírito Santo) thought to refer to escapes from captivity.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common in appropriate *caatinga* scrub. Fairly widely kept in captivity.
Bibliography. Armani (1985), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Marcondes-Machado (1982a), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Sick (1993), da Silva (1999).

271. White-bellied Seedeater

Sporophila leucoptera

French: Sporophile à ventre blanc **Spanish**: Semillero Ventriblanco
German: Zweifarbenpfäffchen
Other common names: Black-backed/Bicolored Seedeater (*bicolor*); Grey-backed Seedeater (all other races)

Taxonomy. *Coccothraustes leucoptera* Vieillot, 1817, Paraguay. Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Affinities of this species not clearly understood; recent molecular-genetic analysis indicates close relationship to Bolivian populations of *S. collaris*, but corroboration required. Bolivian race *bicolor* quite different in appearance from others, and may warrant treatment as a separate species. Four subspecies recognized.
Subspecies and Distribution.
S. l. mexianae Hellmayr, 1912 – S Suriname (Sipaliwini) and S Amapá and NE Pará (Mexiana I), at mouth of R Amazon, in Brazil.
S. l. bicolor (d'Orbigny & Lafresnaye, 1837) – extreme SE Peru (Puno) and N & E Bolivia (La Paz, Beni and W & E Santa Cruz).
S. l. leucoptera (Vieillot, 1817) – C & S Brazil (Goiás and Minas Gerais S to Mato Grosso) S through Paraguay to N Argentina (Formosa, Chaco and Santa Fe).
S. l. cinereola (Temminck, 1820) – E Brazil (C Maranhão E to Paraíba, S to Rio de Janeiro).



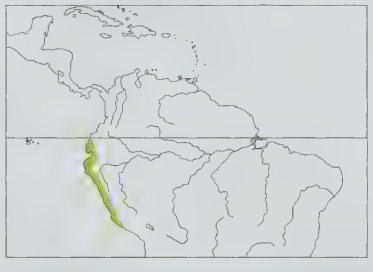
Descriptive notes. 12–12·5 cm; 15–16 g. A comparatively large seedeater with relatively long tail and deep, very short, rounded bill, giving "pushed-in" look to face. Male nominate race has head dark grey, slightly darker around lores, strongly contrasting white throat and submoustachial area; upperparts similarly greyish, some with narrow white band on rump; upperwing and tail darker grey, white at base of primaries forming small white patch on folded wing (white wingstripe noticeable in flight); entirely white below, slightly more greyish on sides and flanks; iris dark brown; bill bright orange-pink; legs blackish. Female is warm-coloured, tawny-brown above and on wings and tail, tawny-buff below, paler than upperparts but similar in colour tone; throat and belly paler, breast and flanks darker; bill blackish. Juvenile resembles female. Race *cinereola* is smaller than nominate, male paler greyish above, lacks white on rump, has extensive grey on flanks, sometimes a partial grey breastband (as spurs on breast sides), female like nominate but smaller; *mexianae* is similar to previous in being pale grey above, but underparts entirely white, lacking grey on flanks and breast side; *bicolor* is very different, male strikingly black on head and upperparts, female slightly browner above and paler below than nominate. Voice. Song of nominate race a repeated loud, ringing note, "cleeuu cleeuu cleeuu cleeuu cleeuu", sometimes uninflected and similar to songs of a nothura (*Nothura*), at other times single whistles rising in pitch; *bicolor* gives similar repetitive song, also a less monotonous secondary song, "piree pew puu pew puu piree pew puu". In Brazil described as giving characteristic ascending whistle repeated in unhurried manner, "ew-éé, ew-éé, ew-éé...". Call "jayip", like that of House Sparrow (*Passer domesticus*).
Habitat. Shrubby thickets, also secondary-forest edge adjacent to patches of grass; always near water, including lakes and streams, but also marshland. Sea-level to 800 m.
Food and Feeding. Seeds of grasses and other plants appear to be primary food; some insects eaten. In São Paulo (Brazil) young fed with seeds of the exotic grass *Brachiaria*. Often forages while hanging from a stem and extracting seeds. Singly and in pairs; generally not in flocks.
Breeding. Season late Nov/Dec to mid-Feb in E Brazil. Nest cup-shaped, built from thin grass roots and spider silk, thin walls allowing contents to be seen through them, often lined with white cottony seed fluff of "algodão-de-seda" (a milkweed in genus *Calotropis*), gives unique white interior, placed 2·5–4·5 m above ground in shrub or tree, often close to water. Clutch 2 eggs, white, with black and brown spots concentrated at large end; incubation by female alone; chicks fed by both parents; no information on duration of incubation and nestling periods.
Movements. Not well studied. Considered mostly sedentary. In Santa Cruz (Bolivia) not present in all months, suggesting some movement; similarly, in parts of Brazil present only Jan–May. Recorded as a vagrant in SE Peru (Tambopata).
Status and Conservation. Not globally threatened. Tends to be relatively uncommon. Has large range, and believed not to be at immediate risk. Many local populations have been extirpated because of intense commercial trapping and habitat loss, and this species' may require a degree of monitoring. Tolerates some habitat disturbance.
Bibliography. Armani (1985), Buzzetti & Silva (2005), Campagna *et al.* (2010), Dubs (1992), Francisco (2009), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Lougheed (1991), McCarthy (2006), Meyer de Schauensee (1952a), de Oliveira (1981), Ouellet (1992), Renssen (1974), Ridgely & Tudor (1989), Short (1975), Sick (1993), da Silva (1999), Storer (1989b).

272. Parrot-billed Seedeater

Sporophila peruviana

French: Sporophile perroquet **German**: Papageischnabelpfäffchen **Spanish**: Semillero Peruano

Taxonomy. *Callyrhynchus peruvianus* Lesson, 1842, Callao, Peru.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). This species was previously placed in its own genus, *Neorhynchus*, on account of its large and oddly shaped bill, but seems well placed in present genus. Closest relatives not clear. Plumage features similar in some respects to those of *S. caerulescens*; shares some similarities in plumage with *S. simplex*, but is broadly sympatric with it; recent mitochondrial DNA study of genus did not include samples of either of these two. Two subspecies recognized.
Subspecies and Distribution.
S. p. devronis (J. Verreaux, 1852) – W Ecuador (from Manabí) S along coast to NW Peru (Tumbes).
S. p. peruviana (Lesson, 1842) – coast of Peru from La Libertad S to Ica.



Descriptive notes. 10·5–12·5 cm; mean 12·6 g. Largely typical seedeater in its small size, but with massively thick bill showing distinct rounded culmen and slightly hooked tip; bill much thicker and more massive than that of congeners, appearing like that of a parrot (Psittacidae) partly because culmen not evenly rounded, but bends strongly half-way along. Male nominate race has greyish head, narrow white eyering, blackish throat separated from grey of head by white malar area; upperparts greyish-brown, contrasting with strongly grey head; tail grey-brown, central feather pair blackish; upperwing similar to upperparts, upperwing-coverts edged buffy and tipped whitish (forming distinct whitish upper wingbar and more diffuse buffy-white lower one, with slightly buffy panel between the two), primary bases white (forming white patch on folded wing); white band on upper breast bordering blackish throat and intruding into side of neck, below it a dark grey to blackish breastband; underparts otherwise white, flanks with buffy wash; iris dark brown; bill apricot-yellow; legs greyish. Female is very nondescript, lacking obvious patterning, entirely pale dusty brown above, colour not dissimilar to that of female House Sparrow (*Passer domesticus*), lacking contrast with equally dull brown wings and tail; small pale patch visible on folded primaries, and two distinctly paler wingbars present; largely off-white with dusty wash below, chin paler than throat, chest with diffuse pale buffy-brown wash; bill pale horn-coloured, often duskier on upper mandible. Juvenile resembles female. Race *devronis* is fairly similar to nominate, but smaller and with relatively smaller bill. Voice. Male song, from hidden perch, relatively short in duration, nasal and harsh, of only 2–3 notes, "jew-jee-jew" or "jit–jew-tcheew" or "tch-chee!". Call a single nasal note.
Habitat. Arid shrubby areas, hedgerows in agricultural areas or villages, overgrown fields and grassy areas; sometimes along dry watercourses. Sea-level to 800 m.
Food and Feeding. Grass seeds. Forages usually on ground, unlike congeners. Singly, in pairs and in small groups; in larger flocks during non-breeding season, when up to 2000 individuals may gather around watering holes, particularly in dry years. How this species differs in food choice from sympatric, smaller-billed *S. telasco* not studied, but its large size and massive bill suggest that it takes larger and harder seeds; perhaps ground foraging, as opposed to stem foraging, is the major difference.
Breeding. Breeds during Feb–Apr wet season; in wet years may be multiple-brooded. Male sings persistently during breeding season, but difficult to locate. Becomes territorial after first rains, begins breeding 2–4 weeks after first important rains. Nest woven from plant tendrils, and placed in bush, often quite high above ground. Sometimes parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Generally sedentary. Seasonal variations in numbers and concentrations suggest that some local movements occur.
Status and Conservation. Not globally threatened. Fairly common to common. Has narrow range, although distribution covers a wide latitudinal span. May benefit from agriculture in desert areas.
Bibliography. Armani (1985), Bond (1951a), Dunning (2008), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Málaga-Arenas & González (2002), Marchant (1958, 1959), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989).



PLATE 66

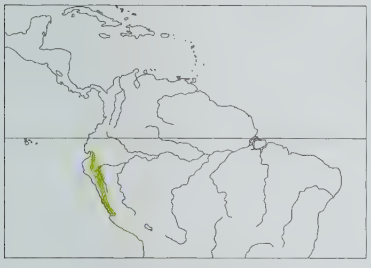
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273. Drab Seedeater

Sporophila simplex

French: Sporophile simple **German**: Dickschnabelpfäffchen **Spanish**: Semillero Simple

Taxonomy. *Spermophila simplex* Taczanowski, 1874, Lima, Peru.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Affiliations uncertain; plumage resembles that of female *S. peruviana*, and conceivable that the two are closely related; molecular-genetic study required. Monotypic.
Distribution. S Ecuador (S Azuay and Loja) and W Peru (upper Marañón Valley and lower Andean slopes from La Libertad S to Ica).



Descriptive notes. 11–11·5 cm. A medium-sized seedeater with rounded bill. Male breeding is greyish-brown above, darker on upperwing and tail; median and greater upperwing-coverts tipped white (forming two narrow whitish wingbars), white bases of primaries (creating white patch on folded wing, wingstripe in flight); whitish below with greyish to buff wash; iris dark brown; bill dull yellow-orange; legs black. Male non-breeding is much like female, but slightly greyer above; this plumage may represent a colour morph, or individual variation, rather than a seasonal change; further investigation required. Female is brownish-buff above, paler below, nearly white on throat and belly; whitish upper wingbar and buffy lower wingbar, and a distinct buffy-white primary patch; bill dusky above, orange-horn on lower mandible; distinguished from rather similar female *S. peruviana* by slightly warmer colour tone of plumage, smaller bill. Juvenile undescribed. Voice. Song a variable rich jumble of warbles and buzzes, similar to that of *S. peruviana* but more notes per phrase. Call a rising "zwee?".
Habitat. Arid scrub, shrubby zones and agricultural sites; 500–2500 m in N of range, down to sea-level in S.
Food and Feeding. Feeds on grass seeds while these still on the stem. Generally in flocks outside presumed wet-season breeding period.
Breeding. No information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA and Peru–Chile Pacific Slope EBA. Fairly common. Relatively poorly known species. Habitat appears not to be at any particular risk, and no evidence of any large decline; population likely stable.
Bibliography. Armani (1985), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Schulenberg *et al.* (2007).

274. Chestnut-throated Seedeater

Sporophila telasco

French: Sporophile télasco **German**: Braunkehlpfäffchen **Spanish**: Semillero Gorjicastaño
Other common names: Tumaco Seedeater ("*S. insulata*")

Taxonomy. *Pyrrhula telasco* Lesson, 1828, vicinity of Lima, Peru.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). Taxonomic status of "*S. insulata*" (known only from Tumaco I, off Nariño, in SW Colombia), with rufous rump and underparts, is uncertain: possibly a race of present species, or a mutant population, or a hybrid with *S. minuta*; further study required. Monotypic.
Distribution. Pacific coast and coastal slope from S Colombia (SW Cauca) S through coastal lowlands of Ecuador (inland as far as S Loja) and Peru (where also in upper Marañón Valley) to N Chile (desert valleys of Arica–Parinacota).



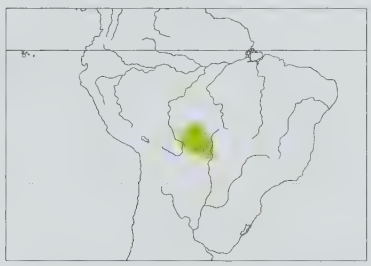
Descriptive notes. 10–10·5 cm; two males 8·4 g and 10·9 g. Typical seedeater, tiny and with thick bill approximately as long as it is deep, with distinct rounded culmen. Male has head mid-grey, crown feathers with deep chestnut bases (which become more noticeable as plumage wears), upperparts greyish, slightly browner on hindneck and lower back, with crown to mantle distinctly streaked dusky (unusual in genus); rump white, uppertail-coverts grey; upperwing blackish, greyish fringes on coverts (on some forming indistinct greyish wingbars) and tertials, noticeable white patch at base of primaries; tail feathers blackish with greyish edging, extreme bases of rectrices white (sometimes visible in the field); throat to upper breast dark chestnut, tiny white patches at base of malar tract; otherwise, entirely whitish below; iris dark brown; bill and legs black. Female in fresh plumage is warm brown above, noticeably streaked darker on crown, nape and mantle, wings more blackish, warm brown fringes on coverts and tertials and noticeable white primary patch, tail similarly blackish with warm brown fringes; white on throat, buffy breastband continuing to flanks, and whitish from lower breast to undertail-coverts; in worn plumage more greyish-brown, not so warm-toned; bill dull pinkish, legs dusky. Immature male is variable, intermediate in plumage between adult male and adult female, often resembles female but with greyish wash on upperparts and some chestnut on throat. Voice. Song a short and staccato musical warble, sometimes with sputter towards end, quality sharp and rich, each note having great frequency range and with bouncing cadence, although songs variable, "chwiip chipiti chaw-pwee" or "chwit cheepa chupa-chit-chupawhit". Call a fine "zeeteep" and a "cheep".
Habitat. Shrubby and open areas, including edge of dry grassland, agricultural areas, desert oasis valleys, hedgerows and edges of small towns and villages; sea-level to 1000 m.
Food and Feeding. Diet largely of grass seeds; feeds nestlings with grass seeds. Forages both on ground and, more usually, while perched on grass stalks or other stems as it extracts seeds. Often in large flocks outside breeding period.
Breeding. Breeds in Feb–May rainy season in Ecuador and Peru (in SW Ecuador 2–5 weeks later than sympatric *S. peruviana*); farther S, where no rainy season, may breed also in that period, but confirmation required. Nest a cup woven from dry grasses and stems, built close to ground in low-growing annual plant or low shrub. Some nests parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Resident; possibly some short local movements.
Status and Conservation. Not globally threatened. Common to abundant throughout its range. Has a large range from N to S. Agriculture in desert areas is likely increasing the amount of suitable habitat for this species.
Bibliography. Armani (1985), Butchart & Stattersfield (2004), Jaramillo (2003), Klicka *et al.* (2007), Marchant (1958, 1959, 1960), McCarthy (2006), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Sabel (1981), Stattersfield & Capper (2000), Stiles (2004).

275. Black-and-tawny Seedeater

Sporophila nigrorufa

French: Sporophile noir et roux **Spanish**: Semillero Rojinegro
German: Schwarzmantelpfäffchen

Taxonomy. *Pyrrhula nigro-rufa* d'Orbigny and Lafresnaye, 1837, Chiquitos, Bolivia.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). This species presumed most closely related to *S. bouvreuil*, and part of the S clade of "capped" seedeaters (*S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris*, *S. cinnamomea*, *S. melanogaster*). Monotypic.
Distribution. E Bolivia (E Santa Cruz; recently also Llanos de Moxos, in NE Beni) and SW Brazil (W Mato Grosso).



Descriptive notes. 10 cm. A typically shaped seedeater, small in size, and with thick, stout but short bill with rounded culmen. Male has well set-off black cap reaching to just below level of eye, cheek and ear-coverts tawny-cinnamon, narrow black band on nape joining with black of upperparts, including upperwing and tail, dark tawny on lower back and rump; primaries with white at bases (very small white patch on folded wing often entirely hidden on perched bird, but evident as whitish wingstripe in flight); in fresh plumage, tertials broadly fringed white, greater upperwing-coverts crisply fringed white (creating pale panel on closed wing); cinnamon-tawny from chin to undertail-coverts, this colour also intruding to side of neck; iris dark brown; bill blackish, in non-breeding period pinkish-horn with dark culmen; legs black. Female is typically dull, sandy with olive tone on head and upperparts, upperwing and tail rather uniform dusky olive with paler edging; pale yellowish on throat, slightly tinged olive on breast, off-white to pale cinnamon on rest of underparts; bill horn-coloured, legs dusky. Younger immature male is similar to adult female, but with greenish feather tips on crown and upperparts; older immature male similar to adult male, but cap brownish, upperpart feathers tipped green, wing-coverts and tertials lack bold white fringes, underparts paler. Voice. Song a pleasant series of whistles, more resonating than songs of most other members of clade and notes delivered at slow and leisurely pace, "cheeooo cheeooo, tp-twee, tp-cheeo, tp-twee, tpweeo, tp-twee, chp-weeo, tp-twee ...". Calls include nasal "phhht", sharper "puut" and rising "cheeé".
Habitat. Grassy *cerrado* habitats, also tall-grass areas near water, open savanna; sea-level to 500 m.
Food and Feeding. Little information. Feeds on grass seeds. Forages while clinging to grass stem at heights of 0·5–1·5 m above ground, extracting seeds from seedheads. In flocks of up to 100 or more, mainly in presumed non-breeding season.
Breeding. No information.
Movements. Appears to be migratory. Exhibits classic austral migration pattern: present E Bolivia (Noel Kempff Mercado National Park) during presumed breeding season of Oct–Dec, peak in May (possibly migration), and largely absent Jul–Oct.
Status and Conservation. VULNERABLE. Rare and local. A very poorly known species. After initial description, in 1830s, this species disappeared until 1979, when rediscovered in Brazil. Currently known from eight locations in Bolivia and three in adjacent Brazil. Has small population, which likely to be in continuous and rapid decline owing to habitat loss and degradation caused by conversion of grassland to agriculture. Main breeding site Flor de Oro, in Noel Kempff Mercado National Park (Santa Cruz); local density of 2 birds/km² estimated at Los Fierros, in Neol Kempff Mercado. In Brazil, 55 presumably breeding individuals counted E of Vila Bela da Santaissima Trinidade (Mato Grosso) in Jan 1988, and at least 100 (non-breeding condition) present there in Jul 1997. In Bolivia, occurs at three sites in Noel Kempff Mercado National Park, also in Otuquis National Park; present in Pantanal Matogrossense National Park, in Brazil. Noel Kempff Mercado was extended to W in 1997, and now protects more habitat suitable for this species.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Güller (2008), Hennessey *et al.* (2003), Herrera & Maillard (2007), Kirwan & Areta (2009), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000).

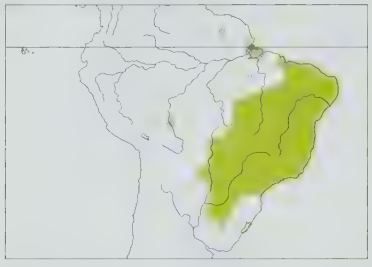
276. Capped Seedeater

Sporophila bouvreuil

French: Sporophile bouvreuil **German**: Orangepfäffchen **Spanish**: Semillero Capinegro
Other common names: Sao Paulo Seedeater (*saturata*)

On following pages: 277. Ruddy-breasted Seedeater (*Sporophila minuta*); 278. Tawny-bellied Seedeater (*Sporophila hypoxantha*); 279. Rufous-rumped Seedeater (*Sporophila hypochroma*); 280. Dark-throated Seedeater (*Sporophila ruficollis*); 281. Marsh Seedeater (*Sporophila palustris*); 282. Chestnut-bellied Seedeater (*Sporophila castaneiventris*); 283. Chestnut Seedeater (*Sporophila cinnamomea*); 284. Black-bellied Seedeater (*Sporophila melanogaster*).

Taxonomy. *Loxia bouvreuil* Statius Müller, 1776, Bahia, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. castaneiventris* and *S. minuta*, and a S clade consisting of present species and *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*; relationships within S clade not possible to determine, as genetic differentiation very low and species apparently part of a very recent and rapid radiation, only present species appearing genetically more distinct within clade. It has recently been suggested that pale race *pileata* may merit treatment as a separate species; also, that *saturata* and *crypta* be synonymized with nominate; further research needed. Four subspecies recognized.
Subspecies and Distribution.
S. b. bouvreuil (Statius Müller, 1776) – S Suriname; E Brazil at mouth of R Amazon and from Maranhão E to Rio Grande do Norte, S to Goiás, NE São Paulo and Rio de Janeiro.
S. b. pileata (P. L. Sclater, 1865) – C & S Brazil (locally in E Pará, and from S Mato Grosso and S Minas Gerais) S through E Paraguay to NE Argentina (Corrientes and Misiones), locally to N Uruguay; also locally in NE Bolivia (Beni).
S. b. saturata Hellmayr, 1904 – environs of city of São Paulo, in SE Brazil.
S. b. crypta Sick, 1968 – environs of city of Rio de Janeiro, in SE Brazil.

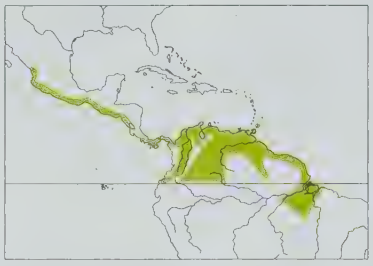


Descriptive notes. 10 cm; 7·6–10 g. Typical seedeater, tiny and with thick bill approximately as long as it is deep, with distinctly rounded culmen. Male nominate race has clean-cut black cap reaching down to level of eye, contrasting cinnamon face and nape, with similar cinnamon colour on throat and entire underparts, except for black thigh; cinnamon of nape continues down back to uppertail-coverts; tail and upperwing contrastingly blackish, wing-coverts and tertials fringed cinnamon-brown (creating cinnamon wing-panel, in fresh plumage), noticeable white at base of primaries (forming rectangular white patch on folded wing); iris dark brown; bill and legs blackish. Female is dull olive-brown above and ochre-buff below, becoming whitish on belly; bare parts as for male. Juvenile resembles female. Races differ in plumage of males: *pileata* is paler than nominate, especially below, where off-white, creamy or pinkish (marked variation in strength of underpart coloration), and paler birds often have more greyish-brown back, also male has non-breeding plumage resembling that of female (but with larger white wing patch, yellowish bill), first-year male paler still, almost whitish below; *saturata* is darker than nominate, chestnut (rather than cinnamon) below; *crypta* is unusual in that breeding male is essentially female-like in plumage, a few showing black specks on crown. Voice. Classic song a series of sweet whistles that fall in pitch, "twee tweeta cheew tweeta phwee", phrases containing pleasant and nicely resonating whistles; another song type described as long, hurried, with varied notes, and tempo of siskin (*Carduelis*); may incorporate mimicry in song. Call a strident "tslit" or a two-note "ewt-eet".
Habitat. Open *cerrado* in N of range, savannas and tall-grass (old) grasslands in S; sea-level to 1100 m.
Food and Feeding. Diet of grass seeds. Forages usually by clinging to grass stem and extracting seeds. Generally in pairs during breeding season, but sometimes joins with other members of genus; may forage in small flocks during non-breeding season.
Breeding. No information.
Movements. Resident in most of range. Migratory in S part of range; many or most of those in Argentina, Uruguay and extreme S Brazil retreat N from late Feb, returning in Nov. Abundance in a given area increases when grass in seed.
Status and Conservation. Not globally threatened. Common to abundant in N part of range; uncommon in S. Has large range and is relatively numerous. Much of this species' habitat is being burnt, being converted to the growing of soybean or sunflowers, or being overgrazed, and populations therefore likely to be declining.
Bibliography. Armani (1985), Belton (1985), Campagna *et al.* (2010), Dunning (2008), Herrera & Vidoz (2009), Klicka *et al.* (2007), Machado & Silveira (2011), McCarthy (2006), Mees (1968), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Sick (1968, 1993).

277. **Ruddy-breasted Seedeater**
Sporophila minuta

French: Sporophile petit-louis **German**: Zwergpfäffchen **Spanish**: Semillero Pechirrufo
Other common names: Minute/Pygmy Seedeater

Taxonomy. *Loxia minuta* Linnaeus, 1758, Suriname.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). This species was at one time considered conspecific with *S. hypoxantha*, but molecular data and vocal details suggest that the two are not very closely related. A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing present species and *S. castaneiventris*, and a S clade consisting of *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*. Three subspecies recognized.
Subspecies and Distribution.
S. m. parva (Lawrence, 1883) – arid Pacific lowlands from W Mexico (Nayarit) S to Nicaragua.
S. m. centralis Bangs & T. E. Penard, 1918 – SW Costa Rica and Pacific slope of Panama.
S. m. minuta (Linnaeus, 1758) – N Colombia S to NW Ecuador, E to Venezuela, Trinidad, Tobago, the Guianas, and N Brazil (NW Amazonas, N Roraima, and Amapá S to N Pará).
Descriptive notes. 8·6–9·6 cm; 7–9 g. A tiny seedeater. Male nominate race has crown and face mid-grey, this colour continuing to back, which is diffusely streaked brownish; lower back and rump rufous, longest uppertail-coverts grey like back; upperwing blackish-brown, wide grey fringes on coverts and tertials, white at bases of primaries (forming distinct white rectangular patch on folded wing); tail feathers blackish with olive fringes; white spot at base of lower mandible, grey of ear-coverts cleanly separated from rufous of submoustachial region and throat, entire underparts rufous; iris dark brown; bill and legs blackish. Female is nondescript, warm buffy brown on crown, nape, mantle and back; wings and tail buff-brown like upperparts (in fresh plumage may show narrow cinnamon-brown wingbars); breast a similar warm buff-brown, contrasting with paler throat,

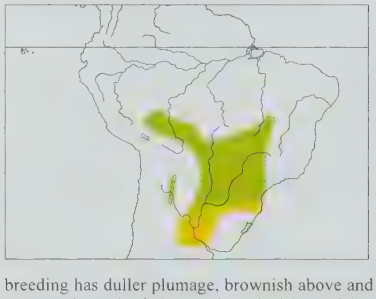


darker coloration extending to flanks and contrasting with paler buff belly and vent; crissum darker than belly, similar to flanks; bill dark horn-coloured. Juvenile is like female; young male gradually acquires rufous on underparts and greyish on upperparts. Race *parva* male is more blue-grey above than nominate, lacking brownish tones, female warmer buff below than other races; *centralis* is smaller than nominate, male with more of a brownish wash on upperparts, paler underparts, female similar to nominate. Voice. Song simple, but sweet and plaintive, "see-seeur tee-te-e-e-e, seeeeur tse-e-e-e-e", in some places with trill reduced to a few notes, or a fairly long, sweet "weet, weet, too eet tew". Call a sharp "chip" or "chink" (varies geographically).
Habitat. Open spaces, often on roadsides, in parks and near dwellings; in bramble (*Rubus*) and wild rose (*Rosa*) thickets, old clearings with bracken (*Pteridium*) and pines (*Pinus*). Found in open savannas, sometimes on farms or in gardens. Sea-level to 2200 m.
Food and Feeding. Overall, a specialist on grass seeds; in Venezuela may feed on soft unripe seeds of *Digitaria* grasses. May vary diet with some other types of seed, fruit, and arthropods, depending on season and availability. Forages principally by perching on grass seedheads, bending down the grass with its own weight while extracting seeds as it clings to stem, often with head down as it does so. Often in groups with other seedeaters.
Breeding. Season Jun–Aug in Central America; mainly Apr–Sept in Colombia. Monogamous. Nest a simple but coarse open cup of grasses, stiff grasses projecting from rim, placed low in grass or in low bush or small tree. Clutch 2–3 eggs, white with brown or reddish-brown spotting. No other information.
Movements. Mostly sedentary. If grass-seed stock low, as in a period of drought or during a long dry season, this species moves elsewhere; dynamics of these erratic movements not known.
Status and Conservation. Not globally threatened. Often common or abundant in appropriate habitat in much of range; rarer and more local in Ecuador.
Bibliography. Anon. (1998), Armani (1985), Dunning (2008), Hellmayr (1938), Hilty & Brown (1986), Howell & Webb (1995), McCarthy (2006), Meyer de Schauensee (1952a), Miller *et al.* (1957), Ouellet (1992), Restall *et al.* (2006), Ridgely & Tudor (1989), Ridgway (1901), Stiles & Skutch (1989), Weathers (1997), Wetmore *et al.* (1984).

278. **Tawny-bellied Seedeater**
Sporophila hypoxantha

French: Sporophile à ventre fauve **Spanish**: Semillero Ventricanela
German: Ockerbrustpfäffchen

Taxonomy. *Sporophila hypoxantha* Cabanis, 1851, Montevideo, Uruguay.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). This species was at one time considered conspecific with *S. minuta*, but molecular data and vocal details suggest that the two are not very closely related. A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypochroma*, *S. ruficollis*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Monotypic.
Distribution. N, W & E Bolivia (La Paz, E Beni and Santa Cruz), Paraguay, Brazil S of Amazon Basin (S Mato Grosso, Goiás and W Minas Gerais S to N Rio Grande do Sul), NW & NE Argentina (Salta S to N Tucumán and N Cordoba; Formosa and Misiones S to Santa Fe, Corrientes and Entre Ríos), and marginally W Uruguay.



Descriptive notes. 10 cm; 10·5 g. A classic seedeater, tiny and with rounded culmen. Male breeding has crown to mantle and upper back greyish (sometimes sandy tips of back feathers when plumage fresh), lower back and rump tawny; tail contrastingly blackish, edges of outer rectrices grey (giving grey-based appearance to folded tail, as edges wider basally); upperwing dark greyish, edged sandy brown (creating brownish wingpanel), white at primary bases (most evident in flight); lower side of head to throat and entire underparts tawny to pale rufous, often darkest on belly; iris dark brown; bill and legs black. Male non-breeding has duller plumage, brownish above and duller on underparts, with paler bill coloration; some males paler below and washed brownish on wings and tail, these likely first-year males. Newly described morph ("*uruguaya*") has tawny of rump extending right up onto nape, isolating grey cap; thus, very similar to *S. cinnamomea*, but paler. Female is relatively warm-coloured, sandy brown above, often with paler buff forehead and supercilium, warm buff below, palest on middle of throat and belly; wings and tail darker, two dull sandy wingbars (when plumage fresh), also a small whitish primary patch; bill and legs dark horn to blackish. Juvenile resembles female; younger male much like female, but may have dark speckling on crown or back. Voice. Song simple and sweet, comprising clear descending whistles, can sound rather monotonous, "cheeu cheeu chewee chu", the whistles given at longer intervals than in songs of other members of clade and more mellow-sounding, song somewhat reminiscent of that of Eastern Meadowlark (*Sturnella magna*); in SE Brazil notes shorter and more staccato, making song sound more choppy. Recent work reveals significant geographical variation in song, with five discernible types from: lowland Bolivia; Formosa; Entre Ríos; Corrientes; and SE Brazil. Common call a mellow, descending "pheeooo"; also gives thin "tsi" or "tsit".
Habitat. Tall moist grasslands, rolling grassy hillsides, also roadside patches of grassland that have been allowed to grow to an older stage; often near marshes or a moist spot adjacent to grassland. In N Argentina (Formosa) breeds in dry grasslands of *Elionurus muticus* and *Imperata brasiliensis* or *Andropogon lateralis*, and in wet grasslands of *Paspalum intermedium* and *Sorghastrum setosum*. Sea-level to 1100 m.
Food and Feeding. Grass seeds. Often perches on stems, and feeds on grass seeds while clinging to stem. Forages in small groups; also in mixed flocks with other seedeaters.

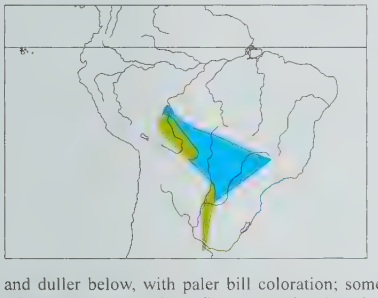
Breeding. Season mainly Oct/Nov–Feb, locally to Apr; in SE Brazil (Santa Catarina) peak in late Nov, and in N Argentina (Formosa) laying starts in second half Oct and continues until second half Mar. Nest, built solely by female, a well-concealed cup of dry grasses, placed close to ground (usually below 45 cm, but to 1 m up) and attached to taller weed stalk or shrub (often of family Asteraceae) in denser section of grass; in Brazil, *Eupatorium polystachyum* and *Vernonia chamaedrys* account for nearly half of all plants used for nesting. Clutch 2–3 eggs, cream-coloured with brown and blackish markings spread throughout; incubation by female, period 11–12 days; chicks initially fed only by female, after 5 days male assists in foraging to collect food for chicks, nestling period c. 9–10 days.
Movements. S populations migratory, retreating N after breeding season; arrival in breeding areas in Nov–Dec, departure by Feb–Mar. Some N Argentine populations may be partially resident, e.g. in Formosa and Entre Ríos, whereas those in S Brazil all migratory; wintering grounds not clearly known, but appear to be in *cerrado* of C Brazil.
Status and Conservation. Not globally threatened. Fairly common; rare, possibly extinct, in Uruguay. Has large breeding range. The old/tall grasslands required by this species are becoming less common throughout its range owing to conversion to commercial crops such as soya and sunflower, overgrazing and, in some areas, frequent burning.
Bibliography. Areta & Repenning (2011a, 2011b), Armani (1985), Belton (1985), Benites *et al.* (2010), Campagna *et al.* (2010), Canevari *et al.* (1991), Claramunt *et al.* (2006), Facchinetti *et al.* (2008), Fontana *et al.* (2010), Franz & Fontana (2010), Kirwan & Areta (2009), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Lopes *et al.* (2010), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Short (1969, 1975), Sick (1993).

279. **Rufous-rumped Seedeater**

Sporophila hypochroma

French: Sporophile à croupion roux **German**: Rotbürzelpfäffchen **Spanish**: Semillero Culirrufo
Other common names: Grey-and-chestnut/Rufous-naped Seedeater

Taxonomy. *Sporophila hypochroma* Todd, 1915, Buena Vista, Santa Cruz, Bolivia.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypoxantha*, *S. ruficollis*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Monotypic.
Distribution. Locally in N & E Bolivia (Beni, La Paz and W Santa Cruz), SW Brazil (S Mato Grosso and S Goiás), C Paraguay, NE Argentina (E Formosa and E Chaco S to Corrientes, Entre Ríos and N Buenos Aires) and W Uruguay.



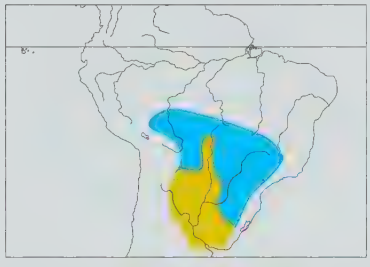
Descriptive notes. 10 cm; one young male 9·7 g. A tiny seedeater with small, rounded bill. Male breeding has crown to mantle and upper back greyish, lower back and rump chestnut; tail contrastingly blackish, edges of outer rectrices grey (giving grey-based look to folded tail, as these edges wider basally); upperwing blackish, white on primary bases (most obvious in flight), tertials black with grey edging; lower side of head to throat and entire underparts chestnut; iris dark brown; bill and legs black. Differs from very similar *S. hypoxantha* in having colours more saturated. Male non-breeding has duller plumage, brownish above and duller below, with paler bill coloration; some males paler below and washed brownish on wings and tail, these likely first-year males. Female is relatively warm-coloured, being sandy brown above, often with paler buff forehead and supercilium, warm buff below, palest on middle of throat and belly; wings and tail darker, two dull sandy wingbars when plumage fresh; bill dark horn to blackish, legs dusky. Juvenile resembles female; younger male much like female, but may show dark speckling on back or crown. Voice. Song more complex than that of other "capuchino" seedeaters, a long warble with many inflected ascending or descending nasal whistles, but also has a cadence reminiscent of slowed-down song of a siskin (*Carduelis*). Call a rising "pwee".
Habitat. Tall grasslands adjacent to marshes or other open wetlands; breeding evidently confined to seasonally wet low-lying grasslands. To 1100 m.
Food and Feeding. Grass seeds. Clings to grass stem while foraging for seeds. Sometimes in mixed flocks with other members of genus.
Breeding. Season Dec–Feb. No other information.
Movements. Poorly known. Partially migratory, but details of movements and precise location of non-breeding grounds incompletely known.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Generally uncommon to rare, and very patchily distributed. Range sometimes mapped as rather large, but appears to be comprised of two disjunct populations, one in E Bolivia and the other in NE Argentina. Population may be in rapid decline owing to loss of native grasslands, as well as trapping for the cagebird trade. Much native grassland within this species' range has been replaced by exotic pine (*Pinus*) and/or eucalypt (*Eucalyptus*) plantations, grown for pulp wood. Protection of important native grasslands is considered necessary for this and many other Neotropical species.
Bibliography. Anon. (2010c), Benites *et al.* (2010), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Claramunt *et al.* (2006), Kirwan & Areta (2009), Klicka *et al.* (2007), McCarthy (2006), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Roda & López-Lanús (2008), Short (1969), Stattersfield & Capper (2000).

280. **Dark-throated Seedeater**

Sporophila ruficollis

French: Sporophile à gorge sombre **Spanish**: Semillero Gorjioscuro
German: Schwarzkehlpfäffchen

Taxonomy. *Sporophila ruficollis* Cabanis, 1851, Montevideo, Uruguay.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Has been suggested that present species is a colour morph of *S. hypoxantha*. Monotypic.
Distribution. N & E Bolivia (E La Paz, Beni, E Santa Cruz and E Tarija), S Brazil (S Mato Grosso, S Goiás, W Minas Gerais, W São Paulo and Rio Grande do Sul), W & C Paraguay, N Argentina (Salta E to Corrientes, S to Tucuman, N Cordoba and N Buenos Aires) and N & W Uruguay.



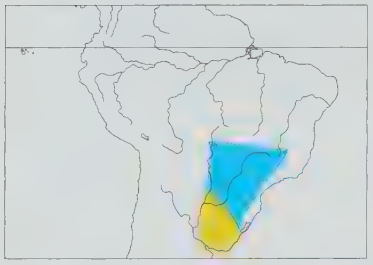
Descriptive notes. 10–11 cm; 7–9·7 g. A distinctive small seedeater, small-billed and relatively long-tailed. Male breeding has forehead to nape and hindneck grey, this colour extending down below eye to upper cheek (creating helmeted appearance, rather than capped pattern); mantle and upper back also grey, sometimes browner than crown, lower back and rump rufous or dark cinnamon; tail contrastingly blackish, some grey edging on outer rectrices; upperwing blackish, coverts narrowly edged grey-brown, tertials more widely edged grey-brown, a noticeable white patch at base of primaries; ear-coverts and cheek to throat and upper breast distinctively blackish-brown, rest of underparts rufous; a recently described morph has brown of throat extending to hindneck, entirely rufous upperparts; iris dark brown; bill and legs dark grey to black. Male non-breeding has duller plumage, with mix of grey and brown on upperparts, paler throat and underparts, and yellowish base of lower mandible. Female is relatively warm-coloured, warm brown above, face uniformly buff, dark eye showing up prominently; wings and tail darker, two dull sandy wingbars when plumage fresh; warm buff below, palest on belly; bill dark horn to blackish, legs blackish. Juvenile is like female; young male in later stages darker on upperparts and buffier on underparts, dark feathers finally appearing on upperparts and throat; some long-standing territorial males observed to retain an immature plumage for years, suggesting that some may never (or only when very old) acquire full adult plumage. Voice. Song sweet and mellow, a series of descending whistles, sometimes with a more complex series of notes towards end, usually begins with two or three whistles, "pheeeh weeo pweeo" or "phee phee feeo pt-pheeo phwit". Calls include quiet "tsiew", "jep" or "tsilew" notes.
Habitat. Old tall grasslands, sometimes near a moist grassy swale, but not so dependent on adjacent marshland as are other "capuchinos"; also roadside grassy areas if grass allowed to grow high. Also in scrubbier habitats, not necessarily near water, in NE Argentina. In non-breeding period also in grassy *cerrado* habitat. Sea-level to 1200 m.
Food and Feeding. Grass seeds. Forages while clinging to grass stems and eating the seeds. Often in small groups or mixed-species flocks.
Breeding. Season Dec–Feb. Nest a cup-shaped structure of dry woven vegetation, fortified with spider webs, mean diameter 4·5 cm, depth 4 cm, placed c. 0·5 m from ground in low vegetation. Clutch 2–3 eggs, whitish with ochre, grey and black markings distributed throughout, but concentrated at wide end. No other information.
Movements. Migratory. Arrives in breeding range in late Nov to Dec; good numbers of this species spend winter months in Cerrado region of Mato Grosso, in S Brazil. Found relatively commonly on passage in NE Paraguay.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Generally uncommon to rare; fairly common to common in N Bolivia. Has relatively large distribution. Considered to be undergoing a moderately rapid population decline. Has clearly decreased in NE Argentina. As with many grassland-dwelling seedeaters, this species is commonly trapped for the cagebird trade and its habitat has been extensively converted to agriculture, with unsuitable crops such as soya and sunflower, and also to plantations of exotic eucalypts (*Eucalyptus*) and pines (*Pinus*); also suffers from overgrazing of grasslands, annual burning on adjacent agricultural land, and pesticide usage. Protection of native grasslands required in order to ensure this species' future survival.
Bibliography. Anon. (2010c), Areta (2009a), Areta *et al.* (2011), Armani (1985), Belton (1985), Benites *et al.* (2010), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Canevari *et al.* (1991), Di Giacomo, A.S. *et al.* (2010), Kirwan & Areta (2009), Klicka *et al.* (2007), Meyer de Schauensee (1952a), Ouellet (1992), de la Peña (1987), Ridgely & Tudor (1989), Short (1969), Sick (1993), Stattersfield & Capper (2000).

281. **Marsh Seedeater**

Sporophila palustris

French: Sporophile des marais **German**: Sumpfpfäffchen **Spanish**: Semillero Palustre
Other common names: White-bibbed Seedeater; Narosky's/Entre Rios Seedeater ("*S. zelichi*")

Taxonomy. *Spermophila palustris* Barrows, 1883, near Concepción del Uruguay, Entre Ríos, Argentina.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. cinnamomea* and *S. melanogaster*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Has been suggested that present species is a white-throated morph of *S. ruficollis* or a colour morph of *S. hypoxantha*. In addition, form described as *S. zelichi* (from Entre Ríos, in NE Argentina) considered to be a white-necked morph of present species, to which it is vocally identical, and found in same habitat and at same locations as it; or possibly a hybrid between present species and *S. cinnamomea*. Monotypic.
Distribution. Breeds in NE Argentina (Corrientes and Entre Ríos, possibly also Buenos Aires), extreme SE Brazil (Rio Grande do Sul) and Uruguay (R Uruguay basin and SE wetlands), possibly also SE Paraguay. Migrates N as far as SC Brazil (N to S Mato Grosso, S Goiás and W Minas Gerais) and E Paraguay.
Descriptive notes. 10 cm; 7·5–9 g. Typical "capuchino" seedeater, very small in size, small-billed and relatively long-tailed. Male has grey forehead and lores to nape, similarly grey mantle and back, rufous lower back and rump; tail contrastingly blackish, some grey edging on outer rectrices; upperwing blackish, narrowly grey-edged coverts, more widely grey-edged tertials, a noticeable white patch at base of primaries; distinctive snow-white on throat and face reaching up to eye level



and extending down to upper breast; rest of underparts rufous; iris dark brown; bill and legs black. At least some males moult into a brown plumage after breeding (how widespread this is requires more research). Female is relatively warm-coloured, warm sandy brown above, face uniformly buff, dark eye showing up prominently; wings and tail darker, coverts with sandy-brown edging that on some appears as two dull sandy wingbars when plumage fresh; warm buff below, whitish on belly and sometimes on middle of throat and breast; bill dark horn to blackish, legs blackish. Juvenile is very like female; young male in later stages darker on upperparts, buffier on underparts, eventually dark feathers begin to show on upperparts and white ones on throat. Voice. Song sweet, melodious and pleasant, composed largely of sweet descending whistles, and with distinctive note that rises in pitch before falling, "tweeew tri tweew teee tweéé0000 twip tweew tweew teee tweéé000 twip..."; overall a tad higher-pitched than song of closely related *S. cinnamomea*, and with characteristic rising and falling note. Songs appear to alter over time, with slight but detectable changes between songs from 1980s and those in 2000s. Rarely, some males territorial and sing while still in immature plumage. Call typically a sweet descending whistle, "twéeeeeww", also "tslit".

Habitat. For breeding requires older, taller very moist grasslands or grass adjacent to marshes. Of the "capuchino" seedeaters perhaps the one most closely tied to marshes; often perches on a taller stalk (such as *Erigonum*) in otherwise straight *Scirpus* or *Typha* marshes. In non-breeding range also in dry grassland. Sea-level to 1100 m.

Food and Feeding. Grass seeds. Forages while clinging to grass stems. Often in mixed flocks with other seedeaters.

Breeding. Season Dec–Feb. No other information.

Movements. Migratory; apparently breeds only in S part of range during austral spring and summer, and then migrates N. Details of movements remain to be determined.

Status and Conservation. ENDANGERED. Relatively rare and locally distributed. Estimated global population in range 1000–2499 mature individuals. Has fairly small breeding range and very small population. Has suffered extensive habitat loss and degradation; moist or flooded grasslands are often drained or overgrazed. In addition, this species suffers from widespread trapping for the cagebird trade, as its unique coloration is favoured by bird-collectors. A main threat is the replacement of native grassland and other vegetation with exotic pine (*Pinus*) and eucalypt (*Eucalyptus*) plantations; this not only eliminates suitable grassland habitats, but also decreases chances of migrating birds of locating their naturally variable and spatially scattered food resources. Similarly, some seasonally inundated grasslands and marshes, e.g. in S Paraguay and parts of Uruguay, have been converted to rice fields. Further threats include annual burning of grasslands, which destroy or put at risk migration stopover sites and non-breeding habitats, and use of pesticides in foraging areas. Legally protected in Brazil, Paraguay and Uruguay; trapping of this species prohibited in Argentina and Uruguay, but enforcement of laws not fully effective. Breeds in several protected areas, including Iberá Provincial Reserve (Argentina) and Potrerillo de Santa Teresa Reserve (Uruguay); in Brazil, Das Emas National Park possibly an important wintering site, and has been recorded also in Espinilho Ecological Park, Ibirapuitã and São Donato Biological Reserves and Itirapina Ecological Station; occurs in two protected areas within San Rafael National Park (Paraguay), where a monitoring scheme is studying threatened grassland birds. Passage migrants occur in several Paraguayan and Argentine reserves. Surveys needed in order to ascertain this species' precise breeding and non-breeding ranges, and effective enforcement of laws required.

Bibliography. Anon. (2010c), Areta (2008, 2009a), Armani (1985), Azpiroz (2003b), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Di Giacomo, A.S. *et al.* (2010), Hirschfeld (2007), Klicka *et al.* (2007), Lopes *et al.* (2010), Meyer de Schauensee (1952a), Ouellet (1992), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000).

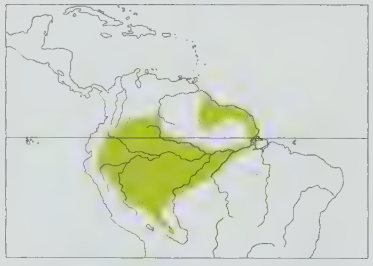
282. Chestnut-bellied Seedeater

Sporophila castaneiventris

French: Sporophile à ventre châtain **Spanish**: Semillero Ventricastaño
German: Rotbauchpfäffchen

Taxonomy. *Sporophila castaneiventris* Cabanis, 1848, Cumaka, coast of Guyana.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing present species and *S. minuta*, and a S clade consisting of *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris*, *S. cinnamomea* and *S. melanogaster*. Proposed taxon *S. hypochroma rothi* (based on single specimen from near Abary, in NE Guyana) likely a hybrid between present species and *S. minuta*. Monotypic.

Distribution. The Guianas, and E Colombia (from Guainía and Meta) and S Venezuela (extreme SW Amazonas) S, E of Andes, to Ecuador, Peru and N & W Bolivia (Pando, La Paz, Beni and Cochabamba), and Amazonian Brazil (S to NW Mato Grosso and N Pará, also NE Roraima and Amapá).



Descriptive notes. 10 cm; average 7·8 g. Typical seedeater, very small in size, and with stubby, rounded bill. Male has entire head down to cheek and ear-coverts blue-grey, this colour continuing on upperparts to back and rump; tail blackish, grey edging at base of outer rectrices; upperwing blackish, feathers edged greyish, particularly on tertials, sometimes a hint of paleness on primary bases; sometimes a tiny white spot at base of lower mandible, rest of submoustachial region and throat chestnut, this colour broadening at breast, then narrowing but continuing down mid-line of underparts on belly, broadening again on vent and undertail-coverts; flanks blue-grey, similar in colour to upperparts; iris dark brown; bill and legs black. Female is relatively warm-coloured, warm sandy brown above, face uniformly buff, dark eye showing prominently; upperwing and tail darker, wing-coverts with sandy-brown edging (can give impression of two dull sandy wingbars when plumage fresh); warm buff below, palest on belly and sometimes on middle of throat and breast; bill dark horn to blackish, legs blackish. Juvenile is very like female, male with more distinctive buffy edging on wing feathers; male becomes progressively more like adult, first acquiring a patchy plumage mixing browns with grey and chestnut feathering. Voice. Song a quick warble of nasal whistles; sometimes gives a longer and more complex song with many rambling notes and repeated phrases. Call a descending "cheeoo" whistle or a shorter "tsiep".

Habitat. Grassy and shrubby clearings, agricultural areas, and lawns and grassy openings in towns and villages; also floating vegetation in lakes or *cochas* (artificial lagoons). Recorded from sea-level up to 500 m.

Food and Feeding. Grass seeds; also fruits of *Cecropia* trees, as well as their Müllerian bodies. Forages on grasses while on the stem; also on ground when prostrate stems of grasses available. When eating fruit, takes those already opened by larger species. Often in groups or small flocks.

Breeding. No information available.

Movements. Insufficient information. Possibly a partial migrant.

Status and Conservation. Not globally threatened. Common and widespread. In some areas this seedeater appears to be expanding its range.

Bibliography. Armani (1985), Beebe (1917), Benites *et al.* (2010), Borges & Torres de Macedo (2001), Campagna *et al.* (2010), Chubb (1921b), Klicka *et al.* (2007), McCarthy (2006), Meyer de Schauensee (1952a), Ouellet (1992), Restall *et al.* (2006), Ridgely & Tudor (1989), Short (1969).

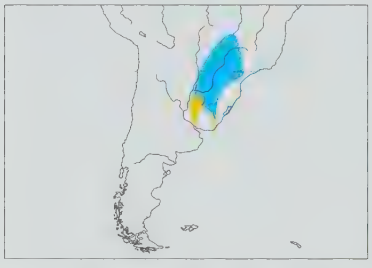
283. Chestnut Seedeater

Sporophila cinnamomea

French: Sporophile cannelle **German**: Zimtpfäffchen **Spanish**: Semillero Castaño
Other common names: Grey-capped Chestnut Seedeater; Narosky's/Entre Rios Seedeater ("*S. zelichi*")

Taxonomy. *Pyrrhula cinnamomea* Lafresnaye, 1839, River Araguaia, Goiás, Brazil.
Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris* and *S. melanogaster*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Form described as *S. zelichi* (from Entre Ríos, in NE Argentina) considered to be a white-necked morph of *S. palustris* or possibly a hybrid between latter and present species. Monotypic.

Distribution. Breeds in NE Argentina (Corrientes and Entre Ríos), extreme SE Paraguay (Itapúa), extreme SE Brazil (W & SC Rio Grande do Sul) and W & SE Uruguay (mostly Paysandú, Río Negro and Rocha, also Artigas, Soriano and Treinta y Tres). Migrates N as far as SC Brazil (Goiás, SE Mato Grosso and W Minas Gerais).



Descriptive notes. 10 cm. A tiny, small-billed and relatively long-tailed seedeater. Male has distinctive grey cap, rest of head, neck, entire upperparts, throat and entire underparts chestnut (some seemingly adult males have pale feather tipping on underparts, giving patchy appearance, also some have entirely chestnut undertail-coverts, while others whitish from here to vent); tail contrastingly blackish, some grey edging on rectrices; upperwing also blackish, lesser upperwing-coverts blue-grey (creating greyish shoulder), remaining coverts edged grey, tertials more widely grey-edged, a noticeable white patch at base of primaries; iris dark brown; bill and legs black. Female is relatively warm-coloured, warm sandy brown above, face uniformly buff, dark eye prominent; upperwing and tail darker, wing-coverts with sandy-brown edging (on some appears as two dull sandy wingbars when plumage fresh); warm buff below, whitish on belly, and sometimes on middle of throat and breast; bill dark horn to blackish, legs blackish. Juvenile is very like female; young male in later stages darker on upperparts, buffier on underparts, eventually dark feathers begin to appear on upperparts and white ones on throat. Voice. Song sweet, melodious and pleasant, composed largely of sweet descending whistles, with some more nasal or slightly warbled notes, "tweew tii-tweeew tweew, peew put-tweew tuu-twii nhhhnhhh tweew..."; overall slightly lower-pitched and more nasal in quality than song of closely related *S. palustris*. Call typically a sweet descending whistle, "twéeeeeww".

Habitat. Tall grassland adjacent to moist swales, moist shrubby marsh or wet savanna. In study in Argentina, found in undulating grassland 73·5% of time, in marsh or wet grassland 14·7%, and in cardal–caraguatal (*Cardus–Eryngium horridum*) thickets 11·7% of time.

Food and Feeding. Grass seeds. Clings to grass stem as it removes seeds. Forages in small groups or in mixed flocks with other seedeater species; in non-breeding season in larger flocks with various other members of genus.

Breeding. Season Dec–Feb. Nest a woven cup of dry grass, often very pale in colour, and translucent owing to thin nature of nest bottom. Clutch 3 eggs, white with grey, brown and blackish markings, these largely around wide end. No other information.

Movements. Migratory; breeds during austral spring and summer, then migrates N. Details of migration remain to be determined.

Status and Conservation. VULNERABLE. Locally fairly common; very patchily distributed. Has suffered rapid decline, and global population believed now to be small and fragmented. Main causes of decline are capture for the cagebird trade and degradation and loss of habitat. Illegal trapping has led to great reduction in numbers of this species in the wild, and alteration or loss of habitat owing to draining of wetlands, overgrazing and, primarily, the planting of exotic pines (*Pinus*) and eucalypts (*Eucalyptus*) has compounded the problem. Has been suggested that small grassland patches adjacent to these tree plantations may attract grassland birds such as seedeaters, but that reproductive rates there may be lower than in large patches of grassland, effectively creating a population sink in these areas. In addition, pesticides and other harmful chemicals enter marshes, and invasive grasses and annual burning are a further threat to habitats in non-breeding period. In S Paraguay seasonally inundated grasslands and marshes have been converted to rice fields, but effect, positive or negative, of rice-farming unknown. In Argentina, where trapping prohibited, this species breeds in El Palmar National Park; trapping prohibited also in Uruguay, but illegal trade continues, especially along R Uruguay basin; legally protected in Paraguay, where it

occurs in two protected sectors of San Rafael National Park. Protected by law in Brazil, and occurs in Das Emas (Goiás) and Ilha Grande National Parks (Paraná–Mato Grosso do Sul border), Itirapina Ecological Station (São Paulo) and São Donato Biological Reserve (Rio Grande do Sul); non-breeding visitors numerous only at Das Emas National Park.

Bibliography. Anon. (2010c), Areta (2008), Armani (1985), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Canevari *et al.* (1991), Di Giacomo, A.S. *et al.* (2010), Klicka *et al.* (2007), Lopes *et al.* (2010), Meyer de Schauensee (1952a), Narosky (1975), Ouellet (1992), Ridgely & Tudor (1989), Stattersfield & Capper (2000).

284. **Black-bellied Seedeater**

Sporophila melanogaster

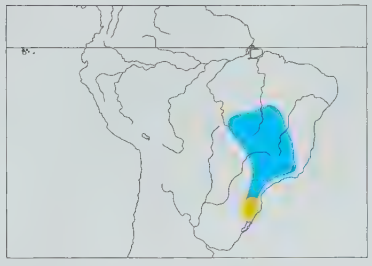
French: Sporophile à ventre noir **Spanish**: Semillero Ventrinegro
German: Schwarzbauchpfäffchen

Taxonomy. *Spermophila melanogaster* Pelzeln, 1870, Itararé and Resaca, São Paulo, Brazil.

Molecular evidence suggests that genus is closely related to *Oryzoborus*, which should perhaps be subsumed within it; further, that both genera should be placed in the tanager family (Thraupidae). A molecular-genetic study of 17 species in genus, including ten in "capped" group ("capuchinos"), indicated that latter form two clades, a N clade largely N of R Amazon containing *S. minuta* and *S. castaneiventris*, and a S clade consisting of present species and *S. bouvreuil*, *S. hypoxantha*, *S. hypochroma*, *S. ruficollis*, *S. palustris* and *S. cinnamomea*. Determination of relationships within the S clade not possible, as genetic differentiation very low and species are apparently part of a very recent and rapid radiation. Monotypic.

Distribution. Breeds in SE Brazil (E Santa Catarina and NE Rio Grande do Sul); migrates N as far as C Goiás and W Minas Gerais.

Descriptive notes. 10 cm; 8–10·5 g. Typical seedeater in shape and small size, with stubby, rounded bill. Male breeding has head down to malar region blue-grey, sometimes with tiny white spot by base of lower mandible, neck and upperparts similarly blue-grey; tail blackish, pale grey edging at base of outer rectrices; upperwing also blackish, feathers edged grey, particularly on tertials, narrow greyish wingbars sometimes apparent, small white patch on primary bases; throat black, black continuing along centre of breast, broadening into largely black belly and continuing to all-black vent and undertail-coverts, with flanks blue-grey (similar in colour to upperparts); iris dark brown; bill and legs black. Male non-breeding moults into female-like plumage, and bill becomes more yellowish. Newly described morph ("*xumanxu*") is almost entirely black, apart from grey cap and



greyish feather edgings on wings. Female is relatively warm-coloured, warm sandy brown above, face uniformly buff, dark eye showing prominently; upperwing and tail darker; warm buff below, palest on belly and sometimes on middle of throat and breast; bill dark horn to blackish, legs blackish. Juvenile and immatures not well known; presumably much like female, and older immature males beginning to show traces of adult plumage. Voice. Song begins with one or two buzzy trills followed by a long, high descending note, which sounds as if divided into three parts, "twah-wah-weew"; final section of song is continued by rhythmic sequence of clear notes, normally alternating with very characteristic rough "chirp" notes. Also pairs of descending whistles or single whistles with moderately long intervals between them, "tweeooo-twi... cheeeooooo...tweeoooo...". Call a short "thwup" or "chip".

Habitat. Old tall grassland adjacent to wetlands or moist swales, at 700–1000 m; lower in non-breeding season.

Food and Feeding. Grass seeds. Clings to grass stem while extracting the seeds. Forages in pairs and in small groups.

Breeding. Season Nov–Mar. No other information.

Movements. Migratory; arrival on breeding grounds in Oct–Nov, departure Feb–Mar. Details of migration remain to be determined.

Status and Conservation. Not globally threatened. Currently considered Near-threatened. Locally common; has tiny breeding range. Thought to be undergoing a moderately rapid population decline, largely as a result of decrease in area of habitat. Grasslands continue to be converted to cattle ranching, invasive grasses are becoming ever commoner, and other agriculture is encroaching. Pesticides noted as a potential problem. Surveys required in order to ascertain full extent of this species' range, particularly during non-breeding season; its ecological requirements and extent to which it tolerates agricultural habitats need also to be determined. Effective protection of significant areas of suitable grassland habitat at key sites needs to be ensured.

Bibliography. Anon. (2010c), Armani (1985), Belton (1985), Butchart & Stattersfield (2004), Campagna *et al.* (2010), Fontana *et al.* (2010), Klicka *et al.* (2007), Lopes *et al.* (2010), Meyer de Schauensee (1952a), Ouellet (1992), Repenning *et al.* (2010), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000).



PLATE 67

inches 2

cm 5

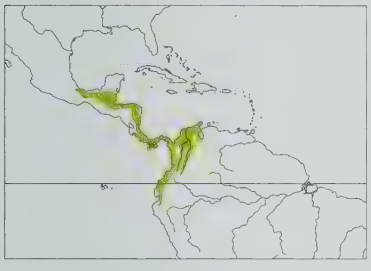
Genus *ORYZOBORUS* Cabanis, 1851

285. **Thick-billed Seed-finch**

Oryzoborus funereus

French: Sporophile à bec fort **Spanish**: Semillero Piquigrueso
German: Dickschnabel-Reisknacker
Other common names: Lesser Rice Grosbeak, Lesser Seed-finch (when treated as conspecific with *O. angolensis*)

Taxonomy. *Oryzoborus angolensis funereus* P. L. Sclater, 1860, Suchapam, Oaxaca, Mexico.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Present species commonly treated as conspecific with *O. angolensis*; they hybridize in S Colombia (upper Magdalena Valley), but apparently only to a limited extent. Four subspecies recognized.
Subspecies and Distribution.
O. f. funereus P. L. Sclater, 1860 – SE Mexico (S Veracruz) S in Caribbean lowlands to Nicaragua.
O. f. salvini Ridgway, 1884 – S Nicaragua, Costa Rica (except extreme SW) and Caribbean coast of Panama.
O. f. ochrogyne Olson, 1981 – SW Costa Rica, and Pacific slope of Panama, including Coiba I (off S Veraguas) to W & N Colombia (E to Magdalena Valley and Guajira Peninsula) and extreme NW Venezuela (W shores of L Maracaibo).
O. f. aethiops P. L. Sclater, 1860 – SW Colombia (Nariño) and W Ecuador.



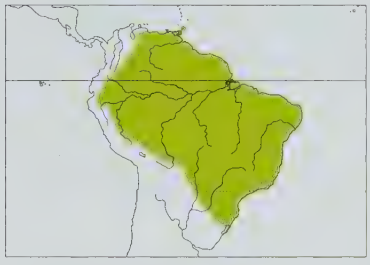
Descriptive notes. 10·7–12·5 cm; 12·8–13·9 g. Small, with large, very deep-based bill (larger than *Sporophila*). Male nominate race is all black, except for white at bases of primaries and secondaries (mostly concealed), and white underwing-coverts; iris black; bill and legs blackish. Female is dark brown above, paler cinnamon-brown below, lacks white in primaries; bare parts as for male. Juvenile is like female. Races differ in depth of colour of females and subadult males: *salvini* is much more richly coloured than others, with underparts deep reddish-chestnut; *aethiops* is similar to previous, but more sooty (less reddish) above and below; *ochrogyne* is much paler than others. Voice. A series of sweet, slurred whistles and warbles, "techu techu chu chi techu chu chi...", duration 4–20 seconds. Call a slurred "tchew" or staccato "dik".
Habitat. Humid forest edge, grassy and shrubby fields with scattered shrubs and trees, second growth and tall grass; usually found in scrub in grassy areas; more arboreal than other seedeaters. Lowlands to 1100 m, usually below 500 m.
Food and Feeding. Feeds on grass seeds, including hard-shelled seeds of a grass in genus *Olyra*. Forages in dense vegetation; flicks wings and tail in nervous manner. Singly and in pairs; sometimes in small groups, occasionally with other seed-finches.
Breeding. Season Apr–Sept in Middle America and May–Oct in Colombia. Nest a slight cup of rootlets, fibres and grasses, lined with finer rootlets and spider webs, placed up to 1 m above ground or water in bush, dense tree or vine tangle. Clutch 2–3 eggs, dull greenish-white, heavily spotted with brown or lilac. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally fairly common; common on Coiba I, off S Panama; uncommon to rare in Mexico. Apparently increasing in numbers in Darién, Panama, following clearing of forest.
Bibliography. Armani (1985), Howell & Webb (1995), McCarthy (2006), Miller *et al.* (1957), Monroe (1968), Olson (1981a, 1981e), Ridgely & Gwynne (1989), Ridgway (1901), Stiles & Skutch (1989), Wetmore *et al.* (1984).

286. **Chestnut-bellied Seed-finch**

Oryzoborus angolensis

French: Sporophile curio **German**: Braunbauch-Reisknacker **Spanish**: Semillero Curió
Other common names: Lesser Rice Grosbeak, Lesser Seed-Finch (when treated as conspecific with *O. funereus*)

Taxonomy. *Loxia angolensis* Linnaeus, 1766, Angola; error = eastern Brazil.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Present species commonly treated as conspecific with *O. funereus*; they hybridize in S Colombia (upper Magdalena Valley), but apparently only to a limited extent. Proposed race *theobromae* (known from two specimens from upper Magdalena Valley in Tolima and Huila, in Colombia) is synonymized with *torridus*. Two subspecies recognized.
Subspecies and Distribution.
O. a. torridus (Scopoli, 1769) – E & SE Colombia, Venezuela, Trinidad and Tobago, the Guianas, and Amazonian Brazil S to lowlands of E Ecuador and E Peru.
O. a. angolensis (Linnaeus, 1766) – C & E Brazil (Mato Grosso, Goiás and Piauí S to Rio Grande do Sul) to N & E Bolivia (Beni and Santa Cruz), Paraguay and extreme NE Argentina (Misiones).
Descriptive notes. 10·6–12·4 cm; 11·4–14·5 g. A medium-sized, heavy-billed finch. Male has entire head down to breast and all of upperparts, including tail, black; upperwing also black, except for a small, well-formed white patch at base of primaries; black of breast stops abruptly, changing to deep chestnut that continues to undertail-coverts; flanks also chestnut, thighs black; wing-linings brilliant white, this extending to marginal wing-coverts (often visible on perched bird); iris lack; bill and legs black. Female is nondescript, lacking distinct patterns on face and wing; entirely warm brown above, upperwing and tail brown like upperparts; pale cinnamon below, darkest on breast



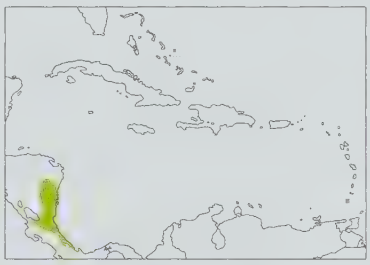
and nearly whitish on chin; wing-linings bright white, as on male; bill dark, legs dusky. Juvenile is like female. Race *torridus* is smaller than nominate, smaller-billed and relatively short-tailed. Voice. Song a fairly long series of musical whistled notes, interspersed with chattering notes, and often ending in trills; quite variable. Call a single liquid whistle.
Habitat. Shrubby or grassy clearings in forest and edges, deciduous forest and second growth. Sea-level to 1600 m.
Food and Feeding. Little information. Diet seeds and insects. Gleans grass seeds by clinging to long stems that bend over, or by hopping on ground. Generally singly or in pairs; occasionally joins flocks of other seedeaters.
Breeding. Season Feb–Aug in N and Sept–Feb in S. Nest flimsy, a deep cup of fine reddish grasses and vines, usually placed fairly near ground. Clutch 2 eggs, sometimes 3. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Generally fairly common in most parts of its very large range. Rare in Trinidad. Records from Tobago are thought to refer to escaped captives. Highly prized as a cagebird because of its song, and often trapped. Formerly widespread and common in Trinidad, but numbers there greatly reduced by trapping and now rare.
Bibliography. Armani (1985), Dunning (2008), ffrench (1991), Hilty (2003), Lill (1974), McCarthy (2006), Miller (1982), Olson (1981a, 1981e), Restall (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Ridgway (1901).

287. **Nicaraguan Seed-finch**

Oryzoborus nuttingi

French: Sporophile de Nutting **Spanish**: Semillero Nicaragüense
German: Rosenschnabel-Reisknacker
Other common names: Pink-billed Seed-finch, Nutting's Rice Grosbeak

Taxonomy. *Oryzoborus nuttingi* Ridgway, 1884, Los Sábalos (River San Juan), Nicaragua.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Formerly considered conspecific with *O. crassirostris*, *O. maximiliani* and *O. atrirostris*; still included by some authors in *O. maximiliani*, but by others considered closest to *O. crassirostris*; taxonomy of this group still in flux. Monotypic.
Distribution. Caribbean lowlands of Nicaragua, N & E Costa Rica (including Laguna de Arenal, near Finca La Selva) and W Panama (Almirante region of Bocas del Toro).



Descriptive notes. 14–14·5 cm; 24 g. Medium-sized finch with massive bill. Male is all black; iris blackish; bill pale pinkish; legs lead-grey. Female is slightly smaller than male, dark brown above, rump and uppertail-coverts paler than back; paler warm brown on ventral surface; bill blackish. Juvenile is like female. Voice. Male's song, from tree or shrub overlooking grassy breeding site, or in flight, a series of slurred whistled notes, slower, deeper and richer than song of *O. funereus*. Call a short, sharp "check".
Habitat. Wet grassy areas, usually near water; 500–900 m.
Food and Feeding. Feeds mostly on grass seeds. When not breeding may be found in small flocks, sometimes with other seed-eating finches.
Breeding. Season Feb–Jul. Nest a flimsy cup of fibres and grasses, lined with finer rootlets and spider webs, placed fairly low over ground or water in bush or other vegetation. Clutch 2 eggs, greenish-white with brown spots. No other information.
Movements. Resident; apparently moves in response to available food.
Status and Conservation. Not globally threatened. Uncommon; local. Has apparently expanded its range S from S Nicaragua in recent years.
Bibliography. Armani (1985), Olson (1981a), Ridgway (1901), Stiles (1984), Stiles & Skutch (1989), Wetmore *et al.* (1984).

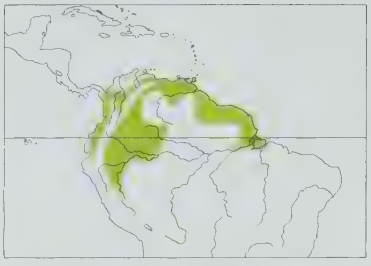
288. **Large-billed Seed-finch**

Oryzoborus crassirostris

French: Sporophile crassirostre **German**: Mohrenreisknacker **Spanish**: Semillero Piquigrande

Taxonomy. *Loxia crassirostris* J. F. Gmelin, 1789, no locality = Cayenne, French Guiana.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Formerly considered conspecific with *O. nuttingi*, *O. maximiliani* and *O. atrirostris*; race *occidentalis* often placed in *O. maximiliani*; taxonomy of this group still in flux. Two subspecies recognized.
Subspecies and Distribution.
O. c. occidentalis P. L. Sclater, 1860 – Pacific slope of Colombia S to SW Ecuador.
O. c. crassirostris (J. F. Gmelin, 1789) – Venezuela, the Guianas, E Colombia S to NE Peru, and N & W Brazil (NW Amazonas, NE Roraima, Amapá and N Pará); also Trinidad (at least formerly).
Descriptive notes. 13·5–14·5 cm; two birds 19·8 g and 22 g (nominate), 22–28·4 g (*occidentalis*). A medium-sized finch with proportionately long tail and enormous bill for its body size; bill so deep that crown appears to sweep back from base of upper mandible, giving flat-headed look. Male nominate race is almost entirely black and lacking noticeable gloss; white patch at base of primaries; wing-

On following pages: 289. Great-billed Seed-finch (*Oryzoborus maximiliani*); 290. Black-billed Seed-finch (*Oryzoborus atrirostris*); 291. White-naped Seedeater (*Dolospingus fringilloides*); 292. Blue Seedeater (*Amaurospiza concolor*); 293. Blackish-blue Seedeater (*Amaurospiza moesta*); 294. Carrizal Seedeater (*Amaurospiza carrizalensis*).

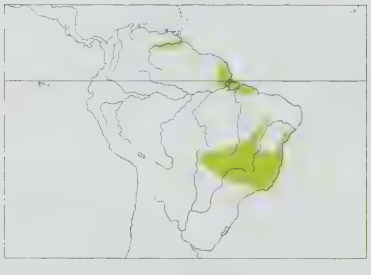


linings white; iris very dark; bill ivory-white, glossy; legs black. Distinguished from very similar *O. maximiliani* by smaller size and less massive bill, also by often cleaner-looking bill; from *O. atrirostris* also by paler bill. Female is warm brown above, slightly darker on plain wings and tail, paler buff-brown below; white wing-linings; bill blackish, legs dark. Juvenile is like female, but young male with slightly streaked head and darker wings, as well as paler throat and horn-coloured bill. Race *occidentalis* differs in having smaller white primary patch and darker underwing. VOICE. Song (race *occidentalis*) lasts 4–5 seconds, a couple of introductory notes followed by rich gurgling series of rapidly delivered notes; overall effect similar to that of song of Bobolink (*Dolichonyx oryzivorus*). May give a flight song which is much more complex and longer than perched song. Call a sharp "chwit!" or "tchweet!", with explosive quality.
Habitat. Usually found near water in shrubby areas adjacent to marshes, as well as tall emergent vegetation by rivers, swamps and lakes; also damp pastures and tall moist grassy areas. Sea-level to 500 m.
Food and Feeding. Seeds; perhaps particularly well adapted to feeding on seeds of large sedges (Cyperaceae). Probably some insects taken. Forages by perching on stem or adjacent stem to reach seedheads; also on ground. Searches in rice paddies. Singly and in pairs; sometimes in small flocks.
Breeding. Nests found in May and possibly Sept in Trinidad. Nest a well-constructed but loose cup-shaped structure of stalks and grass, lined with softer material, greenish moss around rim, placed fairly low in shrub. Clutch 2–3 eggs, cream-coloured and spotted with dark brown; incubation by female, period 12 days; chicks fed by both male and female. No further information.
Movements. Resident.
Status and Conservation. Not globally threatened. Generally uncommon, and local. Numbers of this species have been greatly depleted by trapping for the cagebird trade. Appears to be localized and scarce in most of its range; very rare in French Guiana and increasingly so in Suriname and Guyana, where trapping most severe; very uncommon in Brazil; perhaps still locally fairly common in Colombia. Could become threatened in the future; monitoring required.
Bibliography. Armani (1985), Ffrench (1991), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Lill (1974), McCarthy (2006), Meyer de Schauensee (1970b), Miller (1982), Olson (1981a), Restall *et al.* (2006), Ridgely & Tudor (1989), Robbins *et al.* (2005), Sick (1993).

289. **Great-billed Seed-finch**
Oryzoborus maximiliani

French: Sporophile de Maximilien **Spanish**: Semillero de Maximilian
German: Maximilianreisknacker
Other common names: Greater Seed-finch

Taxonomy. *Oryzoborus maximiliani* Cabanis, 1851, River Espírito Santo, Espírito Santo, and Caravellas, Bahia, Brazil.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Formerly considered conspecific with *O. nuttingi*, *O. crassirostris* and *O. atrirostris*; race *occidentalis* of *O. crassirostris* often placed in present species; taxonomy of this group still in flux. If present species is placed in genus *Sporophila*, name *magnirostris* becomes preoccupied, and must be replaced by *parkesi*. Two subspecies recognized.
Subspecies and Distribution.
O. m. magnirostris Phelps, Sr & Phelps, Jr, 1950 – E Venezuela (SE Sucre S to Delta Amacuro, and N Bolivar along S bank of R Orinoco), W Guyana and E French Guiana to N Brazil (Amapá and N Pará).
O. m. maximiliani Cabanis, 1851 – C & E Brazil (N Goiás, C Piauí and Bahia S to C Mato Grosso and N São Paulo).

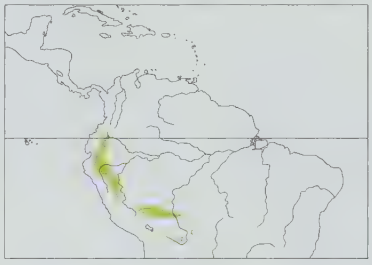


Descriptive notes. 14·5–16·5 cm. A medium-sized finch with proportionately long tail and enormous bill; bill so deep that crown appears to sweep back from base of upper mandible, giving flat-headed look. Male is black with dull blue gloss, except for noticeable white patch at base of primaries; wing-linings also white; iris very dark; bill ivory-white, worn and uneven-looking in texture, often with diagonal ridges or lines; legs black. Distinguished from very similar *O. crassirostris* by larger size, also proportionately larger bill looking worn and less neat (not shiny and smooth). Female is warm brown above and paler buff-brown below, wings and tail slightly darker than upperparts and lacking any pale bars or patches, wing-linings white; bill black; legs dusky. Juvenile is like female, but juvenile male slightly streaked on head, with darker wings, paler throat and horn-coloured bill; male eventually moults some black feathers, retain patchy appearance for several months before becoming entirely black. Race *magnirostris* has slightly longer wing and tail, and bill averages c. 20% longer. VOICE. Song rapid and flute-like, jumping from high notes to low notes and sometimes having metallic timbre, usually 2–3 sweet whistles and a rattled trill followed by many musical notes; female known to sing, and at times as accomplished as male. Song types vary geographically. Call a loud "jep" or "chok".
Habitat. Usually found near water in shrubby areas adjacent to marshes (riparian thickets), as well as tall emergent vegetation by rivers, swamps and lakes; also damp pastures and tall moist grassy areas. Lowlands.
Food and Feeding. Little known. Forages largely for seeds; usually found in pairs, and does not form flocks.
Breeding. Singing in Aug in NE Venezuela. Male performs aerial display, with song; also a wing-raising display to show normally hidden white underwing to female during presumed breeding season. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Uncommon to rare, and local; possibly not uncommon in parts of NE Venezuela; very rare in Brazil (where a significant captive population exists). Has suffered moderate population decline largely as a result of trapping for the cagebird trade, also of habitat loss through large-scale deforestation. This species is widely coveted by cagebird-fanciers because of its singing ability; numbers seriously depleted by trapping, but effect is patchy and local. In Brazil, occurs in Das Emas National Park (Goiás).
Bibliography. Anon. (2010c), Butchart & Stattersfield (2004), Klicka *et al.* (2007), Lijtmaer *et al.* (2004), McCarthy (2006), Meyer de Schauensee (1970b), Olson (1981a), Restall *et al.* (2006), Ridgely & Tudor (1989), Robbins *et al.* (2005), Sick (1993), Tostes (2003).

290. **Black-billed Seed-finch**
Oryzoborus atrirostris

French: Sporophile à bec noir **Spanish**: Semillero Piquinegro
German: Schwarzschnabel-Reisknacker
Other common names: Peruvian Seed-finch

Taxonomy. *Oryzoborus atrirostris* P. L. Sclater and Salvin, 1878, Moyobamba, San Martín, Peru.
Genus sometimes subsumed in *Sporophila*. Molecular evidence suggests that genus as currently constituted may not be monophyletic, and some of its members may have closest relatives in *Sporophila*; more data necessary in order to resolve a basal polytomy in the phylogeny. Formerly considered conspecific with *O. nuttingi*, *O. crassirostris* and *O. maximiliani*; taxonomy of this group still in flux. Races weakly differentiated, and larger bill of *gigantirostris* may be individually variable; species perhaps better treated as monotypic. Two subspecies tentatively recognized.
Subspecies and Distribution.
O. a. atrirostris P. L. Sclater & Salvin, 1878 – locally in extreme S Colombia, E lowlands of Ecuador and E Andean slopes in N Peru (San Martín, Loreto and Ucayali).
O. a. gigantirostris J. Bond & Meyer de Schauensee, 1939 – SE Peru (Madre de Dios) and N & E Bolivia (Beni; isolated records in W & C Santa Cruz).



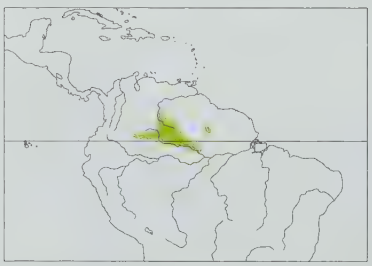
Descriptive notes. 15–16·5 cm; two males 23 g and 29 g (*gigantirostris*). A medium-sized finch with proportionately long tail and enormous bill for its body size; bill so deep that crown appears to sweep back from base of upper mandible, giving flat-headed look. Male is almost entirely black and without noticeable gloss; some white at primary bases, often very restricted (variable); white wing-linings; iris very dark; bill black; legs dusky or dark grey. Female is warm brown above, slightly paler brown below, with wings and tail slightly darker than upperparts; paler, whitish wing-linings; bare parts much as for male. Juvenile is like female, but young male slightly streaked on head and with darker wings, paler throat and horn-coloured bill. Race *gigantirostris* is very like nominate, but bill supposedly even bigger. VOICE. Song a rich and leisurely warbling composed of many rich whistles; no other information.
Habitat. Grassy areas and clearings in marshy areas, or adjacent to riparian forest, lakes reedbeds, or aquatic thickets. Lowlands.
Food and Feeding. Diet presumably seeds. Forages singly and in pairs. No other information.
Breeding. No information.
Movements. Resident.
Status and Conservation. Not globally threatened. Previously listed as Near-threatened; recently downgraded owing to better understanding of total population numbers. Uncommon to rare, and patchily distributed. Popular in captivity, and trapped for the cagebird trade. Should be monitored on a regular basis in order to guard against potential declines caused by trapping and habitat loss.
Bibliography. Klicka *et al.* (2007), Lijtmaer *et al.* (2004), Restall *et al.* (2006), Ridgely & Tudor (1989), Robbins *et al.* (2005).

Genus *DOLOSPINGUS* Elliot, 1871

291. **White-naped Seedeater**
Dolospingus fringilloides

French: Sporophile à nuque blanche **Spanish**: Semillero Nuquiblanco
German: Spitzschnabelpfäffchen

Taxonomy. *Oryzoborus* (?) *fringilloides* Pelzeln, 1870, River Xié, upper River Negro, Brazil.
Molecular work indicates that genus is very closely related to *Sporophila* and should perhaps be merged with it; appears not to be close to *Catamenia* and some other genera with which it has been placed in the past. Monotypic.
Distribution. SE Colombia (Guainía and Vaupés), S Venezuela (Amazonas) and NW Brazil (N Amazonas E to Presidente Figueiredo); also S Guyana.



Descriptive notes. 13–13·5 cm; c. 12–13 g. A slim seedeater with elongate body structure, tail relatively long, long and triangular bill thick at base. Male has black hood reaching down to most of throat, noticeable white collar on nape (an extension of white underparts); upperparts black, rump white and contrasting with black uppertail-coverts and tail; upperwing black, median coverts white (forming bold and wide upper wingbar), greater coverts with restricted white wedge shaped markings at tips (rather broken-looking lower wingbar), white patch at base of primaries (normally concealed); throat and underparts white, small dark wedge on side of breast, sides and flanks sometimes pale greyish, flanks with obscure blackish blotching; pale underwing-coverts; iris dark brown; bill bright ivory-white with blue-grey tinge, particularly on

base of lower mandible; legs greyish to blackish. Female is dull brown on head, upperparts, wings and tail; below, brownish from throat and breast down to flanks, whitish belly contrasting with buffy undertail-coverts; bill brownish, legs blackish-brown. Juvenile is indistinguishable from female; older immature male darker brown than adult female, with black centres of crown feathering, black mottling on face and chin, indistinct brown breastband sprinkled with some black feathers, whitish lower breast and abdomen with some feather tips tinged buffy brown, also a white primary patch and wingbars. VOICE. Male song, from exposed perch (often tree snag) usually 2–4 m above ground, loud, fast and musical, with notes arranged in triplets, "ne-ne-ne, te-te-te, ge-ge-ge, jii-jii-jii, tué tué tué..."; some variations with longer notes, again usually tending to be in threes. Call a sharp "tzink!".
Habitat. Clearings with low scrub and isolated dead trees in white-sand forest, also taller forest edge, and grassy savannas of upper R Orinoco–R Negro watershed; often in ridgetop sand-forest vegetation in rocky outcroppings. Sea-level to 700 m.
Food and Feeding. Stomach contents reveal a mainly granivorous diet, but feeds also on insects; an observation of males and females foraging on mistletoe fruits (Loranthaceae). Forages up to 4 m high in dense vegetation. Singly and in pairs.
Breeding. Season appears to span Aug–Apr (end of rainy season to end of dry season) in S Guyana. No other information.
Movements. Not well known; presumably resident.
Status and Conservation. Not globally threatened. Relatively rare and little known. Recently discovered in extreme S Guyana, as well as in E Amazonas (Presidente Figueiredo), in Brazil. Has fairly large range, and no evidence of population declines. Given this species' habitat choice of white-sand forest, it should be monitored in case habitat fragmentation does begin to have adverse effects on its numbers.
Bibliography. Armani (1985), Newman (2000), Restall *et al.* (2006), Ridgely & Tudor (1989), Robbins *et al.* (2005).

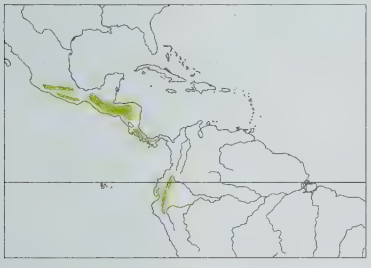
Genus *AMAUROSPIZA* Cabanis, 1861

292. **Blue Seedeater**

Amaurospiza concolor

French: Sporophile bleu **German**: Indigopfäffchen **Spanish**: Semillero Azul
Other common names: Cabanis's Seedeater; Slate-blue Seedeater (*relicta*)

Taxonomy. *Amaurospiza concolor* Cabanis, 1861, Costa Rica.
Molecular data indicate that genus may belong in the cardinal family (Cardinalidae), rather than in present one. Race *relicta* sometimes treated as a separate species. Proposed race *grandior* (described from Peña Blanca, in E Nicaragua) synonymized with nominate. Three subspecies recognized.
Subspecies and Distribution.
A. c. relicta (Griscom, 1934) – mountains of Guerrero, Morelos and Oaxaca, in SW Mexico.
A. c. concolor Cabanis, 1861 – S Mexico (Chiapas), Honduras, Nicaragua, Costa Rica and W & C Panama.
A. c. aequatorialis Sharpe, 1888 – SW Colombia (Nariño), W & C Ecuador (SW Manabí and W Guayas; W slope of Andes S locally to Loja) and N Peru (Cajamarca, possibly also Piura).



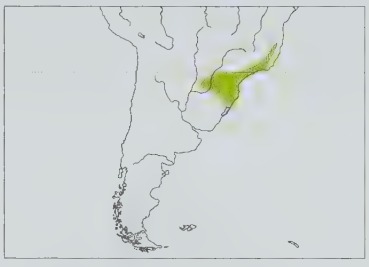
Descriptive notes. 11·5 cm; 12–15 g. A small, thickset finch, bill slightly longer than it is deep and with slightly rounded culmen. Male nominate race is almost entirely dark greyish-blue with very weak iridescence; upperwing and tail blackish-brown with dark bluish edging; plumage very uniform, only slightly paler on belly; iris dark; bill greyish; legs blackish. Distinguished from *Volatinia jacarina* by larger size, deeper bill, and lack of blackish and deeply iridescent plumage. Female is nondescript, lacking distinctive features; entirely warm brown with chestnut tone, very uniform other than slightly paler throat and belly; upperwing brown, chestnut-brown edging on remiges, entirely chestnut-brown coverts like rest of upperparts; wing-linings slightly paler cinnamon-brown, this extending to marginal coverts (may show paler edge of shoulder when perched); tail brown with chestnut-brown fringes; bill dark horn. Juvenile is like female, but somewhat more rufescent below, and has fairly conspicuous buffy wingbars. Race *relicta* is larger, female colder brown; *aequatorialis* is smaller, paler and duller than nominate. VOICE. Song a brief, fast, jumbled warble with sweet quality, "sweet-sweet-sweet-saweet" or "chi chi whee chee chee". Call a sharp "hu-tsset" or "chu-tsee".
Habitat. Overgrown forest borders and secondary woodland; in Mexico (Oaxaca) reported also in humid pine–oak (*Pinus–Quercus*) woodlands or cloudforest. Usually found in association with *Chusquea* bamboo in Costa Rica and Panama; in Ecuador may be found in bamboo, but can occur in other places. At 450–2000 m in N of range, race *relicta* 1200–2500 m; 1000–2200 m in Costa Rica, and to 2700 m in Panama; mainly 1100–2300 m in Ecuador.
Food and Feeding. Feeds on tender growing stem tips of bamboo; also insects and seeds. Forages from low levels (1–2 m) to up to 10 m in dense vegetation; hops and flits in foliage of bamboo. Singly and in pairs or family groups; sometimes in small mixed-species flocks.
Breeding. Breeds mostly in May and Jun; in Jul in Morelos (Mexico); fledglings reported in early Sept in Costa Rica. Nest a cup of coarse grasses, lined with finer grasses, placed 2·5–3 m up in fork of a forb (*Lantana*). Clutch 2 eggs, unmarked pale blue. No other information.
Movements. Resident; wanders irruptively in search of seeding bamboo.
Status and Conservation. Not globally threatened. Not well known. Apparently rare and local throughout its range. Available information suggests that this species' population is stable.
Bibliography. Armani (1985), Binford (1989), Butchart & Stattersfield (2004), Davidson (1938), Griscom (1934), Howell & Webb (1995), Klicka *et al.* (2007), Miller *et al.* (1957), Monroe (1968), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Ridgway (1901), Rowley (1962), Schaldach (1973), Stattersfield & Capper (2000), Stiles & Skutch (1989), Vallely & Aversa (1997), Wetmore *et al.* (1984).

293. **Blackish-blue Seedeater**

Amaurospiza moesta

French: Sporophile noirâtre **German**: Weißachselpfäffchen **Spanish**: Semillero Negruzco

Taxonomy. *Sporophila moesta* Hartlaub, 1853, Brazil.
Molecular data indicate that genus may belong in the cardinal family (Cardinalidae), rather than in present one. Monotypic.
Distribution. SE Brazil (S Espírito Santo S to Paraná and N Rio Grande do Sul), E Paraguay and NE Argentina (Misiones).



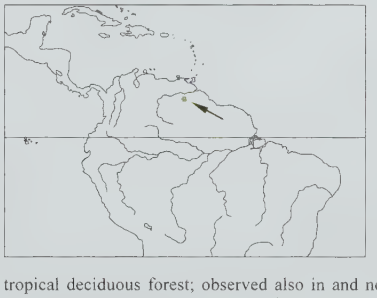
Descriptive notes. 12·5 cm; 13–14·5 g. A small and compact finch with proportionately small head and short tail; bill relatively small and triangular, with slightly curved culmen. Male is dark slaty blue all over, blacker on foreface and underparts, with wing-linings white; iris dark brown; bill black, lower mandible sometimes dark greyish; legs reddish-grey to blackish. Female is tawny-brown, slightly paler on underparts, with white wing-linings; bill black, horn-coloured base of lower mandible, legs black. Juvenile apparently undescribed. VOICE. Song a pleasant warble, "swee-swee-swi-sweeseeseeu" or "tseeo tsee tsu tsee tit", variable, but always quickly delivered; tonal quality suggest song of Ultramarine Grosbeak (*Cyanocompsa brissonii*). Call "psit" or "pix".
Habitat. Undergrowth of tropical forest and woodland, especially where bamboo (of genera *Chusquea* and *Guadua*) common; particularly likes forest edge, where middle levels and understorey thick. Will also accept forests with admixture of *Araucaria angustifolia*. Sea-level to 1600 m.
Food and Feeding. Seeds of bamboo, also other seeds, and insects; has been observed to eat leaf petioles of bamboo. Forages usually c. 2–3 m above ground, not higher up in trees; sometimes on the ground. Singly or in pairs.
Breeding. Males and females in breeding condition between late Aug and mid-Sept, as well as mid-Apr, in SE Brazil; wide span of dates suggests that breeding may be timed to coincide with seed availability, rather than any specific time of year. No other information.
Movements. Resident; partly nomadic in search of seeding bamboo, but can be found in areas also when bamboo not seeding.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Tends to be rare; not common anywhere. In Brazil, relatively common in Serra do Mar and Paraná, very local elsewhere; in Paraguay, rare and recorded at few sites; in Argentina, locally common, especially in highlands. In Brazil, one historical record from Maranhão, well N of current range, and reported also from Tocantins, also to N of present known range. A bamboo associate, increasing in numbers when seeding bamboo available, but not dependent on bamboo. Has been suggested that this species' population is in gradual decline owing to continuing habitat degradation and loss. Extensive tracts of montane forest still exist within this species' range, especially in São Paulo, but lowland Atlantic Forest now severely degraded and further threatened by agricultural expansion, human colonization, urbanization, industrialization and associated road-building. Populations at known sites should be monitored in order to determine trends and rates of range contraction; also, ecological studies needed to ascertain this species' precise habitat requirements and its levels of tolerance of habitat degradation and fragmentation. Suitable habitat should be afforded official protection.
Bibliography. Anon. (2010c), Areta *et al.* (2009), Armani (1985), Belton (1985), Butchart & Stattersfield (2004), Klicka *et al.* (2007), Ridgely & Tudor (1989), Sick (1993), Stattersfield & Capper (2000), Storer (1989b).

294. **Carrizal Seedeater**

Amaurospiza carrizalensis

French: Sporophile de Carrizal **German**: Carrizalpfäffchen **Spanish**: Semillero de Carrizal

Taxonomy. *Amaurospiza carrizalensis* Lentino and Restall, 2003, Isla Carrizal, River Caroní, Bolívar, Venezuela. Molecular data indicate that genus may belong in the cardinal family (Cardinalidae), rather than in present one. Monotypic.
Distribution. Lower R Caroní basin (N Bolívar), in Venezuela.



Descriptive notes. 12 cm; 12–14 g. A compact finch, with bill of substantial size and with slightly curved culmen, the longest-billed of the genus; cutting edge of bill bends downwards near base. Male is dark slaty with strong blue gloss, blacker on face and underparts; wing-linings white; iris dark; bill and legs black. Female is warm brown above, paler ochraceous buff on underparts, darker on flanks; creamy-buff wing-linings; olive-grey base of lower mandible, legs dark grey. VOICE. Song a pleasant whistled warble, "sweet sweet pit-swee pit-swoo".
Habitat. Stands of spiny *Guadua latifolia* bamboo and *Ripidocladus* bamboo within tropical deciduous forest; observed also in and near *Guadua angustifolia* stands.
Food and Feeding. Crop contents of the type series included insects, as well as vegetable items; insects appeared to be beetles of family Curculionidae. No other information.
Breeding. No information.
Movements. No information.
Status and Conservation. CRITICALLY ENDANGERED. Recently discovered species, confined to tiny area of Venezuela. Very poorly known. Nowhere common, and global range appears to be tiny. Area of type locality now flooded; since initial description of this species, it has been found at an additional seven sites in lower R Caroní basin. Believed to have an extremely small population and to be declining because of continuing destruction of other potentially suitable habitat. Entire habitat at type locality was destroyed during development of Guri Dam, which not only caused this site to be flooded, but in addition destroyed other potentially suitable habitat in the vicinity. Main threat to existing populations is the total clearance of forest. Extreme scarcity of records possibly due partly to the difficulties of surveying its habitat. Following destruction of habitat at type locality, four organizations (three of them conservation-oriented, the other a commercial hydro-electric company) set up a two-year project to identify, locate and survey potential habitat for this species. The spiny bamboo in which it was initially discovered is an extremely dangerous habitat in which to conduct surveys; moreover, as it lies beneath the forest canopy, this habitat cannot be detected by means of aerial survey. Effective protection of potentially suitable habitat is considered essential if this species is to survive in the future.
Bibliography. Anon. (2010c), Hirschfeld (2007), Lentino & Restall (2003).



PLATE 68

inches 3
cm 8

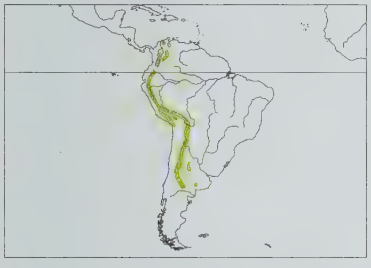
Genus *CATAMENIA* Bonaparte, 1850

295. Band-tailed Seedeater

Catamenia analis

French: Cataménie maculée **German**: Spiegelcatamenie **Spanish**: Semillero Colifajado

Taxonomy. *Linaria analis* d'Orbigny and Lafresnaye, 1837, Sicasica and Cochabamba, Bolivia.
Molecular data suggest that genus is part of a clade which includes *Haplospiza*, as well as *Phrygilus unicolor* and *Phrygilus plebejus* (but not other members of latter genus). Races divide into two fairly well-defined groups: southern "*analis* group" (nominate, *soderstomi*, *griseiventris*), with large and obvious wing stripe, and northern "*analoides* group" (*alpica*, *schistaceifrons*, *analoides*, *insignis*), with wingstripe less extensive or entirely lacking. Proposed race *subinsignis* (described from Sandillani, near La Paz city, in Bolivia) is synonymized with nominate. Seven subspecies currently recognized.
Subspecies and Distribution.
C. a. alpica Bangs, 1902 – Santa Marta Mts, in N Colombia.
C. a. schistaceifrons Chapman, 1915 – C parts of C & E Andes of Colombia.
C. a. soderstromi Chapman, 1924 – Ecuador (W slope and inter-Andean valleys).
C. a. analoides (Lafresnaye, 1847) – W slope of Andes of Peru (Piura S to Ayacucho).
C. a. griseiventris Chapman, 1919 – SW Peru (Cusco S to Tacna).
C. a. insignis J. T. Zimmer, 1930 – E slope of Peruvian Andes (Cajamarca S to Ancash).
C. a. analis (d'Orbigny & Lafresnaye, 1837) – extreme N Chile (Arica–Parinacota), highland Bolivia (La Paz E to W Santa Cruz, S to Tarija), and NW & EC Argentina (Jujuy and Salta S to Mendoza and La Pampa, and highlands of Córdoba; also Sierra de Ventana in SW Buenos Aires).



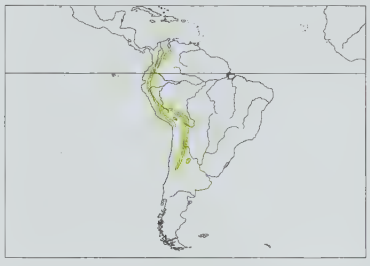
Descriptive notes. 12–14·5 cm; 10·3–16·6 g. A small emberizid with short conical bill as long as it is deep, but with only moderately rounded culmen. Male nominate race has head grey, at most indistinct streaking on crown, and typically darker blackish-grey around bill base; upperparts also grey, back with browner tone than crown and rump, the latter a purer blue-grey; tail blackish, bold white band across middle (band may be hidden by all-dark central rectrices when bird perched); upperwing blackish, grey fringes on coverts, cinnamon fringes on tertials, white bases of all primaries (showing as white patch on folded wing, white wingstripe in flight); underparts grey, paler than upperparts, becoming whitish-grey on middle of belly, contrasting with deep chestnut undertail-coverts; iris dark; bill yellowish; legs brownish-grey. Female is brown and streaked: head rather plain, lacking obvious supercilium or dark eyeline, and streaked throughout, streaking denser on crown, back warmer brown with dense dark brown streaks; tail brown with bold white band (band obvious in flight; visible also on underside of tail when bird perched); brown wings edged warmer cinnamon-brown, usually a small white or pale patch at base of primaries; throat, breast and flanks off-white with brown streaking, belly to undertail-coverts pale buffy white and unstreaked; bill horn-yellow with dark culmen and tip, legs greyish. Juvenile is like female, but much browner and more densely streaked both above and below; much variation in subadult plumages, apparently two immature (post-juvenile) stages in both sexes before adult plumage, male becomes progressively less streaked and more solidly darker greyish above and below, younger female more heavily streaked than older female, and adult female the most greyish and least streaked; more study needed to determine variation in this pattern (and, in particular, whether it applies throughout species' range). Races differ mainly in size, depth of plumage colours, and extent of wingstripe: *analoides* has white in wing restricted to inner web of each primary, but extending farther towards wingtip; *insignis* is more greyish below than previous, and lacks an obvious white wingstripe; *alpica* is large, has greyish around bill base (lacking black-faced look), little or no white at base of primaries (no obvious wingstripe), smaller tailband; *schistaceifrons* resembles last, but smaller, with bigger tailband; *soderstromi* is darker rufous on undertail-coverts, has white fringes on primaries, more extensive wingstripe (to outer primary webs); *griseiventris* is smaller than last, has more white on tail and is similarly greyish flanked, unlike warmer-toned *analoides*. Voice. Song a buzzy trill, "bzzzzzzzz" or "trrrrrrrr", lasting c. 1 second, repeated every 3–8 seconds, speed and pitch of trill variable, some males change from one trill type to another; some songs begin with very faint introductory note (followed by trill). At least in Argentina, also a complex song, a trill followed by a buzzy ascending note and then another trill on different pitch, "trrrrrrrrrr zwZZZZZ prrrrrrr zwZZZZ prrrrrr zwZZZZZ". Call "st" or "tzi".
Habitat. Inhabits cultivated areas, including edge of agricultural fields, pastures, villages and edges of towns; also shrubby hillsides and grasslands adjacent to thickets or scrub. Generally occurs at 1000–3700 m; up to 4650 m in Santa Marta Mts (N Colombia); also down to sea-level in Peru (Lima).
Food and Feeding. Seeds, with apparent liking for seeds of composites; also eats berries and insects. Forages on ground and in low vegetation; often perches on grass or weed stems to extract seeds while still on stalk. In pairs and in small groups of up to 20 individuals; often in mixed flocks with other seed-eating species.
Breeding. Fledglings found in May (Moquegua) and Jun (Amazonas) in Peru and in Sept in Colombia (Boyacá); breeding appears to take place in Mar–May (after summer rains) in S Peru and N Chile. Nest a cup made from vegetable fibres, lining of hair and wool. Clutch in Argentina 3 eggs, pale greenish with brown and violet markings, these largely concentrated at wide end; in Colombia 2 eggs, bluish with darker marking around wide end. No other information.
Movements. Largely resident. In C Argentina evidence of some downslope movements in winter, some reaching W Buenos Aires during non-breeding season.
Status and Conservation. Not globally threatened. Fairly common to common, and locally abundant. Has large range, high abundance, and no evidence of any significant population declines.
Bibliography. Armani (1985), Bond (1951a), Canevari *et al.* (1991), Chapman (1915, 1924), Dickerman (1986), Fjeldså & Krabbe (1990), Johnson & Goodall (1967), Marone (1992a), Maugeri (2006), Narosky *et al.* (1984), Restall *et al.* (2006), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), Stiles *et al.* (2000).

296. Plain-colored Seedeater

Catamenia inornata

French: Cataménie terne **German**: Schlichtcatamenie **Spanish**: Semillero Sencillo
Other common names: Plain Seedeater

Taxonomy. *Linaria inornata* Lafresnaye, 1847, Bolivia.
Molecular data suggest that genus is part of a clade which includes *Haplospiza*, as well as *Phrygilus unicolor* and *Phrygilus plebejus* (but not other members of latter genus). Four subspecies recognized.
Subspecies and Distribution.
C. i. mucuchiesi Phelps, Sr & Gilliard, 1941 – *páramos* of Mérida, in W Venezuela.
C. i. minor Berlepsch, 1885 – W Venezuela (Táchira) S through Andes of Colombia (E & C ranges) and Ecuador to C Peru (Junín).
C. i. inornata (Lafresnaye, 1847) – Andes of SW Peru (Cuzco and Puno) and extreme N Chile (N Tarapacá) E to C Bolivia and NW Argentina (S to C Mendoza).
C. i. cordobensis Nores & Yzurieta, 1983 – NC Argentina (Córdoba).



Descriptive notes. 13·5–14·5 cm; 12·3–14·5 g. A small finch with conical bill as long as it is deep, but with only very slightly rounded culmen. Male nominate race has head grey, crown slightly darker and indistinctly streaked, grey neck nearly unstreaked, darker grey mantle and back clearly and narrowly streaked; rump unstreaked grey; tail feathers blackish-brown with grey fringes; upperwing blackish-brown, indistinct greyish fringes on coverts and flight-feathers; grey below, paler on throat, darkest on breast and flanks, with belly paler buffy grey, crissum chestnut; iris dark; bill salmon-pink, browner in non-breeding period; legs pinkish to dusky, usually duller on feet. Female is brown above with distinct blackish-brown streaking, densest on crown and back, least dense on hindneck and rump; ground colour of back slightly paler brown than rest of upperparts; entirely buff below, dense streaking on throat, breast, flanks and crissum, belly unstreaked; bill often brownish. Juvenile has brown crown with conspicuous dark shaft streaks, back tawny-olive with broad dark streaks, rump buffy brown, throat and breast whitish-grey, streaked dark on breast, flanks and undertail-coverts, bill all dark; male appears to go through two plumages after juvenile before reaching adult, becoming less streaked and greyer with age, first immature still noticeably streaked on crown and back, and rump brown, second immature stage like adult, but olive wash on crown and back, buff wash on underparts, weakly streaked on back (crown appears streaked only in worn plumage); young female like adult, but even browner above and underparts paler, two post-juvenile stages before adulthood but differences more subtle than in male, with age essentially more greyish (less brownish) and streaking reduced. Race *minor* is smaller than nominate, has smaller and finer bill; *mucuchiesi* is similar to previous, but above darker, more dark bluish-slate (less dull greenish-grey), streaking on back darker, blackish, throat and chest deeper grey, belly paler, also has heavier and more conical bill than others; *cordobensis* is slightly smaller than nominate, male paler grey, especially on underparts, with cinnamon-buff tinge on flanks, female more yellowish-brown and more evenly streaked on head. Voice. Song, from top of low bush, geographically and individually variable, the most noticeable part a short and buzzy musical trill. Often 2–5 very soft and short musical notes (not audible from any great distance) followed by 2–6 slow buzzy trills, varying in speed and pitch, total duration 3–6 seconds; often contains trills that ascend or descend in a sequence, and interspersed with sweeter descending whistle, "prrrr trrrr CHHRRR tweeew prrrr CHRRRR tweeew..." or "trrrrr PRRR tzeew PRRRR tzeew trrrr CHRRRR". Call a fine "zee" and a lower "tchip".
Habitat. Open highland grasslands; also *Espeletia páramo* and *puna* areas with grass; also pastures with shrubs or adjacent small trees, *Polylepis* forest edge, and short *Polylepis* scrub. Generally on slopes, particularly shrubby slopes, tending to occupy dry sites rather than humid ones. At 2600–4400 m.
Food and Feeding. Seeds. Forages on ground; also feeds heavily on *Espeletia* seeds by perching on stems and feeding from exposed seed clusters. In pairs and small groups; in non-breeding season in larger flocks, sometimes mixed with *Phrygilus* species or other highland granivores.
Breeding. Eggs and fledglings in Feb in N Argentina (Jujuy); possibly breeds throughout year in Colombia, where males in breeding condition in Jan–Feb (in E Cauca), Jul–Aug (Santander) and Aug–Sept (Cundinamarca and Boyacá). No other information.
Movements. Apparently resident; some nomadic movements in *páramo* of Venezuela, depending on seed crops.
Status and Conservation. Not globally threatened. Uncommon to fairly common; more local in Venezuela. Reported from extreme N Chile, but no substantiated evidence of its occurrence there. Has large range, within which no evidence of any significant population declines.
Bibliography. Armani (1985), Bond (1951a), Dickerman (1986), Fjeldså & Krabbe (1990), Hilty (2003), Restall *et al.* (2006), Ridgely & Tudor (1989), Salvador & Narosky (1984).

297. Paramo Seedeater

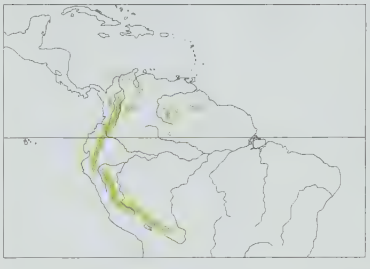
Catamenia homochroa

French: Cataménie du paramo **Spanish**: Semillero Paramero
German: Schlankschnabelcatamenie
Other common names: Colombian/Santa Marta Seedeater (*oreophila*); Tepui Seedeater (*duncani*)

Taxonomy. *Catamenia homochroa* P. L. Sclater, 1859, Matos, about 15 miles [c. 24 km] north of Riobamba, Ecuador.
Molecular data suggest that genus is part of a clade which includes *Haplospiza*, as well as *Phrygilus unicolor* and *Phrygilus plebejus* (but not other members of latter genus). Race *oreophila* often treated as a separate species. Differences in plumage, voice and ecology suggest that tepui race *duncani* may be a separate species, but more research needed. Also, birds in Sierra La Neblina, on

On following pages: 298. Orangequit (*Euneornis campestris*); 299. Cuban Grassquit (*Tiaris canorus*); 300. Yellow-faced Grassquit (*Tiaris olivaceus*); 301. Dull-colored Grassquit (*Tiaris obscurus*); 302. Black-faced Grassquit (*Tiaris bicolor*); 303. Sooty Grassquit (*Tiaris fuliginosus*).

S Venezuela–N Brazil border, have noticeably darker plumage than others, and may merit treatment as a separate race; study required. Three subspecies recognized.
Subspecies and Distribution.
C. h. oreophila Todd, 1913 – Santa Marta Mts, in N Colombia.
C. h. homochroa P. L. Sclater, 1859 – Sierra de Perijá (Colombia–Venezuela border), and Andes of W Venezuela (Mérida) and Colombia S to Peru and NW Bolivia (La Paz and Cochabamba).
C. h. duncani (C. Chubb, 1921) – tepui highlands of Venezuela and adjacent N Brazil (extreme N Amazonas).



Descriptive notes. 13·5 cm; 12·2–14·4 g. A small seedeater with longish conical bill longer than it is deep, with only very slightly rounded culmen. Male nominate race is entirely dark grey, except for dark rufous crissum and blacker face, and pencil-thin darker streaks on back; in fresh plumage, a warmer brownish wash on flanks; iris dark; bill bright to pale yellow-pink, sometimes ivory-pink (colour perhaps dependent on breeding state); legs dusky. Distinguished from *C. inornata* mainly by darker body plumage and pale and longer bill. Female is olive-brown above, streaked darker on crown to back, with lower back and rump largely unstreaked; face and underparts, including throat and breast, pale greyish, sometimes some fine dark streaking on breast and flanks, unstreaked crissum pale chestnut, becoming pale cinnamon on belly; pale pinkish bill with dark tip. Juvenile is like female, but darker-billed and strongly streaked throughout, including underparts and crissum; male appears to go through two post-juvenile plumages before adult, first immature still noticeably streaked on crown and back, with rump brown (like female, but more strongly streaked), second immature like adult male but olive wash on crown and back, buff wash on underparts, back weakly streaked (crown appears streaked only when plumage worn), young female ages in similar manner, but distinctions between first and second immatures less noticeable. Race *oreophila* is longer-tailed and shorter-billed than others, has brown wash on breast and is more uniformly plumaged overall and generally paler than nominate; *duncani* is similar to nominate, but lighter grey, back browner and with more noticeable dark streaking, tertials with wider brown edging (fresh plumage), flanks browner, bill more yellowish. Voice. Song in Peru a series of melancholy buzzy whistles, "dseeeeeee djúúúúúúúú-djúúúúúúú-djúúúúúú"; in Bolivia a high-pitched, electrical-sounding buzzy whistle that ascends slightly in pitch, "tzzzzzzzz"; *duncani* sings a low-pitched whistle. Contact call a doubled "ts-ip!", flight call "tsit-tsit".
Habitat. Moist shrubbery at edge of montane forest, elfin forest, cloudforest edge, also second growth, usually below tree-line and tends not to venture into open grassland; in Andes, presence of *Chusquea* bamboo in the area appears to be important. In tepuis, race *duncani* in more open habitats, often singing from exposed rocks, primarily in *Brocchinia* scrub. At 2500–3500 m; *duncani* 1600–2500 m.
Food and Feeding. Variety of seeds; in Andes primarily those of *Chusquea* bamboo (seeding of which is cyclic and very localized), whereas isolated tepuis race (*duncani*) appears not to be associated with bamboo-flowering. Forages on ground, also in vegetation; tends to keep under cover of vegetation, seldom foraging in open, exposed situations. Generally shy and retiring. In pairs and small groups; may forage with mixed-species flocks of tanagers and flowerpiercers (Thraupidae), sometimes also with congeners.
Breeding. Juveniles in Jul in Peru (Cuzco) and birds in breeding condition in Jul in Colombia (Perijá and E Antioquia). No other information.
Movements. Resident; may be somewhat nomadic, following seeding of *Chusquea* bamboo.
Status and Conservation. Not globally threatened. Rare to uncommon and local; can be fairly common in Colombia. Has large range, and no evidence of any significant population declines.
Bibliography. Armani (1985), Chubb (1921b), Dickerman (1986), Fjeldså & Krabbe (1990), Hilty (2003), Restall *et al.* (2006), Ridgely & Tudor (1989), Romero-Zambrano (1977), Willard *et al.* (1991).

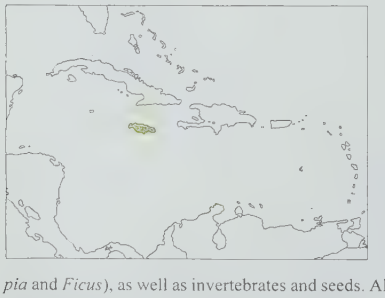
Genus *EUNEORNIS* Fitzinger, 1856

298. **Orangequit**

Euneornis campestris

French: Pique-orange de Jamaïque **German**: Braunlatz-Ammerfink **Spanish**: Semillero Azulillo

Taxonomy. *Motacilla campestris* Linnaeus, 1758, Jamaica.
Sometimes placed in tanager family (Thraupidae), with which perhaps has closer ancestral affinities; appears to be part of a clade which also includes several other Caribbean genera (*Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Monotypic.
Distribution. Jamaica.



Descriptive notes. 14 cm; 13·2–19·2 g. A small finch-like bird with slightly decurved bill. Male is almost entirely grey-blue (appearing dark in poor light), with orange-red throat; iris dark brown; bill and legs black. Female has crown and nape olive-grey, upperparts warmer and browner; dull greyish-white below, faintly streaked, flanks washed light buffish. Juvenile is like female. Voice. A thin, high-pitched "tseet", or occasionally "fi-sweee".
Habitat. Humid forest, also commonly in shade coffee plantations. Sea-level to 1500 m; commonest at middle elevations.
Food and Feeding. Nectar; also fruit (*Cecropia* and *Ficus*), as well as invertebrates and seeds. Also takes tree sap at holes drilled by sapsuckers (*Sphyrapicus*). Forages at low to medium heights. Generally singly and in pairs.
Breeding. Season Apr–Jun. Nest a moderately deep cup, usually uncovered, made from grass and plant fibres, built up to 6 m above ground in tree or shrub; abandoned nest of Jamaican Becard (*Pachyramphus niger*) occasionally used. Clutch 2–4 eggs, white with reddish-brown and grey-brown markings, these concentrated at wide end; incubation by female. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Locally common. No known threats.
Bibliography. Cruz (1974), Dunning (2008), Levy (1997), Mundle (2000), Raffaele *et al.* (1998), Ridgway (1901).

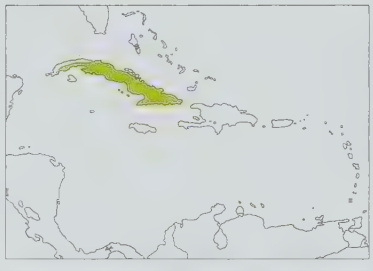
Genus *TIARIS* Swainson, 1827

299. **Cuban Grassquit**

Tiaris canorus

French: Cici petit-chanteur **German**: Kubagimpelfink **Spanish**: Semillero Canoro
Other common names: Melodious Grassquit

Taxonomy. *Loxia canora* J. F. Gmelin, 1789, Nova Espania; error = Cuba.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Molecular data suggest that genus as currently constituted is polyphyletic; further research required. Monotypic.
Distribution. Cuba.



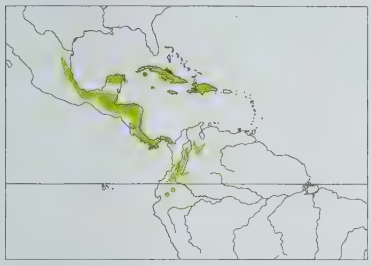
Descriptive notes. 11·5 cm; 6–9·5 g. Small and short-tailed, with distinctive plumage pattern. Male has black face and throat, contrasting broad yellow patch starting above eye, curving around rear ear-coverts and extending forward as broad collar to lower throat (collar often broken in centre); crown and upperparts, including upperwing and tail, greenish, crown often greyer, primaries edged yellowish; breast black, side of breast and rest of underparts olive-grey, paler posteriorly; iris dark brown; bill black; legs pinkish to flesh-coloured or dark. Female is similar to male, but duller, lacking black; face dark chestnut, collar paler yellow. Juvenile resembles female, but duller. Voice. Song a shrill "chiri-wichi-wichi, chi-wichi-wich" or "tsit-tsit-tilloi", characterized by buzzy and harmonic rich syllables, also a longer song characterized by many pure-toned syllables; short song probably primarily aggressive in function (increased in frequency in presence of other males), long song probably sexual in function (increased in presence of females). Partners also sing in duet against territorial rivals, or as greeting ceremonies between mates. Call a soft "chip" or high "tsit", often repeated.
Habitat. Primarily in semi-arid country, commonly near coast, also in open pines (*Pinus*), brushy areas, shade coffee and citrus plantations, and rural farmland with shrubbery. Sea-level to middle elevations.
Food and Feeding. Feeds on seeds and small fruits. Forages generally near the ground. Will leap upwards to reach seeds still on stem. Singly and in pairs; in flocks outside breeding season.
Breeding. Season Apr–Jun. Nest a large globular mass of woven dried grasses, lined with softer materials, entrance on side, placed low in spiny branches of tree. Clutch 2–3 eggs, pale greenish-white with lilac or brown spots, especially at large end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common in some parts of Cuba. Appears to be declining in some places close to human settlements.
Bibliography. Armani (1985), Baptista (1978), David & Gosselin (2002b), Dunning (2008), Garrido & Kirkconnell (2000), Grant, Grant & Petren (2000b), Llerena de Calgua (2006), Raffaele *et al.* (1998), Ridgway (1901), White *et al.* (2006).

300. **Yellow-faced Grassquit**

Tiaris olivaceus

French: Cici grand-chanteur **German**: Goldbrauen-Gimpelfink **Spanish**: Semillero Tomeguín
Other common names: Mexican Grassquit

Taxonomy. *Emberiza olivacea* Linnaeus, 1766, Dominica = Hispaniola.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Molecular data suggest that genus as currently constituted is polyphyletic; further research required. Proposed race *coryi* (described from Cayman Brac, in Cayman Is) is synonymized with nominate. Five subspecies recognized.
Subspecies and Distribution.
T. o. pusillus Swainson, 1827 – Atlantic slope of Mexico S locally through Central America to Colombia (W of E Andes, excluding Santa Marta region) and NW & E Ecuador, and W Venezuela (SW Mérida and Táchira).
T. o. intermedius (Ridgway, 1885) – Cozumel I (off Quintana Roo), in E Mexico.
T. o. ravidus Wetmore, 1957 – Coiba I (off S Veraguas), in W Panama.
T. o. olivaceus (Linnaeus, 1766) – Cuba, I of Pines, Cayman Is, Jamaica and Hispaniola.
T. o. bryanti (Ridgway, 1898) – Puerto Rico and neighbouring islands.
Descriptive notes. 9·3–11·5 cm; 6–10 g. Small and short-tailed. Male is olive above, including upperwing and tail; prominent deep orange-yellow supercilium from above lores to behind eye, pale yellow crescent below eye; face and breast blackish, distinctive orange-yellow patch on chin and throat; side of breast and rest of underparts light olive-grey; iris black; bill and legs dark. Female is like male, but dull greenish, without black markings; supercilium pale creamy, throat patch much paler. Juvenile resembles female, but greyer and duller. Race *bryanti* is similar to nominate, but is rather smaller, and much brighter olive-green above, more yellowish on underparts; *intermedius* is larger than nominate, with black on chest of male more extensive; *pusillus* is similar to previous, but male has black more extensive, sometimes with ear-covert region and crown black; *ravidus* is darker than last, black on male extending to nape and, below, to belly.



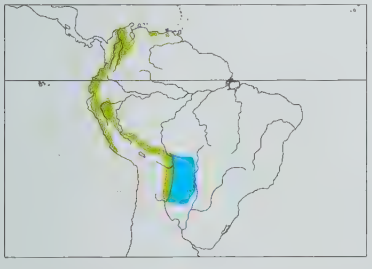
Voice. Song, delivered from a low perch, mostly during wet season (singing commences when rains begin), is a long weak, insect-like rapid high-pitched trill, "ti-ti-ti-ti" or "tsee-tsee-tsee-tsee" (c. 10 notes given per second). Call is a quiet "tick" or "tsit".
Habitat. Moist pastures, thickets, clearings, roadsides, and shrubby fields with scattered shrubs and trees, second growth and tall grass; usually found in scrub in grassy areas. Lowlands to 2000 m.
Food and Feeding. Feeds on seeds of grasses (*Paspalum*, *Panicum*), and sometimes takes insects and berries; also picks tiny white protein bodies from *Cecropia* trees. Forages sometimes on ground, but often while perched on grass stem and picking seeds from seedhead or heads of nearby grasses; when seeds scarce, will forage in trees in manner of New World warbler (Parulidae). In pairs and small groups; often in flocks with other seedeaters (e.g. *Volatinia*, *Sporophila*).
Breeding. Season Apr–Jan (most commonly May–Aug), Jan on Coiba I (race *ravidus*) and probably Mar in El Salvador; throughout year in Cuba, and in virtually all months in rest of West Indies. Monogamous. Male sings especially intensely when nesting, and courting male may sing while vibrating wings a few centimetres from female. Nest built by both sexes, a globular structure with side entrance, made from thickly woven dry grasses, lined with finer fibres, placed often low down, sometimes as high as 1·5 m, in grass clump or other low vegetation. Clutch 2–4 eggs (usually 2, rarely 4), dull white with blue cast, spotted with brown or lilac, especially at large end; chicks fed by both parents. No other information.
Movements. Generally sedentary. In S USA, nominate race casual in Florida and *pusillus* vagrant in S Texas, indicating some short, dispersive movements.
Status and Conservation. Not globally threatened. Very common in appropriate habitat. Has wide range, in which no significant threats identified.
Bibliography. Acosta Broche (2005, 2007), Armani (1985), Binford (1989), David & Gosselin (2002b), Dickey & van Rossem (1938), Dunning (2008), Garrido & Kirkconnell (2000), Grant, Grant & Petren (2000b), Howell & Webb (1995), Jones (2003), Keith *et al.* (2003), Miller *et al.* (1957), Monroe (1968), Raffaele *et al.* (1998), Ridgway (1901), Skutch (1954), Smith, P.W. *et al.* (1991), Smith, R.W. (1966), Stiles & Skutch (1989), Wetmore *et al.* (1984).

301. **Dull-colored Grassquit**

Tiaris obscurus

French: Cici obscur **German**: Braungimpelfink **Spanish**: Semillero Oscuro
Other common names: Dull-colored Seedeater

Taxonomy. *Emberiza obscura* d'Orbigny and Lafresnaye, 1837, Chiquitos, Bolivia.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Molecular data suggest that genus as currently constituted is polyphyletic; further research required. This species was previously included in genus in *Sporophila*, but skeletal features, nest type, song and molecular data indicate that it is better placed in present genus, and that it is sister to *T. fuliginosus*. Taxonomy complex: a detailed study of geographical variation of this species identified six diagnosable populations, each of which could be considered a race; of the currently recognized races, however, *pacificus* and *haplochroma* correspond to two of the six aforementioned populations, while nominate and *pauper* incorporate the remaining four. The six identified populations are: those in range of *haplochroma* (as listed below); population from extreme S Colombia and Ecuador (currently part of *pauper*); birds of dry N valleys of Peru, in valleys of R Marañón and R Huallaga (currently part of *pauper*); those in range of *pacificus* (as listed below); non-coastal regions in Peru, S to La Paz, in Bolivia (currently part of nominate); and E slope from N Bolivia S to N Argentina (currently part of nominate). Thorough review required. Pending full revision, four subspecies recognized.
Subspecies and Distribution.
T. o. haplochroma (Todd, 1912) – mountains of N Colombia (Santa Marta) and N Venezuela (Carabobo E to Monagas), also Andes S to Colombia (S in Cauca Valley to S of Cauca Province).
T. o. pauper (Berlepsch & Taczanowski, 1884) – extreme S Colombia (Nariño) S on W slope of Andes to NW Peru (to La Libertad and Cajamarca) and on E slope in N Peru (S to San Martín and Loreto).
T. o. pacificus (Koepcke, 1963) – coastal plain and slope in Peru from Ancash S to Arequipa.
T. o. obscurus (d'Orbigny & Lafresnaye, 1837) – E slope of C Peru (from San Martin S, patchily, to Puno) and S through Andean slopes of Bolivia to NW Argentina (S to Tucumán); also, probably non-breeding, in E lowlands of Bolivia (Santa Cruz and Chuquisaca), W Paraguay and N Argentina (Chaco).



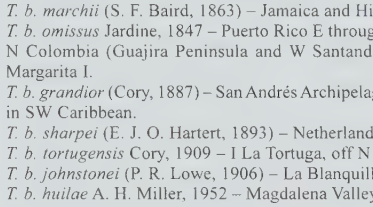
Descriptive notes. 10·5–11·5 cm; average 11·2 g. A small songbird, moderately long-tailed and small-headed, with short conical bill with relatively straight culmen. Nominate race (in extreme S of range) is very plain, brownish all over, paler on underparts; has very dull and narrow paler supercilium, darker eyeline, and pale crescents above and below eye; throat, breast and upper flanks more greyish-brown, a greyish wash sometimes extending to face; nominate geographically variable, in C to S Peru and adjacent Bolivia (La Paz) darker grey-brown on chest than those farther S, creating distinct contrast with pale belly, whereas populations from W slope of La Paz S to Argentina are pale like N Peruvian birds; iris dark brown; bill dark, yellowish-horn base of lower mandible, some variation in colour due to sex and breeding state; legs brownish. Sexes alike. Juvenile is similar to adult. Races differ in plumage coloration and bill colour: *haplochroma* is darker below than others, also more uniform, with no contrast between breast and belly, also the only race with entirely dark bill; *pauper* in N of range (extreme S Colombia and Ecuador) has bicoloured bill with pale lower mandible, paler brown breast with pale cream belly, contrasting buffier flanks, in S (N Peru from W slope of Andes, also Marañón and Huallaga Valleys) greyish on breast, with flanks pale like belly, some with whitish throat; *pacificus* is large and pale, in plumage resembles N Peruvian populations of previous. Voice. Song buzzy and explosive, "zeetig, zeezeezig", in Peru also described as similar to that of *Volatinia jacarina* but longer, more complex and more musical; little geographical variation in songs, all being quite clearly identifiable as of present species. Call a high-pitched "ti".
Habitat. Edge habitats, including edge of open forest, shrubby clearings and roadside thickets, also gardens, dry scrub; also in Lomas vegetation in coastal Peru (race *pacificus*). At 500–2100 m.
Food and Feeding. Seeds; often takes seeds of grasses, particularly *Panicum*. Usually forages on ground or by bending down grass-heads or other seedheads, often within cover of understorey. Found singly and in pairs, sometimes in small groups.
Breeding. Season Jan–Feb in Bolivia and Argentina. Nest domed, with rounded side entrance, constructed from vegetable fibres, small overhang over entrance, placed in upright triple fork of branch usually less than 3 m from ground in small tree or bush. Clutch 3–4 eggs, whitish with evenly distributed pale brown and dark brown speckling. No other information.
Movements. Resident in most of range. Lowland populations in E Bolivia appear to be present largely in non-breeding season; these presumed migrants from higher elevations in Bolivia, indicating an E–W migratory movement in extreme S of species' range. Recorded in SW Brazil (Mato Grosso).
Status and Conservation. Not globally threatened. Uncommon to locally common; rare in much of Peru. Has large range, within which no evidence of any large-scale population decline. In Venezuela, this species area of distribution appears to have become smaller as a result of to urbanization and development; in Ecuador, on other hand, it is thought to be expanding.
Bibliography. Armani (1985), Bates (1997, 2006), David & Gosselin (2002b), Grant, Grant & Petren (2000b), Koepcke & Koepcke (1961), Lijtmaer *et al.* (2004), Ouellet (1992), de la Peña (1987), Ridgely & Greenfield (2001a), Ridgely & Tudor (1989), Schulenberg *et al.* (2007), de Vasconcelos *et al.* (2008), Webster & Webster (1999).

302. **Black-faced Grassquit**

Tiaris bicolor

French: Cici verdinère **German**: Jamaikagimpelfink **Spanish**: Semillero Biocolor
Other common names: Black Sparrow, Grass Bird (Jamaica)

Taxonomy. *Fringilla bicolor* Linnaeus, 1766, America = Bahama Islands.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Molecular data suggest that genus as currently constituted is polyphyletic; further research required. Eight subspecies recognized.
Subspecies and Distribution.
T. b. bicolor (Linnaeus, 1766) – Bahama Is; Cayo Tío Pepe, NW of Isabela de Sagua, off N Cuba.
T. b. marchii (S. F. Baird, 1863) – Jamaica and Hispaniola, including nearby small islands.
T. b. omissus Jardine, 1847 – Puerto Rico E through Lesser Antilles to Tobago, and mainland from N Colombia (Guajira Peninsula and W Santander) E through coastal Venezuela to Sucre and Margarita I.
T. b. grandior (Cory, 1887) – San Andrés Archipelago (Providencia, Santa Catalina and San Andrés), in SW Caribbean.
T. b. sharpei (E. J. O. Hartert, 1893) – Netherlands Antilles (Aruba, Curaçao and Bonaire).
T. b. tortugensis Cory, 1909 – I La Tortuga, off N Venezuela.
T. b. johnstonei (P. R. Lowe, 1906) – La Blanquilla and Los Hermanos, off N Venezuela.
T. b. huilae A. H. Miller, 1952 – Magdalena Valley, in C Colombia.



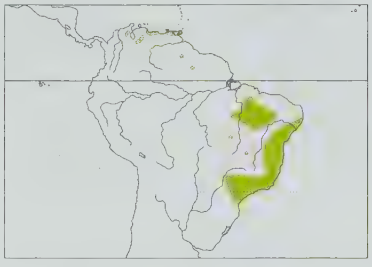
Descriptive notes. 10·2–11·5 cm; 7–11·6 g. Small, relatively short-tailed emberizid. Male nominate race has black head, throat and most of underparts, with dark greenish flanks posteriorly; upperparts, including upperwing and tail, greenish; iris dark; bill black, gape becoming vivid pink during breeding season; legs flesh-coloured. Female is drab olive-green, somewhat browner or greyer below; dark upper mandible and paler lower mandible, bare parts otherwise much as on male. Juvenile is like female. Races differ mainly in size and plumage coloration: *omissus* is like nominate, but smaller; *marchii* is similar to previous, but male has black on underparts confined to anterior half; *grandior* is like *omissus*, but much larger and brighter olive-green above; *huilae* is paler brownish-olive above, with paler greyish flanks; *johnstonei* is blackest race, with upperparts, wings and tail brighter olive-green than nominate; *sharpei* is similar, but paler; *tortugensis* is paler still than last, greyish-olive above. Voice. Song an emphatic buzz, "tse-tsee-tsee-tsizzle-tsizzle", or a weak, buzzing series, "dik-zeezeezee" or "tzit-tzweeee". Call note a soft "tsip".
Habitat. Open, dry areas of acacia (*Acacia*) and cactus scrub with grasses and shrubs in forest clearings, along roads, urban areas, and plantations and gardens; in Netherlands Antilles occurs in manchineel (*Hippomane mancinella*) bushes and mangroves; on Curaçao, present even high in the Sint Christoffel Hills. Sea-level to 860 m.
Food and Feeding. Feeds almost exclusively on seeds; in Netherlands Antilles also on fruit (or possibly seeds) of large candle cactus (*Lemaireocereus*). Forages generally near ground. Singly and in pairs; often found in small groups. May roost communally in large numbers.
Breeding. Breeds throughout year in West Indies, Apr–Jun in Cuba; in rainy season, Jun–Jan, in Trinidad. Nests in small colonies or loose groups. Male sometimes performs aerial song display, rapidly vibrating wings and drifting downwards. Nest a globular mass of grasses with entrance on side or bottom, placed on ground among *Opuntia* cacti or up to 2·5 m up in small bush. Clutch 2–4 eggs, dull white, marked with pale reddish-brown at large end. No other information.
Movements. Resident. Some limited dispersal; vagrant in SE USA (S Florida; fewer than ten records), apparently involving nominate race from Bahamas.
Status and Conservation. Not globally threatened. Often common in appropriate habitat. Fairly common in Colombia and Venezuela; very rare in Cuba, where found only on Cayo Tío Pepe. Although still common, has apparently declined in number in Netherlands Antilles.
Bibliography. Armani (1985), Askins *et al.* (1987), Bates (1997), Boal *et al.* (2006), David & Gosselin (2002b), Dunning (2008), ffrench (1991), Garrido & Kirkconnell (2000), Goodwin (1959), Grant, Grant & Petren (2000b), Hilty (2003), Kale (1988), Keith *et al.* (2003), Raffaele *et al.* (1998), Reader, Morand-Ferron *et al.* (2002), Restall (1976, 2003), Ridgway (1901), Voous (1983), White *et al.* (2006).

303. **Sooty Grassquit**

Tiaris fuliginosus

French: Cici fuligineux **German**: Schwarzbrust-Gimpelfink **Spanish**: Semillero Fuliginoso

Taxonomy. *Fringilla fuliginosa* Wied, 1830, Camamú, Bahia, Brazil.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Molecular data suggest that genus as currently constituted is polyphyletic; further research required. Birds from Sierra de Perijá (W Venezuela) described as race *zuliae* and birds from Trinidad as *fumosus*, but both considered undiagnosable, as mensural and plumage characteristics variable throughout range of species. Monotypic.
Distribution. W & N Venezuela (Sierra de Perijá, N end of E slope of Andes, and coastal mountains from E Falcón and Carabobo E to Sucre; also Cerro Roraima, in E Bolívar); Trinidad; S Guyana; and E Brazil (Maranhão and Ceará to NE Goiás and Piauí; Pernambuco S to São Paulo) and extreme NE Argentina (Misiones).
Descriptive notes. 10–11·4 cm; 11–16 g (Trinidad). Small, all-dark emberizid. Male is sooty blackish, back with olive tinge; iris dark; bill dark, gape yellowish to orange-red; legs dark. Female is brown, darker above than below; richer-toned than *T. obscura*, and with yellowish gape and mostly dark bill. Juvenile is like female; first-year male similar to adult, but paler in colour, with greyish tones on head. Voice. Song "ezz'u'da'leé", like that of *T. bicolor*, but shorter and thin. Call "chee".
Habitat. Moist to humid forest edges, grassy areas, also regenerating burnt areas; in second growth and forest edges in Trinidad. Sea-level to 600 m in Trinidad; 800–2300 m in Venezuela.



Food and Feeding. A specialist on seeding bamboo (*Guadua* and *Chusquea*, possibly also *Merostachys*); forages on seedheads still attached to plant. Also takes seeds of grasses and some fruit. Singly and in pairs; in small flocks of up to c. 40 individuals outside breeding season, when sometimes roosts communally.
Breeding. Season Jul–Dec (and occasionally May) in Trinidad and Aug in NE Argentina; timing of breeding may be correlated to abundance of bamboo seed, and season may shift depending on local conditions. Nest a flimsy ball with side entrance, made from grasses and rootlets, lined with finer fibres, placed on stump, on ground or up to 10 m up in fork of small tree. Clutch 2–3 eggs, occasionally 4, white with brown markings; young fed by both parents. No other information.
Movements. Non-migratory, but eruptive and nomadic; wanders into regenerating burnt areas, also into areas of seeding bamboo. On Trinidad moves to higher elevations in wet season.
Status and Conservation. Not globally threatened. Status not well known; apparently fairly common. Eruptive behaviour makes true status in many areas difficult to assess. Only one confirmed record in Colombia, one in Bolivia, and one in Paraguay; isolated records in other parts of Brazil, e.g. Mato Grosso and Paraná. Some earlier reports of this species in e.g. Colombia apparently involved misidentified *T. obscurus*.
Bibliography. Areta & Bodrati (2008), Armani (1985), Bates (1997), Bornschein & Reinert (1996), Brooks *et al.* (1996), David & Gosselin (2002b), Dunning (2008), ffrench (1991), Grant, Grant & Petren (2000b), Hilty (2003), Hilty & Brown (1986), Marcondes-Machado (1994), Mazar Barnett & Herrera (1996), Restall (2005b).

PLATE 69 ➤


304
♂
♀
ssp *nigra*
♂
♀
ssp *taylori*
305
306
♂
♀
307
♀
♂
310
ssp *noctis*
♂
308
ssp *ridgwayi*
♂
309
variants
311
ssp *bifasciata*
ssp *fusca*
ssp *becki*
variants
312
PLATE 69
inches 2
cm 5
ssp *luteola*
♂
variants
ssp *mentalis*
313
♂
♀
♀
314
♂

Genus *LOXIPASSER* H. Bryant, 1866

304. Yellow-shouldered Grassquit

Loxipasser anoxanthus

French: Pèrenoir mantelé **German**: Goldbug-Gimpelfink **Spanish**: Semillero Jamaicano
Other common names: Yellow-backed Grassquit/Finch/Grass Bird, Yellow-shouldered Finch

Taxonomy. *Spermophila anoxantha* Gosse, 1847, Mount Edgecumbe, Jamaica.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Melopyrrha*, *Loxigilla*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Monotypic.
Distribution. Jamaica.



Descriptive notes. 10·2–11·5 cm; 10·5–12·5 g. Very small, with moderately short tail and large head, bill thick and with strongly rounded culmen. Male has black on head and underparts to belly, lower belly and flanks greenish, contrasting rusty crissum; above, black extends to nape and lower neck, then strongly contrasts with grass-green mantle and back to tail; upperwing greenish, contrasting bright yellow shoulder; iris dark; bill and legs black. Female has head and breast grey with slight green wash; entire upperparts greenish with yellow wash, greenish wing strongly marked with yellow on shoulder; underparts below breast greyish-green, pale rusty crissum; bill horn-coloured, legs blackish. Juvenile is like female, but with reduced yellow at bend of wing. Voice. Song consists of 5 descending notes, with an almost echo-like quality.
Habitat. Edges of forest, including montane evergreen forest; woodlands, and gardens near wooded areas. Sea-level to 1800 m.
Food and Feeding. Seeds and fruits, probably also insects. Forages low in bushes and in trees. In small groups, presumably pairs and family groups.
Breeding. Season Mar–Sept, egg-laying recorded Mar–Jul. Nest a finely woven dome of grass and down, with side entrance, built in tree or bush, or concealed among epiphytes. Clutch 3–4 eggs, white with reddish or dull brown speckles and spots, these sometimes concentrated at broad end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Fairly common; reasonably widespread within its very small global range. No known threats.
Bibliography. Armani (1985), Douglas & Levy (1996), Dunning (2008), Hughes (1992), Raffaele *et al.* (1998), Ridgway (1901).

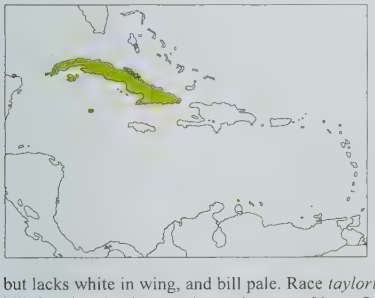
Genus *MELOPYRRHA* Bonaparte, 1853

305. Cuban Bullfinch

Melopyrrha nigra

French: Pèrenoir négrito **German**: Schwarzgimpelfink **Spanish**: Semillero Negrito
Other common names: Black Bullfinch/Sparrow (*taylori*).

Taxonomy. *Loxia nigra* Linnaeus, 1758, Cuba.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Loxigilla*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Race *taylori* sometimes considered a separate species. Two subspecies recognized.
Subspecies and Distribution.
M. n. nigra (Linnaeus, 1758) – Cuba (including some larger cays in Sabana-Camagüey Archipelago, and Cayo Cantiles in Los Canarreos Archipelago) and I of Pines.
M. n. taylori E. J. O. Hartert, 1896 – Grand Cayman I.



Descriptive notes. 14–15 cm; male 9–18·4 g, female 10·2–18·3 (nominate), 14·5–18·5 g (*taylori*). Small, dark finch with curved bill and white band on edge of wing. Male nominate race is black with blue or violet-blue gloss; alula, part of primary coverts, edging of outer web of one or more primaries white, greater portion of inner webs of secondaries and variable amount of inner webs of primaries (except outermost) white, underwing-coverts and axillaries also white; iris black; bill black; legs dark brownish. Female is like male, but black duller or dark slate in colour, paler on belly; bill black or dark slate. Juvenile is like female, but lacks white in wing, and bill pale. Race *taylori* is larger than nominate, with much more hefty bill, female paler than nominate, slate-grey. Voice. Song a thin melodious trill that ascends or descends in pitch, "ti ti ti ti-si-dddiiiyyy-sssiii". Call a buzzing "chip" or "chi-dip", or thin "tsee".
Habitat. Tropical evergreen forest, pine (*Pinus*) forests, brushy areas, including brush under pines, secondary forest; also mangroves. Sea-level to 900 m.
Food and Feeding. Feeds on insects, seeds and fruit. Forages in canopy, as well as near ground. Often in small flocks; sometimes in mixed-species foraging flocks.
Breeding. Season Mar–Jul. Nest a large spherical bulky mass with entrance at side, made from dried leaves, grass hairs, rootlets and feathers, built close to ground among bushes or twigs or placed low in spiny branches of trees; in one study, all nests found were built with materials from species of fern in genus *Lygodium*. Clutch 3–5 eggs, pale greenish-white, with reddish-brown and lilac spots concentrated at large end. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Common resident throughout Cuba and I of Pines; common on Grand Cayman I.
Bibliography. Armani (1985), Dunning (2008), Gálvez Aguilera *et al.* (1999), Garrido & Kirkconnell (2000), Michaelis (1978), Raffaele *et al.* (1998), Ridgway (1901), Sánchez *et al.* (2003).

Genus *LOXIGILLA* Lesson, 1831

306. Puerto Rican Bullfinch

Loxigilla portoricensis

French: Pèrenoir de Porto Rico **Spanish**: Semillero Puertorriqueño
German: Rotkopf-Gimpelfink
Other common names: Puerto Rican Grosbeak; Mountain Blacksmith (*grandis*)

Taxonomy. *Loxia portoricensis* Daudin, 1800, Puerto Rico.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Lesser Antilles race *grandis*, sometimes considered a separate species, is extinct. One extant subspecies recognized.
Subspecies and Distribution.
L. p. portoricensis (Daudin, 1800) – Puerto Rico.



Descriptive notes. 16·5–19 cm; male 26·7–44·8 g, female 23·4–45·5 g. Male has forecrown and side of crown, chin, throat, chest and undertail-coverts orange-red; rest of plumage black; iris dark brown; bill and legs dusky. Female is similar to male, but black less intense. Juvenile is deep olive-brown or olive, with undertail-coverts orange-rufous. Extinct race *grandis* was substantially larger and thicker-billed than nominate, with rufous darker and, on throat, more restricted. Voice. Song is a series of 2–10 rising whistles, followed by a buzz, or a loud "coochi, coochi, choochi". Call "check".
Habitat. Montane evergreen forest, tropical lowland evergreen forest, tropical deciduous forest, secondary forest, dry coastal thickets, occasionally mangrove forest. Sea-level to 1000 m.
Food and Feeding. Broad diet. Feeds mostly on fruits and seeds, also on flower parts; snails (Gastropoda) and insects also taken. In one study, found to forage on 41 species of plant, taking mainly fruits and seeds, and lesser amounts of shoots and flowers; Melastomataceae accounted for 43% of fruit consumed. Mainly arboreal, but may also drop to ground to forage. In forests feeds within middle strata of trees, searching outer branches more than inner ones.
Breeding. Season mainly Feb–Jun. Nest typically a spherical structure of twigs and leaves, with side entrance (rarely a cup, perhaps when structure not yet finished), placed on tree branch or in tree cavity, in shrub or in grass clump. Clutch usually 3 eggs, dull greenish with dark spots. No other information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Race *grandis* extinct. Nominate race very common in woodlands of Puerto Rico, particularly in heavy forests of mountains. One of this species' congeners, *L. noctis*, has recently become established on St John (in Virgin Is); if it colonizes Puerto Rico, it may compete with present species. Race *grandis* was formerly resident on St Christopher (St Kitts), in N Lesser Antilles, but not reported since 1920s; the possibility that it might survive in highlands of Mt Misery seems very remote, and this race is considered extinct. Cause of its demise was almost certainly damage to and loss of its limited environment, as a result of hurricanes.
Bibliography. Armani (1985), Dunning (2008), Garrido & Wiley (2003), Olson (1984), Pérez-Rivera (1994), Raffaele (1977, 1989), Raffaele *et al.* (1998), Ridgway (1901).

307. Greater Antillean Bullfinch

Loxigilla violacea

French: Pèrenoir petit-coq **German**: Rotsteiß-Gimpelfink **Spanish**: Semillero Prieto
Other common names: Jamaican Bullfinch (*ruficollis*)

Taxonomy. *Loxia violacea* Linnaeus, 1758, America = Bahamas.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Several races differ almost exclusively on size, and validity questionable. Proposed race *parishi* (described from I à Vache) supposedly differs on smaller size, but measurements do not confirm this; birds of Beata (and previously those of Catalina) sometimes

On following pages: 308. Lesser Antillean Bullfinch (*Loxigilla noctis*); 309. Barbados Bullfinch (*Loxigilla barbadensis*); 310. St Lucia Black Finch (*Melanospiza richardsoni*); 311. Green Warbler-finch (*Certhidea olivacea*); 312. Grey Warbler-finch (*Certhidea fusca*); 313. Vegetarian Finch (*Platyspiza crassirostris*); 314. Cocos Finch (*Pinaroloxias inornata*).

allotted to this race. Birds of Gonâve and Saona sometimes placed in *maurella*. Five subspecies tentatively recognized.

Subspecies and Distribution.

L. v. violacea (Linnaeus, 1758) – most of the larger islands in Bahamas.
L. v. ofella Buden, 1986 – Middle and East Caicos Is (S Bahamas).
L. v. affinis (Ridgway, 1898) – Hispaniola, and offshore islands of Gonâve, à Vache, Beata, Catalina and Saona.
L. v. maurella Wetmore, 1929 – Tortue I (off NW Hispaniola).
L. v. ruficollis (J. F. Gmelin, 1789) – Jamaica.



Descriptive notes. 13·2–17·5 cm; 18–32·4 g. Sturdy, with thick bill. Male nominate race is black, with red-orange short supercilium, throat and undertail-coverts; iris dark; bill dark grey; legs dusky. Female is similar to male, but duller black, more slaty, especially on upperparts. Juvenile is like female, but less greyish, upperparts brown, reddish-orange markings as on adults, but reduced in size on throat. Race *ofella* resembles nominate, but smaller; *affinis* smaller and glossier than nominate; *maurella* is like last, but larger; *ruficollis* is larger than nominate, duller and greyer, with paler rufous on throat and supercilium. Voice. Song a repeated trill of insect-like notes, "t'zeet t'zeet t'seet t'seet seet seet seet". Call a thin "spit".

Habitat. Dense thickets and undergrowth in habitats ranging from dry coastal scrub to wet mountain forest, including pine (*Pinus*) woods and gardens. Sea-level to 2000 m.

Food and Feeding. Feeds mostly on fruits and seeds, also on flower parts and snails (Gastropoda). Tends to keep in dense vegetation; probably feeds on or near ground.

Breeding. Egg-laying Mar–Jun. Nest sometimes a cup, usually a spherical structure with side entrance, made from twigs and leaves, lined with bromeliads, fine pieces of bark and other fine material, placed on tree branch or in tree cavity, in shrub or in grass clump. Clutch 3–4 eggs, very pale bluish-white with thin red-brown and yellow-brown marks, these concentrated at wide end. No other information.

Movements. Sedentary.

Status and Conservation. Not globally threatened. Common on large islands of Bahamas; similarly common in Jamaica and Hispaniola. Current status of populations on smaller islands not known.

Bibliography. Armani (1985), Bond (1943), Buden (1986), Conklin (1970), Dunning (2008), Keith *et al.* (2003), Raffaele *et al.* (1998), Ridgway (1901), Wetmore & Lincoln (1933).

308. **Lesser Antillean Bullfinch**

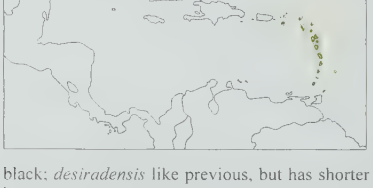
Loxigilla noctis

French: Pèrenoir rougegorge **German**: Bartgimpelfink **Spanish**: Semillero Gorjirrojo
Other common names: West Indian Robin; Red-throat See-see (*grenadensis*)

Taxonomy. *Fringilla noctis* Linnaeus, 1766, Martinique.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Formerly considered conspecific with *L. barbadensis*. Eight subspecies recognized.

Subspecies and Distribution.

L. n. ridgwayi (Cory, 1892) – St John (Virgin Is), St Croix (US Virgin Is) and N Lesser Antilles (Anguilla, St Martin, Barbuda and Antigua).
L. n. coryi (Ridgway, 1898) – Saba, St Eustatius, St Christopher (St Kitts), Nevis and Montserrat, in NW Lesser Antilles.
L. n. desiradensis Danforth, 1937 – Désirade, in NC Lesser Antilles.
L. n. dominicana (Ridgway, 1898) – Guadeloupe, Is des Saintes, Marie Galante and Dominica, in NC Lesser Antilles.
L. n. noctis (Linnaeus, 1766) – Martinique, in SC Lesser Antilles.
L. n. sclateri J. A. Allen, 1880 – St Lucia, in SC Lesser Antilles.
L. n. crissalis (Ridgway, 1898) – St Vincent, in S Lesser Antilles.
L. n. grenadensis (Cory, 1892) – Grenada, in S Lesser Antilles.



Descriptive notes. 14–15·5 cm; 13·1–23·4 g. Male nominate race is black, with small red patch above and in front of eye, and red on throat; iris dark; bill black; legs dusky. Female is brown, with slightly rusty upperwing-coverts and uppertail-coverts, greyer below; bill brown, paler below. Juvenile resembles female. Race *sclateri* is similar to nominate, but smaller; *crissalis* has rufous throat patch more extensive, also undertail-coverts extensively chestnut-rufous; *grenadensis* is like previous, but throat patch more restricted, undertail-coverts partly black; *dominicana* has rufous undertail-coverts, sometimes mixed with black; *desiradensis* like previous, but has shorter wing and tarsus; *ridgwayi* is like *dominicana*, but smaller, with proportionately large bill and feet, also plumage greyish-black (not black), underparts slate-grey; *coryi* is like last, but slightly darker. Voice. Song a crisp trill of 5–10 "tseep" notes usually ending with sharp "chuck" or a buzz. Call "check".

Habitat. Tropical evergreen forest, deciduous woodlands, second growth, gardens, and forest understorey; sometimes in dry areas and mangrove swamps. Sea-level to 900 m.

Food and Feeding. Diet varied; nectar, also fruits and seeds, as well as arthropods. Known to rob flowers of nectar; reaches nectar by biting a small hole at base of calyx. Uses foot to secure fruits as it eats them; essentially steps on fruit against a branch while it feeds from it. Forages mainly up in trees; occasionally descends closer to ground. Sometimes enters dwellings and other buildings in search of food scraps.

Breeding. Egg-laying Feb–Aug; Jan–Feb in Virgin Is. Nest domed, with opening at side, tends to be below 3 m, but varies (c. 1–5 m). Clutch 2–4 eggs, white with fine red specks, these mainly at wide end. No other information.

Movements. Mainly sedentary. Possibly some dispersive movements.

Status and Conservation. Not globally threatened. Common in Lesser Antilles; fairly common and widespread on St John; local breeder on St Croix. Arrived c. 1960 in Virgin Is, where found primarily in dry scrub; considered likely to expand its range to nearby islands.

Bibliography. Armani (1985), Askins *et al.* (1987), Bond (1939), Buckley & Buckley (2004), Dunning (2008), Greenlaw (1990), Prys-Jones (1982), Raffaele (1989), Raffaele & Roby (1977), Raffaele *et al.* (1998), Ridgway (1901).

309. **Barbados Bullfinch**

Loxigilla barbadensis

French: Pèrenoir de Barbade **German**: Barbadosgimpelfink **Spanish**: Semillero de Barbados

Taxonomy. *Loxigilla barbadensis* Cory, 1886, Barbados.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Melanospiza*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Formerly considered conspecific with *L. noctis*. Monotypic.

Distribution. Barbados.



Descriptive notes. 15·5 cm; 13·2–18·1 g. A small, comparatively dull-coloured finch with relatively short and rounded bill slightly longer than it is deep, often upper mandible slightly longer than lower mandible. Has greyish-brown head, slightly browner on crown, unmarked brownish-grey upperparts, including upperwing and tail; back of neck and nape often slightly more greyish than back and crown; upperwing edged with cinnamon-brown on coverts and less so on flight-feathers; chin whitish, throat and most of underparts grey, lower belly and vent whitish, crissum pale cinnamon (some individuals have crissum creamy to whitish, perhaps immatures or perhaps dull females); iris dark; bill black; legs blackish. Sexes similar. Juvenile resembles adult. Voice. Song, from visible perch, edge of small tree, or even building, a repeated set of short sibilant whistles, "sip sip sip sip sip" or "tse tse tse tse tse".

Habitat. Open country, woodland, dry scrub, hotel lawns, villages, essentially any habitat having a mix of taller vegetation and shorter shrubs or grass.

Food and Feeding. Varied diet, including seeds (36%), flowers (29%), insects (20%) and fruit (10%). Forages from ground level to 12 m up; most often on ground, where it pecks for seeds. When higher up, may glean for insects; also mandibulates bases of flowers, or even takes nectar from them. Often observed in small feeding flocks with *Tiaris bicolor*, particularly during dry season.

Breeding. Season Feb–Aug. Nest a domed structure with side entrance, of woven dry grass, usually placed less than 4 m from ground in small tree or shrub. Clutch 3–4 eggs. Male said to perform greater role in breeding, including bulk of nest-building, and greater effort in feeding female on nest and nestlings, than does *L. noctis*.

Movements. Resident.

Status and Conservation. Not globally threatened. Very common, and widespread within its tiny global range. Has adapted well to humans; can be found almost anywhere on Barbados, in nearly all habitats on the island, including urbanized areas, as well as agricultural sites; observed on front lawn of the international airport. No evidence of any major population decline.

Bibliography. Armani (1985), Buckley & Buckley (2004), Lovette, Seutin *et al.* (1999), McNair (1998b), Raffaele *et al.* (1998), Reader, Nover & Lefebvre (2002), Webster & Lefebvre (2000, 2001).

Genus *MELANOSPIZA* Ridgway, 1897

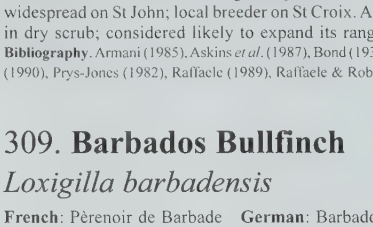
310. **St Lucia Black Finch**

Melanospiza richardsoni

French: Moisson pied-blanc **German**: Blassfuß-Gimpelfink **Spanish**: Semillero de Santa Lucía

Taxonomy. *Loxigilla richardsoni* Cory, 1886, mountains of Santa Lucia, Lesser Antilles.
Genus may belong in tanager family (Thraupidae); appears to be part of a clade which also includes several other Caribbean genera (*Euneornis*, *Loxipasser*, *Melopyrrha*, *Loxigilla*), *Tiaris* grassquits, Bananaquit (*Coereba flaveola*), and "Darwin's finches" (*Certhidea*, *Platyspiza*, *Pinaroloxias*, *Camarhynchus*, *Geospiza*). Monotypic.

Distribution. St Lucia, in SC Lesser Antilles.



Descriptive notes. 13–14; 18–23 g. A stocky, thickset pink-legged finch with thick and proportionately large bill, large legs and feet, and relatively short tail. Male is uniformly deep black; undersurface of primaries slate-coloured; iris black; bill black; legs pinkish. Female has greyish head, contrasting brown upperparts, including upperwing and tail; dull light brown below; bill greyish-horn to blackish, legs pink. Juvenile is like female. Voice. Song a high-pitched, loud and sibilant "tseéééééwww- swisiwis-tew", the initial whistle explosive and with an almost electric quality. Call a sharp "tiiip!".

Habitat. Tropical lowland evergreen forest and secondary forest, from sea-level to 950 m. Prefers forest with generally complex understorey, usually moister sites; therefore in mountains, rather than dry lowlands, for the most part.

Food and Feeding. No details of diet; presumably arthropods, fruits and seeds. Found primarily on ground, where it forages in leaf litter in dense understorey; also commonly perches within 1 m of ground. Often in pairs.

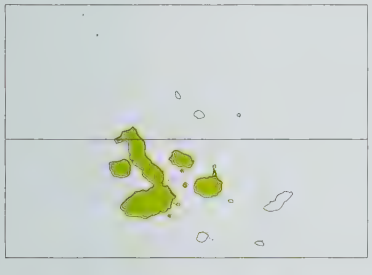
Breeding. Season Nov–Jun. Nest loosely constructed and spherical, with entrance at side, made from dried leaves, twigs, rootlets and ferns, placed c. 3 m above ground in small palm or shrub. Clutch 2 eggs, white with brownish-red spots and specks. No other information.
Movements. Sedentary.
Status and Conservation. ENDANGERED. Uncommon to rare, and local. Has tiny global range and very small population, estimated in range of 250–999 mature individuals; highest densities in moist montane forests. Thought to be in slow decline as a result of continuing habitat loss and degradation, coupled with effects of introduced predators. Main threat probably the clearing of undergrowth, especially in timber plantations, which makes such areas totally unsuitable for this species. Breeding success also hampered by introduced mongooses (Herpestinae) and rats (*Rattus*), which may prey on both nest contents and adults. This finch occurs in La Sorcière and Edmond Forest Reserves, and perhaps some other protected areas. Proposed conservation measures include surveys to ascertain the species' present distribution and population, and efforts to stop the clearing of undergrowth in wooded areas.
Bibliography. Anon. (2010c), Armani (1985), Bond (1929b), Butchart & Stattersfield (2004), Dunning (2008), Grant, Grant & Petren (2000b), Keith (1997), Raffaele *et al.* (1998), Ridgway (1901), Stattersfield & Capper (2000), Trail & Baptista (1988).

Genus *CERTHIDEA* Gould, 1837

311. Green Warbler-finch
Certhidea olivacea

French: Géospize olive **German**: Waldsänger-Darwinfink **Spanish**: Pinzón de Darwin Oliváceo
Other common names: Warbler-finch (when treated as conspecific with *C. fusca*)

Taxonomy. *Certhidea olivacea* Gould, 1837, Santiago (formerly James Island), Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Platyspiza*, *Camarhynchus* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Molecular data indicate that present genus is basal within the monophyletic lineage of Darwin's finches, and comprises two distinct and old lineages, the divergence of these two lineages pre-dating the radiation of all other Darwin's finches. Another study, including individuals from all 16 island populations of this genus, found that genetic and geographical distances are not correlated, and that genetic variation over a large area of the archipelago (the small peripheral islands) is very small; again, the data reveal two separate lineages, now treated as two species, namely present species and *C. fusca*. Monotypic.
Distribution. Islands of Fernandina (formerly Narborough), Isabela (Albermarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour) and Santa Cruz (Indefatigable), in Galapagos Is.

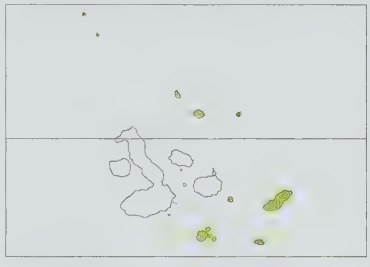


Descriptive notes. 10 cm; 8–12 g. A small Darwin's finch with characteristically long and pointed, parulid-like bill, and short and weak tail. Male is plain sandy brown above, with greyer head except for pale supercilium and foreface, unmarked brownish upperwing and tail; underparts variable, generally off-white, warmer buff on flanks, but some birds with throat and breast chestnut, on some restricted to mid-throat, on others extending to lores and clear down to breast and mid-flanks (differences perhaps related to age); iris dark; bill blackish when breeding, otherwise dull orange-yellow with dark culmen; legs blackish. Female is very like male, pale olive-brown on head and upperparts; upperwing sandy brown with indistinct wingbars, lower one often more obvious than upper one; off-white below, buffier wash on breast and flanks. Juvenile is similar to female. VOICE. Song, from tree or low bush, often high-pitched and includes buzzes, e.g. "piut-tze zzzzzzzzzzztip", duration c. 2 seconds, also a shorter song, e.g. "chzp-zhe chip" or "zhh-chip zhh-chip"; song parameters appear constrained by bill size, this small-billed species having relatively high trill rate, and relatively high frequency bandwidth. Similar to song of *C. fusca* (each will respond to playback of the other's song), but present species sings shorter songs with fewer repetitive notes.
Habitat. Can be found in most habitats and at most elevations on larger islands, but typically most common in humid highlands; only in very low abundance in dry lowlands, where perhaps only seasonal.
Food and Feeding. Food small insects and spiders (Araneae). Alone, or in loose groups, often with other finches.
Breeding. Nest built entirely by male, a sphere with entrance towards top and on side, made from dry grasses and other vegetation, often moss and lichen used. Clutch usually 4 eggs, whitish with pinkish or brown spots. No other information.
Movements. Resident; possibly some short seasonal movements.
Status and Conservation. Not globally threatened. Common and widespread through most of its range.
Bibliography. Armani (1985), Grant, B.R. & Grant (2002a), Grant, P.R. & Grant (2003), Lack (1947), McCarthy (2006), Petren, Grant, B.R. & Grant (1999a), Petren, Grant, P.R. *et al.* (2005), Podos (2001), Sulloway (1982a, 1982b), Swash & Still (2000), Tebbich *et al.* (2004), Tonnis *et al.* (2005).

312. Grey Warbler-finch
Certhidea fusca

French: Géospize gris **German**: Blindloedarwinfink **Spanish**: Pinzón de Darwin Gris
Other common names: Warbler-finch (when treated as conspecific with *C. olivacea*)

Taxonomy. *Certhidea fusca* P. L. Sclater and Salvin, 1870, Pinta (formerly Abington Island), Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Platyspiza*, *Camarhynchus* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Molecular data indicate that present genus is basal within the monophyletic lineage of Darwin's finches, and comprises two distinct and old lineages, the divergence of these two lineages pre-dating the radiation of all other Darwin's finches. Another study, including individuals from all 16 island populations of this genus, found that genetic and geographical distances are not correlated, and that genetic variation over a large area of the archipelago (the small peripheral islands) is very small; again, the data reveal two separate lineages, now treated as two species, namely present species and *C. olivacea*. Seven subspecies recognized.
Subspecies and Distribution.
C. f. becki Rothschild, 1898 – Darwin I (formerly Culpepper) and Wolf I (Wenman), in extreme NW Galapagos Is.
C. f. fusca P. L. Sclater & Salvin, 1870 – Pinta (Abington) and Marchena (Bindloe), in N Galapagos Is.
C. f. mentalis Ridgway, 1894 – Genovesa (Tower), in N Galapagos Is.
C. f. bifasciata Ridgway, 1894 – Santa Fe (Barrington), in C Galapagos Is.
C. f. ridgwayi Rothschild & E. J. O. Hartert, 1899 – Floreana (Charles), in S Galapagos Is.
C. f. luteola Ridgway, 1894 – San Cristóbal (Chatham), in SE Galapagos Is.
C. f. cinerascens Ridgway, 1890 – Española (Hood), in SE Galapagos Is.



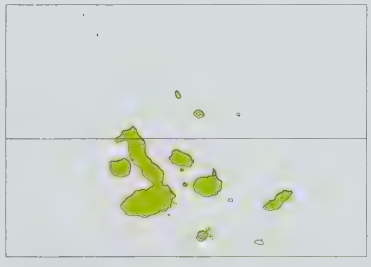
Descriptive notes. 10 cm; 8 g. A small Darwin's finch with characteristically long and pointed, parulid-like bill, short and weak tail. Has pale sandy-grey head and upperparts, slightly paler supercilium; upperwing sandy brown with narrow pale wingbars, lower one often more evident than upper one; off-white below, pale dusky wash on breast and flanks, buff tone on lower flanks; iris dark; bill blackish when breeding, otherwise dull orange-yellow with dark culmen; legs blackish. Sexes alike. Juvenile is similar to adult. Races differ mainly in plumage coloration: *becki* is larger and darker than nominate, with throat ranging from pale buff to rufescent, flanks olive-grey; *mentalis* is smaller and darker below than nominate; *bifasciata* is palest race, very pale above and below, whitish on underparts; *ridgwayi* male has some cinnamon on throat (less extensive than on *C. olivacea*), female paler than nominate; *cinerascens* is slightly larger and paler than nominate; *luteola* is warmer-toned, yellowish below. VOICE. Often song a repeated series of notes, "chip-pi'pi'pi'pi'pi", sounding like slow trill; song parameters appear constrained by bill size, this small-billed species having relatively high trill rate, and relatively high frequency bandwidth. Similar to song of *C. olivacea* (the two will respond to playback of each other's songs), but present species has longer song with more repetitive notes. Songs on Genovesa (race *mentalis*) frequently have more buzzy notes, while those on Pinta (nominate) lack buzzy notes and are least varied.
Habitat. Arid lowlands of small and low islands. May forage on dry sand beaches at very edge of vegetation.
Food and Feeding. Eats small insects and spiders (Araneae). Adults feed nestlings solely with arthropods. Usually forages in middle storey, but will use all levels including, rarely, ground. Singly or in pairs; sometimes in mixed flocks with other finches.
Breeding. Season Jan–May, on Genovesa beginning soon after first rains; up to three clutches laid within one season. Nest built by male alone, a sphere with entrance towards top and on side, made from dry grasses and vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots; incubation 12 days (10–14); nestling period 13–15 days (11–17).
Movements. Resident.
Status and Conservation. Not globally threatened. Common and widespread.
Bibliography. Armani (1985), Grant, B.R. & Grant (2002a), Grant, P.R. (1982), Grant, P.R. & Grant (1980, 1987, 2003), Grant, P.R. *et al.* (2005), Lack (1947), Petren, Grant, B.R. & Grant (1999a), Petren, Grant, P.R. *et al.* (2005), Podos (2001), Swash & Still (2000), Tonnis *et al.* (2005).

Genus *PLATYSPIZA* Ridgway, 1897

313. Vegetarian Finch
Platyspiza crassirostris

French: Géospize crassirostre **Spanish**: Pinzón de Darwin Vegetariano
German: Dickschnabel-Darwinfink
Other common names: Vegetarian Tree-finch

Taxonomy. *Camarhynchus crassirostris* Gould, 1837, Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Camarhynchus* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Genus sometimes subsumed in *Camarhynchus*, but represents a relatively old lineage within Darwin's finches, having separated out before emergence of *Geospiza* ground-finches, *Camarhynchus* tree-finches and perhaps *Pinaroloxias inornata*. Monotypic.



Distribution. Galapagos Is: on Pinta (formerly Abington I), Marchena (Bindloe), Fernandina (Narborough), Isabela (Albemarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable), Floreana (Charles) and satellites, and San Cristóbal (Chatham).
Descriptive notes. 16 cm; 29–40 g. The largest Darwin's finch, with longer and fuller tail than others, and more vertical stance; broad, stout bill strongly curved on culmen, giving appearance like that of a parrot (Psittacidae). Male has black hood, black continuing down to throat, breast and upper flanks; upperparts olive with blackish feather centres, particularly on mantle close to hood; upperwing and tail dark

brown with paler edging; underparts whitish, obscurely streaked on lower breast and flanks, buffy on lower flanks and undertail-coverts; some birds much more rufous overall, especially on underparts; iris dark; bill black, lower mandible becomes horn-coloured during non-breeding season; legs blackish. Female is brown, streaked on crown, face and upperparts, buffy rump; upperwing and tail brown, indistinct buffy wingbars; off-white below, streaked on throat, breast and flanks, lower flanks washed buff; upper mandible mostly dusky brown to blackish, lower mandible usually dull orange or dull pinkish. Immature male is intermediate between female and male adults, blackish restricted to face and throat, more streaked below than adult male. VOICE. Song a long, nasal drawn-out note, "ph'wheeeuuuuu-iiiúúú", accented towards end, each note nearly 2 seconds in length. Call a high-pitched squealing "tzeeeeiiiiiiiiippppppp", like electronic sound made when tuning in a radio, the most extreme vocalization of all Darwin's finches; also a whining "pheep".
Habitat. Variety of habitats, primarily montane evergreen forest; most common in transition zone, but will venture into arid zone lower down, as well as humid zone higher up.
Food and Feeding. Feeds largely on leaves, flowers, buds and fruits; a true vegetarian, often when sighted has a leaf or bud in bill. Forages mostly at middle levels.
Breeding. Breeds primarily in wet season. Nest domed, with side entrance, made from grass. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Uncommon; widespread. No evidence of any population declines.
Bibliography. Armani (1985), Burns *et al.* (2002), Harris (1973), Lack (1947), Swash & Still (2000).

Genus *PINAROLOXIAS* Sharpe, 1885

314. Cocos Finch

Pinaroloxias inornata

French: Spizin de Cocos **German**: Kokosinselammer **Spanish**: Pinzón de Darwin de la Cocos
Other common names: Cocos Island Finch

Taxonomy. *Cactornis inornatus* Gould, 1843, Cocos Island, Costa Rica.
Molecular data support original assertion that this species is part of the group known as "Darwin's finches" (incorporating also *Certhidea*, *Platyspiza*, *Camarhynchus* and *Geospiza*), the only one not found in Galapagos Archipelago; as such, it is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Monotypic.
Distribution. Cocos I, S of Costa Rica.



Descriptive notes. 12 cm; 13·1–16 g. A small finch with long and narrow, finely pointed bill with curved culmen, giving slightly down-curved look, and relatively long tail. Male is almost entirely black, including blackish wings and tail; crissum white with large black feather centres on undertail-coverts; iris dark; bill black throughout year; legs blackish. Female is brownish and streaked throughout, including head; face streaked, often a paler buffy supercilium; mantle and back brown with blackish feather centres, lower back and rump unstreaked and brighter cinnamon-brown; tail brown with variable cinnamon tips and sometimes feather centres; upperwing dark brown, two well-formed paler buff-brown to cinnamon wingbars, tertial edges similar in colour; underparts buff, blackish streaking on breast and flanks, unstreaked belly and vent, rear flanks darker buff; bill orange-yellow with darker culmen. Immature male is similar to female, but more densely and darkly streaked below, and crown and upperparts blackish-brown and less obviously streaked. VOICE. Song a buzzy double note, "chz-zhweeeuu" or "phfft-zheeuu", not unlike those of other Darwin's finches. Calls include high "phzzzzz" and a nasal "phheww".
Habitat. Found in practically every habitat on Cocos I: *Hibiscus* thickets along coasts, woodland, open country and closed-canopy forest, as well as in disturbed vegetation.
Food and Feeding. Feeds on soft fruit, nectar, arthropods and grass seeds. Four main types of foraging activity noted: eating *Cecropia pittieri* fruit, visiting leaf nectaries of *Hibiscus tiliaceus*, gleaning in vine tangles, and gleaning in tree foliage. Individual birds appear to favour particular techniques, resulting in individual specialization in manner in which they forage.
Breeding. Breeds throughout year, mostly Jan–May. Nest built by male, a sphere with entrance towards top and on side, made from dry grasses and vegetation (often moss and lichen used as construction material). Clutch usually 4 eggs, whitish with pinkish or brown spots. No other information.
Movements. Resident.
Status and Conservation. VULNERABLE. Common to abundant; the most common landbird on Cocos. Appears to have high tolerance of disturbed habitats, such that habitat degradation may not have major adverse effects on it. Nevertheless, this species has a very restricted global range of no more than c. 25 km², and is therefore susceptible to chance catastrophic events; in addition, introduced rats (*Rattus*) and cats are potential predators, grazing by feral deer, pigs and goats degrades natural habitats on the island, and increasing tourism is a further disturbance factor. Although the species is numerous, with an apparently stable population, and is a generalist in habitat preferences, its tiny global range is considered sufficient for it to be considered threatened. The entire island of Cocos is protected as a national park.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Lack (1947), Smith & Sweatman (1976), Stattersfield & Capper (2000), Swash & Still (2000), Werner & Sherry (1987).

PLATE 70 ➤


ssp pallidus
315
316
ssp striatipecta
318
ssp habeli
ssp affinis
317
319
ssp psittacula
ssp parvulus
ssp salvini
ssp intermedia
ssp debilirostris
321
PLATE 70
inches 2
cm 5
320
ssp scandens
ssp difficilis
ssp septentrionalis
ssp conirostris
bill variants
323
322
325
ssp propinqua
variation
324
326

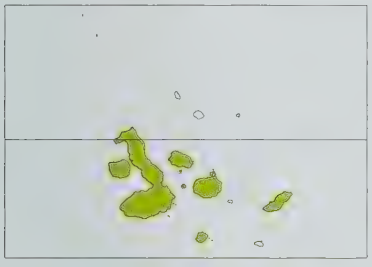
Genus *CAMARHYNCHUS* Gould, 1837

315. **Woodpecker Finch**

Camarhynchus pallidus

French: Géospize pique-bois **Spanish**: Pinzón de Darwin Carpintero
German: Spechtdarwinfink

Taxonomy. *Cactornis pallida* P. L. Sclater and Salvin, 1870, Santa Cruz (formerly Indefatigable Island), Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Three subspecies recognized.
Subspecies and Distribution.
C. p. productus Ridgway, 1894 – Fernandina (formerly Narborough I) and Isabela (Albemarle), in W Galapagos Is.
C. p. pallidus (P. L. Sclater & Salvin, 1870) – Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigabale) and Floreana (Charles), in C & S Galapagos Is.
C. p. striatipecta (Swarth, 1931) – San Cristóbal (Chatham), in SE Galapagos Is.



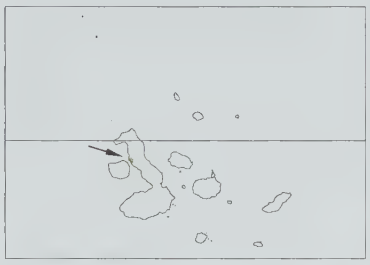
Descriptive notes. 15 cm; 20–31 g. A medium-sized to larger Darwin's finch with long bill, approximately twice as long as base depth, with arched culmen and nearly straight gonys, strong legs and large feet; short and weak tail. Male is somewhat nondescript sandy brown, unstreaked, and rather pale; face sandy brown, pale area above and below eye, upperparts also sandy brown and unstreaked; upperwing and tail sandy brown, two indistinct pale cinnamon wingbars; buffish below, nearing white on throat and belly to undertail-coverts, some individuals unstreaked, others with indistinct streaking on breast (strongest on side of breast); iris dark; bill black during breeding, paler lower mandible at other times; legs dusky. Female is like male in plumage, but often washed buff, bill dull orange, sometimes with darker culmen and tip, not becoming black during breeding. Juvenile resembles female. Races differ in size and plumage: *productus* is smaller and shorter-billed than nominate, also darker, and with more tendency to be streaked below; *striatipecta* also is smaller and shorter-billed, but much more strongly streaked on breast and flanks, also modestly streaked on upperparts. VOICE. Song loud and carries well, e.g. "chup-tupupupu chup-tupupupu" or "cht-trrr cht-trrr" or "chik-tip-tip-tip-tip chik-tip-tip-tip-tip", sounds more warbled and rollicking than that of congeners; song parameters appear to be constrained by bill size, this larger-billed species having relatively high trill rate and broad frequency bandwidth. Calls include nasal "pheew".
Habitat. Found in variety of habitats and elevations, especially montane evergreen forest; typically most common in transition zone and farther up in humid forest zone.
Food and Feeding. Main foods various types of arthropod, including wood-boring beetle (Coleoptera) larvae. Highly distinctive foraging behaviour, including crawling along branches and trunk-clinging; pecks in manner of a small woodpecker (Picidae) in order to gain access to larvae inside the timber. Makes ingenious use of a tool, usually a short pointed stick, to pry out these larvae; observations have revealed that it will search for a short hard twig, break this to the required length, and use it as a spear with which to impale and extract concealed insect prey. Ecologically, fills the role of a woodpecker or nuthatch (Sittidae), creeping along branches, probing in bark and even in clumps of dry leaves. Singly and in pairs.
Breeding. Nest built by male, a sphere with entrance towards top and on side, made from dry grasses and other vegetation (often moss and lichen used as construction material). Clutch mostly 4 eggs, whitish with pinkish or brown spots. No other information.
Movements. Resident.
Status and Conservation. Not globally threatened. Locally common, and widespread. Despite its modest appearance, this is one of the most renowned of all bird species, famed primarily for its well-publicized habit of pecking like a small woodpecker and, in particular, of making use of tools.
Bibliography. Alcock (1972), Armani (1985), Blume (1994), Eibl-Eibesfeldt (1961, 1964), Eibl-Eibesfeldt & Sielmann (1962), Greenhood & Norton (1999), Harris (1973), Lack (1947), McCarthy (2006), Millikan & Bowman (1967), Swash & Still (2000), Tebbich & Bshary (2004), Tebbich, Taborsky, Fessl & Blomqvist (2001), Tebbich, Taborsky, Fessl & Dvorak (2002), Tebbich, Taborsky, Fessl, Dvorak & Winkler (2004), Ulfstrand (2005).

316. **Mangrove Finch**

Camarhynchus heliobates

French: Géospize des mangroves **Spanish**: Pinzón de Darwin Manglero
German: Mangrovedarwinfink

Taxonomy. *Geospiza heliobates* Snodgrass and Heller, 1901, Tagus Cove, Isabela (formerly Albemarle Island), Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Monotypic.
Distribution. W Isabela I, in W Galapagos Is.
Descriptive notes. 14 cm; 18 g. A medium-sized Darwin's finch with typically short and weak tail, relatively long bill with arched culmen, nearly straight gonys. Male is nondescript greyish-brown and streaked, face grey-brown, pale area above and below eye, crown darker (older individuals sometimes acquire black hood); upperparts grey-brown and unstreaked to indistinctly streaked; upperwing and tail brown, two indistinct paler wingbars; off-white below, grey-streaked on throat, breast and flanks; iris dark; bill black during breeding, paler lower mandible at other times; legs dusky. Distinguished from similar *C. pallidus* by smaller size, smaller bill, and darker plumage with distinct streaking on breast. Female is like male in plumage, but bill dull orange with darker culmen and tip, not becoming black during breeding. Juvenile resembles female. VOICE. Song a rollicking "chi'priip chi'prriip chi'prrip" or "ch-wee? ch-wee? ch-wee?". Calls include buzzy "zzzzzz-tuu" and high-pitched "zeeeee".



Habitat. Dense and tall stands of mangrove.
Food and Feeding. Feeds largely on arthropods, mainly insects and their larvae, especially beetles (Coleoptera), and spiders (Araneae); also some vegetable matter. Forages principally in dead wood and leaf litter, and in apical buds of red mangrove (*Rhizophora mangle*).
Breeding. Breeds during start of rainy season, from Dec/Jan, into May. Pair-bond may be kept from previous nesting seasons. Nest built by male, a sphere with entrance towards top and on side, made from dry grasses and vegetation (often moss and lichen used in construction), placed in outermost branches in lower canopy of black mangrove (*Avicennia germinans*) or white mangrove (*Laguncularia racemosa*), with pronounced preference for former tree where available; in recent study, all nests located were in tall trees within patches of high mangroves that were often flooded at high tide (such mangroves rare in Galapagos). Clutch usually 4 eggs, whitish with pinkish or brown spots; incubation by female alone, 12 days; nestling period at least 10 days. Nest predation high, 54%, with only 18% ultimately producing young, most predation by rats (*Rattus*); after rat control, predation rate fell to c. 30%; additional mortality of nestlings due to the botfly *Philornis downsi*.
Movements. Resident.
Status and Conservation. CRITICALLY ENDANGERED. Rare, and extremely local. Total population estimated at 80–120 mature individuals, all within a tiny global range of just 1 km² on NW coast of Isabela I. Historically, this species was present in at least six mangrove patches on E Fernandina I and E, S & W Isabela. Recent surveys failed to locate the species on Fernandina, and likely now extinct as a breeding bird on that island (last reported sighting possibly in 1971). On Isabela, breeding populations found in 1997 and 1998 in only two areas, Playa Tortuga Negra (37 pairs) and Caleta Black (21 pairs), both on NW coast of the island; in subsequent surveys of these sites, estimated populations of, respectively, 36 and 16 pairs in 1999, 24 and 14 pairs in 2007, and a combined total of c. 40 pairs in 2009 (this last possibly the most thorough survey); elsewhere on Isabela, 3–5 territories probably with breeding birds identified in fairly extensive mangroves on SE coast, and in 2008 several other historical sites were searched, including Bahia Urbina, Bahia Elizabeth and Punta Moreno (also Punta Espinoza, on Fernandina), but species was found at only one site, Bahia Cártago (on E coast of Isabela), where possibly 4–5 pairs present. Has probably never been common, and in recent decades its range and population have constricted greatly. Declines due mainly to introduced black rat (*Rattus rattus*), which is a major cause of nesting failure, e.g. 70% of nests preyed on in 2007; other potential threats include feral cats and the Smooth-billed Ani (*Crotophaga ani*), both predators; a significant threat is the accidentally introduced botfly *Philornis downsi*, a nest parasite present in all nests and at high rate of infestation (average of 42 parasites per nest). Habitat degradation probably a contributory factor. Mangroves utilized by this species appear structurally different from those where it is absent, suggesting subtle habitat preferences; appears to favour mangrove with tall trees, relatively low canopy cover, and plenty of leaf litter and dead wood; moreover, separation of the mangrove trees from the sea is evidently essential in avoiding washing-away of the leaf litter, a preferred foraging substrate. Whole habitat is protected within Galápagos National Park, and islands are a World Heritage Site (although classified as threatened in 2007). Control of invasive predators is continuing, and study of methods to control *Philornis downsi* is underway. Studies of breeding biology have been undertaken and blood samples analysed; preliminary results appear to indicate serious inbreeding. Feasibility of translocating individuals being assessed, and possible sites for reintroduction on Isabela investigated. Three-year programme involves the taking of ten young annually from Tortuga Negra colony and releasing them into mangroves on E coast (Bahia Cártago). Yearly monitoring continues.
Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Curio & Kramer (1964), Dvorak *et al.* (2004), Fessl, Dvorak *et al.* (2011), Fessl, Loaiza *et al.* (2011), Harris (1973), Hirschfeld (2007), Lack (1947), Stattersfield & Capper (2000), Swash & Still (2000).

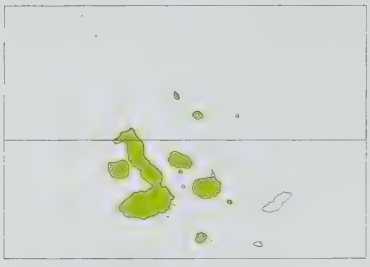
317. **Large Tree-finch**

Camarhynchus psittacula

French: Géospize psittacin **Spanish**: Pinzón de Darwin Lorito
German: Papageischnabel-Darwinfink
Other common names: Large Insectivorous Tree-finch

Taxonomy. *Camarhynchus psittacula* Gould, 1837, Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Three subspecies recognized.
Subspecies and Distribution.
C. p. habeli P. L. Sclater & Salvin, 1870 – Pinta (formerly Abington I) and Marchena (Bindloe), in N Galapagos Is.
C. p. affinis Ridgway, 1894 – Fernandina (Narborough) and Isabela (Albemarle), in W Galapagos Is.
C. p. psittacula Gould, 1837 – Santiago (James), Rábida (Jervis), Santa Cruz (Indefatigable), Santa Fe (Barrington) and Floreana (Charles), in C & S Galapagos Is.
Descriptive notes. 13 cm; 15–21 g. The largest tree-finch, tail proportionately short and weak, deep bill approximately as long as it is deep, strongly arched culmen, mandible tips cross slightly when bill closed. Male nominate race has blackish hood extending to throat and breast; upperparts greyish-olive with darker feather centres; whitish below tinged yellowish-buff, dark streaks on lower breast and flanks, undertail-coverts unstreaked buffy white; iris dark; bill black when breeding, otherwise

On following pages: 318. Medium Tree-finch (*Camarhynchus pauper*); 319. Small Tree-finch (*Camarhynchus parvulus*); 320. Sharp-beaked Ground-finch (*Geospiza difficilis*); 321. Common Cactus-finch (*Geospiza scandens*); 322. Large Cactus-finch (*Geospiza conirostris*); 323. Large Ground-finch (*Geospiza magnirostris*); 324. Medium Ground-finch (*Geospiza fortis*); 325. Small Ground-finch (*Geospiza fuliginosa*); 326. Many-colored Chaco Finch (*Saltatricula multicolor*).



dull orange with dark culmen; legs black. Female is dull greyish-brown, streaking of underparts less bold than in male, often indistinct; head greyish-brown, slightly paler supercilium, upperparts greyish-brown with indistinct darker feather centres (sometimes absent), tail brown; upperwing brownish, two narrow grey-buff wingbars; off-white below, indistinct grey streaking on breast on some individuals, belly to undertail-coverts plain pale buff; bill dull orange with darker culmen; legs blackish. Immature male is like female, but with blackish forehead, face and lower throat. Races differ mainly in size and bill structure: *habeli* is smaller than nominate, has longer bill with less curved culmen, male tends to be darker than nominate; *affinis* is like nominate, but smaller in both body size and bill size. VOICE. Song a repeated series of 4–6 notes given in pairs, "chu-tzee chu-tzee chut-zee". Calls include nasal "tzeeuu".

Habitat. Highland forests; may move to lower elevations during dry season.

Food and Feeding. Food mainly arthropods, also native fruits. Forages under leaves and excavates dead branches in search of insects.

Breeding. Breeds mainly in wet season. Pair-bond may be kept over successive seasons. Nest built by male, a sphere with entrance towards top at side, made from dry grasses and other vegetation (often moss and lichen used in construction). Clutch usually 4 eggs (sometimes 3), whitish with pinkish or brown spots. Incubation by female, c. 12 days; fledging 10–12 days.

Movements. Resident; some downslope movement in dry season suspected.

Status and Conservation. Not globally threatened. Uncommon; widely distributed in the archipelago. Apparently extinct on Pinzón (Duncan) and Baltra (Seymour).

Bibliography. Armani (1985), Curio & Kramer (1965b), Harris (1973), Lack (1947), McCarthy (2006), Swash & Still (2000), Tebbich *et al.* (2004).

318. **Medium Tree-finch**

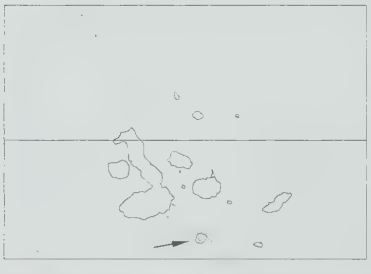
Camarhynchus pauper

French: Géospize modeste **Spanish**: Pinzón de Darwin Modesto
German: Kleinschnabel-Darwinfink
Other common names: Charles (Insectivorous) Tree-finch, Santa Maria/Floreana Tree-finch

Taxonomy. *Camarhynchus pauper* Ridgway, 1890, Floreana (formerly Charles Island), Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Monotypic.

Distribution. Highlands of Floreana I, in S Galapagos Is.



Descriptive notes. 13 cm; 16 g. Intermediate-sized tree-finch, larger body size than *C. parvulus* and with bill distinctly larger and longer; typically has proportionately short and weak tail. Male has blackish hood extending to throat and breast; upperparts brownish-olive with darker feather centres; underparts pale buffy or whitish, blurry streaks on lower breast and flanks, unstreaked undertail-coverts buffy white; iris dark; bill black when breeding, otherwise dull orange with dark culmen; legs black. Female is dull greyish-brown, essentially unstreaked or only indistinctly streaked: head greyish-brown, slightly paler supercilium, upperparts also greyish-brown with indistinct darker feather centres (sometimes absent); tail brown; upperwing brownish, two narrow grey-buff wingbars; off-white below, indistinct grey streaking on breast on some individuals, belly to undertail-coverts pale buff and unstreaked; bill dull orange with darker culmen; legs blackish. Immature male is like female, but has blackish forehead, face and lower throat. VOICE. Song a repeated series of notes, lasting c. 1·5 seconds, "che-che-che-che-che" or "tew-tew-tew-tew" or "chi'ri'ri chi'ri'ri". Calls include high-pitched "zweee" and nasal "phwee."

Habitat. Forested habitats at middle and higher elevations, 300–400 m. Inhabits montane evergreen and tropical deciduous forests, and humid scrub in *Scalesia* zone. May move downslope to dry areas during non-breeding season.

Food and Feeding. Mainly small arthropods, also young buds and nectar and leaves. Forages by probing in bark crevices and branches; searches under foliage and twigs. Gleaning items from leaves and twigs.

Breeding. Nest built by male, a sphere with entrance towards top and at side, made from dry grasses and other vegetation (often moss and lichen used in construction), placed preferentially in native *Scalesia pedunculata* tree. Clutch generally 4 eggs, whitish with pinkish or brown spots; no information on incubation period; nestling period 13–16 days. Of 63 active nests studied, 17 held combined total of 53 chicks, all of which were infested with the parasitic botfly *Philornis downsi*; only 25% of nestlings fledged, 28% were lost to predation, 41% died through *P. downsi* parasitism, and 6% died for other reasons.

Movements. Resident but some down slope movement after the breeding season.

Status and Conservation. CRITICALLY ENDANGERED. Local and uncommon. Appears to be in rapid decline. Has tiny global range of c. 23 km², within which estimated population in 2008 at most 1660 individuals, a reduction of more than 60% since 2004. Small to moderate-sized population in highlands, with largest numbers around base of volcano Cerro Pajas, where preferred nesting tree, *Scalesia pedunculata*, dominant; uncommon to rare on coast. At Cerro Pajas, density dropped from 154 birds/km² in 2004 to 60 birds/km² in 2008, and this species is now significantly less common than it was 50–100 years ago. Main causes of the rapid decrease in this species' numbers are habitat degradation, introduced predators and, especially, effects of the accidentally introduced nest-parasitic botfly *Philornis downsi*. The fly appears to be causing large-scale decreases in nesting productivity; the risk of fly parasitism thought to be increased because this tree-finch's only habitat is adjacent to cleared agricultural land with fruiting trees favoured by the adult fly. In addition, avian pox infects a significant proportion of individuals. Floreana I has several introduced predators and herbivores, including, among others, pigs, cats, dogs and rats (*Rattus*), and suffers extensive habitat destruction and degradation from agriculture and free-ranging domestic stock, as well as habitat alteration caused by invasive plant species. The tree-finch's preferred nesting tree, *Scalesia pedunculata*, is now endangered on Floreana, surviving only in fragmented patches totalling less than 4 km² in extent; visits by tourists to *Scalesia* habitat have increased more than ten-fold since 2004. Galápagos National Park includes almost all land area of islands, but does not incorporate the agricultural zone of Floreana, an area which was this tree-finch's prime habitat; the islands are a World Heritage Site (although classified as threatened in 2007). In 2006, eradication of goats and donkeys on Floreana commenced, and this significantly reduced populations of these grazing mammals. Methods to control or eradicate *Philornis downsi* are currently being tested.

Bibliography. Anon. (2010c), Armani (1985), Butchart & Stattersfield (2004), Curio & Kramer (1965b), Harris (1973), Lack (1947), McCarthy (2006), O'Connor *et al.* (2010), Stattersfield & Capper (2000), Swash & Still (2000).

319. **Small Tree-finch**

Camarhynchus parvulus

French: Géospize minuscule **German**: Zwergdarwinfink **Spanish**: Pinzón de Darwin Chico
Other common names: Small Insectivorous Tree-finch

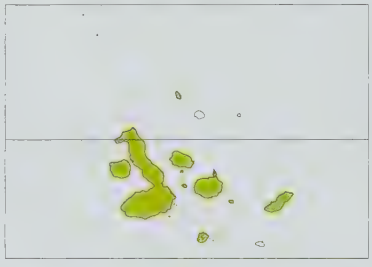
Taxonomy. *Geospiza parvula* Gould, 1837, Santiago (formerly James Island), Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Geospiza*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Two subspecies recognized.

Subspecies and Distribution.

C. p. parvulus (Gould, 1837) – Pinta (Abington), Fernandina (Narborough), Isabela (Albemarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable), Santa Fe (Barrington) and Floreana (Charles), in Galapagos Is.

C. p. salvini Ridgway, 1894 – San Cristóbal (Chatham), in SE Galapagos Is.



Descriptive notes. 11 cm; 11–16 g. The smallest tree-finch, with tiny rounded bill shape similar to that of some *Sporophila* seedeaters; proportionately short and weak tail. Male nominate race has blackish hood extending to throat and breast; upperparts greyish-olive with darker feather centres; underparts whitish with buffy tinge, blurry streaks on lower breast and flanks, unstreaked undertail-coverts buffy white; iris dark; bill black when breeding, otherwise dull orange with dark culmen; legs black. Female is dull greyish-brown, essentially unstreaked above and at most indistinctly streaked below: head greyish-brown, slightly paler area above and below eye, upperparts similarly greyish-brown; tail brown, upperwing brownish, two narrow grey-buff wingbars; off-white to pale buff below, indistinct grey streaking on breast on some individuals, belly to undertail-coverts pale buff and unstreaked; bill dull orange with darker culmen, legs blackish. Immature male is like female, but with blackish forehead, face and lower throat. Race *salvini* is slightly larger than nominate, with longer bill, lacks dark hood, also more yellowish-buff and more strongly streaked on underparts. VOICE. Song a high-pitched double note, "zee-tzee, zee-tzee"; song parameters appear constrained by bill size, this small-billed species having relatively high trill rate, and relatively low frequency bandwidth.

Habitat. Forest areas, agricultural land with trees, also in parts of drier zone where tall shrubs and other vegetation present. At all elevations, from arid zone to highland humid zone; most common from transition zone and above.

Food and Feeding. Diet mostly insects and other small arthropods; also seeds, fruit, buds, and sometimes flower nectar. Forages mostly above ground in foliage, occasionally on ground. Techniques include gleaning from leaves and twigs, as well as hanging from tips of branches, often upside-down, to glean items from leaves, buds and twig tips.

Breeding. Nest built by male, a sphere with entrance at side towards top, made from dry grasses and other vegetation (often moss and lichen used in construction). Clutch usually 4 eggs, whitish with pinkish or brown spots. No other information.

Movements. Resident.

Status and Conservation. Not globally threatened. Common and widespread. Appears to be the most common and the most widespread of the Galapagos tree-finches.

Bibliography. Armani (1985), Christensen & Kleindorfer (2007), Christensen, Kleindorfer & Robertson (2006), Christensen, Robertson & Kleindorfer (2010), Curio & Kramer (1965b), Harris (1973), Kleindorfer *et al.* (2009), Lack (1947), McCarthy (2006), Podos (2001), Swash & Still (2000), Tebbich *et al.* (2004), Wiggins (1965).

Genus *GEOSPIZA* Gould, 1837

320. **Sharp-beaked Ground-finch**

Geospiza difficilis

French: Géospize à bec pointu **Spanish**: Pinzón de Darwin Picofino
German: Spitzschnabel-Grundfink
Other common names: Vampire Finch (*septentrionalis*)

Taxonomy. *Geospiza difficilis* Sharpe, 1888, Pinta (formerly Abington Island), Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. A form *G. nebulosa* was described in 1837 from two specimens, one from Floreana (Charles); relationships uncertain, but, if this is conspecific with present species, name *nebulosa* would have priority; *nebulosa* has been considered a synonym of *G. fortis*. Relationship of present species to other members of genus has always been troubled (hence the name *difficilis*); hybridizes occasionally with *G. conirostris*. Considerable differences exist in habits, ecology, size, and bill shape among its different populations. Recent genetic work suggests that interior island populations, which are restricted to highlands on Pinta, Fernandina (Narborough) and Santiago (James), form a well-sup-

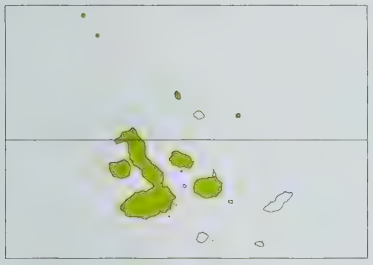
ported clade which may be only distantly related to others in genus, although, from current data, exact relationship not clear. Present species may warrant division into more than one species, e.g. has been suggested that race *septentrionalis* merits elevation to species rank. Also, Genovesa population, currently included in nominate, appears genetically distantly related to Pinta population, and it may be better to resurrect name *acutirostris* for it; indeed, Genovesa population seems genetically closer to other members of genus, suggesting that it should be removed altogether from present species. Full review required. Three subspecies currently recognized.

Subspecies and Distribution.

G. d. septentrionalis Rothschild & E. J. O. Hartert, 1899 – Darwin (Culpepper) and Wolf (Wenman), in extreme NW Galapagos Is.

G. d. difficilis Sharpe, 1888 – Pinta and Genovesa (Tower), in N Galapagos Is.

G. d. debilirostris Ridgway, 1894 – Fernandina (Narborough), Isabela (Albemarle), Santiago (James) and Santa Cruz (Indefatigable), in W & C Galapagos Is.



Descriptive notes. 11–12 cm; 12·3–20 g. A small ground-finch with small, sharply pointed bill distinctly longer than it is deep and with culmen straight, giving more pointed and longer look than bill of *G. fuliginosa*; relatively short and weak-looking tail. Male nominate race is almost entirely black, with slightly browner wings and tail, undertail-coverts with white fringes; iris dark; bill black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding; legs blackish. Female has head down to throat and upperparts dark olivaceous-brown with brownish or olive-grey fringing (head looks weakly streaked and upperparts rather scaly); wing dark brown with buff fringing, tail feathers dark with greyish edging; buff upper half of eyering; underparts boldly streaked dark brown and buff, the streaks becoming obscure on rear underparts, undertail-coverts rather plain whitish-buff; bill dark with orange tint at base and yellow tip, ranging to entirely orange-yellow (depending on breeding state), legs blackish. Immature male is intermediate between streaked female and solidly black adult male, has head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Race *septentrionalis* is larger than nominate, has longer and more sharply pointed bill with more curved culmen, female and immature on average darker in coloration and with cinnamon wingbars; *debilirostris* is large, with proportionately large feet, and proportionately thick-based, sharply pointed bill. Voice. Song on Wolf I often a long (just over 1 second) single rasping note, reminiscent of song of an *Agelaius* blackbird, "chrrheeeewwww"; also on Wolf, a doubled or tripled note, "zheww-zheew, zheww-zheew". On Genovesa song a nasal "tzh-waa tzh-waa". Calls include very high "tzeeeewwww". Males of genus, with rare exceptions, sing only one song type. Song of present species exhibits much geographical variation: in forest-based populations of Fernandina, Santiago and Pinta songs complex both in tempo and in note structure, and have much frequency modulation and use of high-pitched notes; on low scrubby islands of Genovesa, Wolf and Darwin songs short and structurally simple, usually a repeated simple note or a narrow frequency-band buzz, lacking strong frequency modulation. More complexities exist, but next to each other populations from Wolf and Darwin differ radically, those from Darwin giving simple buzzy trill, those from Wolf having short multi-note songs.

Habitat. In highlands of Fernandina, Santiago and Pinta occupies structurally complex and dense *Zanthoxylum* forest. On N low islands of Darwin, Wolf and Genovesa found in arid scrub habitats, as well as within seabird colonies (particularly race *septentrionalis* of Darwin and Wolf).

Food and Feeding. Variety of foods, including leaves, flowers, cactus pulp and insects. In one study on Genovesa I, adults of this species, *G. magnirostris* and *G. conirostris* showed much overlap in food choice during nesting period. All feed nestlings on mixed diet of arthropods, fruits and seeds. Seeds of *Bursera graveolens* absent from diet of small-billed present species, but common in that of large-billed *G. magnirostris*. During non-breeding season diets diverge, and seed size eaten then correlates to bill size. On Darwin I and Wolf I race *septentrionalis* has extraordinary habit of drinking blood from seabirds; it pecks at feather bases on large seabirds, often where a feather is growing, and then "licks up" the blood as it begins to flow.

Breeding. Highland populations breed largely during wet season; on Genovesa season spans Jan–May, beginning soon after first rains; up to five clutches laid within one season. Nest built by male, a sphere with entrance towards top and on side, made from dry grasses and vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots; incubation period 12 days (10–14); nestling period 13–15 days (11–17).

Movements. Resident; highland populations appear to drift lower into drier habitats during non-breeding season.

Status and Conservation. Not globally threatened. Common on N arid low islands, uncommon in highlands. Widespread, and generally showing no signs of any decrease in numbers, although possibly extirpated on Santa Cruz.

Bibliography. Abbott *et al.* (1977), Armani (1985), Bowman & Billeb (1965), Curio (1969), Curio & Kramer (1965b), Grant, B.R. & Grant (2002b), Grant, P.R. (1982), Grant, P.R. & Grant (1980, 1987), Grant, P.R., Grant & Petren (2000a), Harris (1973), Lack (1947), Lewin (1983), McCarthy (2006), Petren *et al.* (2005), Ratcliffe & Grant (1983), Schluter (1982b, 1984, 1986), Schluter & Grant (1982, 1984), Swash & Still (2000), Vagvolgyi & Vagvolgyi (1989).

321. Common Cactus-finch

Geospiza scandens

French: Géospize des cactus **Spanish**: Pinzón de Darwin de los Cactos
German: Kaktusgrundfink
Other common names: (Small) Cactus-finch, Cactus Ground-finch

Taxonomy. *Cactornis scandens* Gould, 1837, Santiago (formerly James Island), Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Present species hybridizes rarely with *G. fortis*. Birds on Rábida I (Jervis), currently included in nominate race, are larger-billed than those on Santiago and perhaps better placed in *intermedia*. Four subspecies recognized.

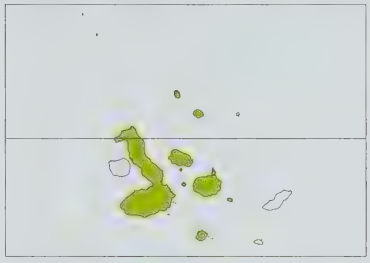
Subspecies and Distribution.

G. s. abingdoni (P. L. Sclater & Salvin, 1870) – Pinta (Abington), in N Galapagos Is.

G. s. rothschildi Heller & Snodgrass, 1901 – Marchena (Bindloe), in N Galapagos Is.

G. s. intermedia Ridgway, 1894 – Isabela I (Albemarle), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable), Santa Fe (Barrington) and Floreana (Charles), in W, C & S Galapagos Is.

G. s. scandens (Gould, 1837) – Santiago and Rábida (Jervis), in C Galapagos Is.



Descriptive notes. 12–14 cm; 20–24 g. A medium-sized ground-finch with long, robust spike-like bill nearly twice as long as it is deep, relatively thick at base, and with distinct droop (downcurved culmen); relatively short and weak-looking tail. Male nominate race is almost entirely black, with slightly browner wings and tail, white crissum with black centres on undertail-coverts; iris dark; bill black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding; legs blackish. Distinguished from extremely similar *G. fortis* only by bill morphology and size, with clearly long and droopy bill. Female has head to throat and upperparts dark grey, with olivaceous-brown to greyish scaling, side of head similar but for buffy eyering and faint buffy bands on supraloral and cheek; wing and tail feathers dark olive-brown to blackish, with buffy-brown fringing, duller on primaries and rectrices; underparts whitish with dark brown streaks all over, the streaks more blurry on rear flanks, and smallest on central belly and vent; bill dark with orange tint at base and yellow tip, varying to entirely orange-yellow (depending on breeding state). Immature male is intermediate between streaked female and solidly black adult male, head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Races differ mainly in size and in bill proportions: *intermedia* is larger than nominate, with proportionately thicker and longer bill; *abingdoni* is larger still, with bill deeper, with strongly arched culmen (specimens of both sexes, are streaked below, suggesting constant plumage difference, although this perhaps an effect of small sample sizes in collections); *rothschildi* is thickest-billed and largest-bodied race. Voice. Song a doubled note, "zhhwe zhhwe", or more complex version, "zhh-wah-wah, zhh-wah-wah". Call a high "tiip". Male ground-finches, with rare exception, sing only one song type; song parameters appear constrained by bill size, this relatively large-billed species having relatively low trill rate, and broad frequency bandwidth. In studies of songs of father and sons on Daphne Mayor I (islet W of Baltra), sons found to learn songs from fathers; songs therefore culturally passed on.

Habitat. Found in arid zone, where prickly-pear cactus (*Opuntia*) present; rarely ventures higher, into more humid zones.

Food and Feeding. Feeds on prickly-pear cactus pulp, flowers, fruits and insects. Primarily a specialist on *Opuntia* seeds, which make up more than a third of diet; another third comprises *Opuntia* flowers, approximately a quarter of diet consists of small seeds, and the rest includes tiny proportion of arthropods and *Tribulus* seeds.

Breeding. May breed at any time of year, but most breeding occurs during wet season; in wet years more than one brood may be raised. Nest normally no higher above ground than 3 m, usually placed in a thick stand of *Opuntia* cactus, but a few are situated in dense shrubs; nest, built by male, a sphere with entrance at side towards top, made from dry grasses and other vegetation. Clutch usually 3–4 eggs, whitish with pinkish or brown spots. Incubation by female, 12 days; young remain in nest c. 11–14 days.

Movements. Resident.

Status and Conservation. Not globally threatened. Common and widespread.

Bibliography. Abbott *et al.* (1977), Armani (1985), Boag (1983, 1984), Boag & Grant (1984), Curio & Kramer (1965b), Gibbs & Grant (1987b), Gibbs *et al.* (1984), Grant, B.R. (1996, 2003, 2004), Grant, B.R. & Grant (1981, 1996, 1997), Grant, P.R. & Grant (1992, 1994, 1997a, 1997b, 2000, 2002a, 2002b, 2009), Grant, P.R., Grant, Keller, Markert & Petren (2003), Grant, P.R., Grant, Keller & Petren (2000), Grant, P.R., Grant, Markert *et al.* (2004), Harris (1973), Heller & Snodgrass (1901), Keller *et al.* (2002), Lack (1947), Markert *et al.* (2004), McCarthy (2006), Millington & Grant (1983, 1984), Millington & Price (1985), Petren, Grant, B.R. & Grant (1999b), Petren, Grant, P.R. *et al.* (2005), Price & Gibbs (1987), Price *et al.* (1983), Schluter & Grant (1984), Schluter & Smith (1986), Swash & Still (2000).

322. Large Cactus-finch

Geospiza conirostris

French: Géospize à bec conique **Spanish**: Pinzón de Darwin Conirrostro
German: Opuntiengrundfink
Other common names: (Large) Cactus Ground-finch

Taxonomy. *Geospiza conirostris* Ridgway, 1890, Española I (formerly Hood Island), Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. On Genovesa (Tower), this species hybridizes rarely with *G. magnirostris* and sometimes with smaller *G. difficilis*. Genetic studies suggest that Española and Genovesa populations are rather distantly related, which would make present taxonomic arrangement paraphyletic; NW populations (*darwini*), however, not sampled, although those on Darwin (Culpepper) and Wolf (Wenman) similar in bill size to those on Genovesa. Three subspecies recognized.

Subspecies and Distribution.

G. c. darwini Rothschild & E. J. O. Hartert, 1899 – Darwin I and Wolf I, in extreme NW Galapagos Is.

G. c. propinqua Ridgway, 1894 – Genovesa, in N Galapagos Is.

G. c. conirostris Ridgway, 1890 – Española, in SE Galapagos Is.

Descriptive notes. 13–15 cm; 28 g. A large ground-finch with thick, yet long and robust bill; relatively short and weak-looking tail. Male nominate race is entirely black with slightly browner wings and tail, except for white crissum with black feather centres on undertail-coverts; iris dark; bill black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding; legs blackish. Distinguished from very similar *G. magnirostris* by longer and thinner bill. Female is dark brownish-grey and streaked throughout, with the paler feather fringes of head, back and most of breast often narrow and indistinct so that these areas appear rather more solid dark than in females of congeners; often with paler buffy-grey supercilium and paler lower eye-crescent (on darker birds, supercilium restricted to a pale spot above and behind eye); upperwing brown with paler, buffy-brown wingbars and tertial edges; below, off-white with darker brown streaking, streaks most dense on throat and breast (breast and throat on some solidly brownish), least dense on belly and vent, undertail-coverts with broad whitish fringes; bill



dusky with variable amounts of dull orange, especially on lower mandible, varying to entirely orange-yellow (depending on breeding state). Immature male is intermediate between streaked female and solidly black adult male, head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Races differ in size and bill proportions: *propinqua* is smaller and has thinner (more laterally compressed) bill than nominate, female paler and more clearly streaked throughout; *darwini* has slightly deeper, heavier bill than nominate, and often an olive wash on rump of male. Voice. Song a doubled nasal note, "ch'whuuu ch'whuuu" or "tcheuu tcheeuu". Male ground-finches, with rare exceptions, sing only one song type. Among Darwin's finches large-billed species are less varied in vocal quality than are small-billed ones, but present species has relatively high trill rate for a large-billed species (although frequency range similar to that of *G. magnirostris*). Calls include high-pitched "tzeeeeee".

Habitat. Arid lowland areas of dry scrub, as well as areas with prickly pear cactus (*Opuntia*).

Food and Feeding. Feeds on prickly-pear cactus pulp, flowers, fruits and insects. In one study on Genovesa I, adults of present species, *G. difficilis* and *G. magnirostris* showed much overlap in food during nesting period, all feeding nestlings with mixed diet of arthropods, fruits and seeds. Seeds of *Bursera graveolens* absent from diet of small-billed *G. difficilis*, but common in that of large-billed *G. magnirostris*, while parts of *Opuntia helleri* were fed to young of present species. During non-breeding season diets diverge, seed size eaten then correlating with bill size.

Breeding. Season on Genovesa Jan–May, beginning within a week of first rains; up to four clutches within one season. Nest built by male, a sphere with entrance towards top and at side, made from dry grasses and other vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots; incubation period 12 days (10–14); nestling period 13–15 days (11–17).

Movements. Resident.

Status and Conservation. Not globally threatened. Common on the few islands on which it is found. Appears not to be undergoing any detectable population decline.

Bibliography. Abbott *et al.* (1977), Armani (1985), Curio & Kramer (1965a, 1965b), DeBenedictis (1966), Downhower (1976, 1978), Drozdov (1972), Grant, B.R. (1984, 1985), Grant, B.R. & Grant (1979, 1981, 1982, 1983, 1984, 1987, 1989a, 1989b), Grant, P.R. (1982, 1983), Grant, P.R. & Grant (1980, 1987), Harris (1973), Koster (1985), Lack (1947), Lewin (1983), McCarthy (2006), Petren *et al.* (2005), Schluter & Smith (1986), Swash & Still (2000).

323. **Large Ground-finch**

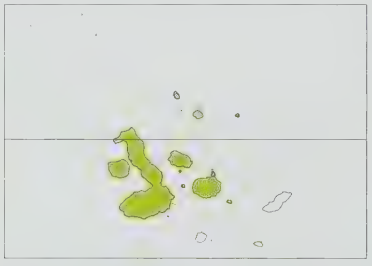
Geospiza magnirostris

French: Géospize à gros bec **German**: Großgrundfink **Spanish**: Pinzón de Darwin Picogordo

Taxonomy. *Geospiza magnirostris* Gould, 1837, Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Present species hybridizes rarely with *G. conirostris* on Genovesa; on Santa Cruz, large-scale hybridization with *G. fortis* thought to have occurred. Monotypic.

Distribution. Galapagos Is: islands of Pinta (Abington), Marchena (Bindloe), Genovesa (Tower), Fernandina (Narborough), Isabela (Albemarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable) and Santa Fe (Barrington); formerly also Floreana (Charles) and satellites.



Descriptive notes. 15–16 cm; 27–39 g. A large ground-finch with massive bill often as deep as it is long and appearing as deep as entire head, base of lower mandible thick and obvious, as is angle of cutting edge, and bill wide (particularly when viewed from below); considerable variation in bill size; relatively short and weak-looking tail. Male is almost entirely black, with slightly browner wings and tail; crissum white with some blackish streaking; iris dark; bill is black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding period; legs blackish. Female is dark brown with sandy-buff to grey fringing, giving a scaled appearance over all; head and breast instead appear rather streaked, the fringing broadening and becoming paler buffy down breast, with dark centres smallest and rather obscure on central belly to undertail-coverts; darkest birds look rather hooded, with side of head plain but for narrow, short pale line above eye; bill dark with orange tint at base and yellow tip, varying to entirely orange-yellow (depending on breeding state). Immature male is intermediate between streaked female and solidly black adult male, head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Distinguished from very similar *G. fortis* by bill structure, body size, and voice; from very similar *G. conirostris* mainly by structure and shape of bill. Voice. Classic song a nasal repetition of 2 or 3 notes, "chzweee-chzwee", notes lower in pitch than those of *G. fortis* and more slowly delivered. Calls include high-pitched "tzeeeeppp". Male ground-finches, with rare exceptions, sing only one song type. Song parameters appear constrained by bill size, this large-billed species having low trill rate, and very narrow frequency bandwidth; of several Darwin's finches studied, this one, because of its large bill size, has the most constraints in vocal capabilities.

Habitat. Arid scrub in lowland areas.

Food and Feeding. Feeds on large seeds, fruits and caterpillars. In one study on Genovesa I, adults of this species, *G. difficilis* and *G. conirostris* showed much overlap in food selection during nesting period, all feeding nestlings with mixed diet of arthropods, fruits and seeds. Seeds of *Bursera graveolens* common in diet of present species (large-billed), but absent from diet of small-billed *G. difficilis*. Diets of the three species diverge during non-breeding season, at which time size of seeds eaten correlates with bill size.

Breeding. Season on Genovesa Jan–May, beginning soon after first rains; up to four clutches laid within one season. Nest built by male, a sphere with entrance towards top at side, made from dry grasses and other vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots; incubation period 12 days (10–14); nestling period 13–15 days (11–17).

Movements. Resident.

Status and Conservation. Not globally threatened. Common and widespread. Present on most islands of Galapagos. Apparently now extinct on Floreana I.

Bibliography. Abbott *et al.* (1977), Armani (1985), Boag & Grant (1984), Curio & Kramer (1965b), Ford *et al.* (1973), Grant, B.R. (2004), Grant, P.R. (1981, 1982), Grant, P.R. & Grant (1980, 1987, 1995a, 2006), Grant, P.R. *et al.* (2001), Harris (1973), Lack (1947), McCarthy (2006), Podos (2001), Schluter (1982a), Steadman (1984), Sulloway (1982a, 1982b), Swash & Still (2000).

324. **Medium Ground-finch**

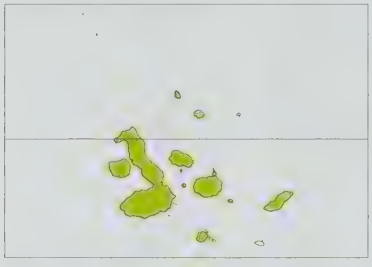
Geospiza fortis

French: Géospize à bec moyen **Spanish**: Pinzón de Darwin Picomediano
German: Mittelgrundfink

Taxonomy. *Geospiza fortis* Gould, 1837, Galapagos Islands.

Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Present species hybridizes rarely with *G. fuliginosa* and with *G. scandens*; on Santa Cruz, large-scale hybridization with *G. magnirostris* thought to have occurred. Monotypic.

Distribution. Galapagos Is: islands of Pinta (Abington), Marchena (Bindloe), Fernandina (Narborough), Isabela (Albemarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable), Santa Fe (Barrington), Floreana (Charles) and offshore islets, and San Cristóbal (Chatham).



Descriptive notes. 11–12 cm; 18–32 g. A medium-sized ground-finch with relatively thick bill slightly longer than it is deep (bill size variable from island to island, and may change slightly depending on alterations in abundance of small/large seeds caused by El Niño–Southern Oscillation events); relatively short and weak-looking tail. Male is almost entirely black, with slightly browner wings and tail; white crissum with black feather centres on undertail-coverts; iris dark; bill black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding period; legs blackish. Distinguished from very similar *G. fuliginosa* and *G. magnirostris* by bill structure, body size and voice. Female is dark brown with pale buffy fringing all over, looking comparatively paler than congeners, with a more regular pattern, and with less contrast between darker upperparts and paler underparts; pale fringing predominates on head, especially on supraloral area and broken eyering, ear-coverts light buffy with dark streaks, side of neck almost unstreaked pale buffy; mantle, scapulars and upperwing appear more scaly, becoming streaked again on uppertail-coverts; rows of dark streaks on underparts become obscure on rear flanks and especially on central belly and vent; bill dark with orange tint at base and yellow tip, varying to entirely orange-yellow (depending on breeding state). Immature male is intermediate between streaked female and solidly black adult male, head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Voice. Classic song a nasal repetition of 2 or 3 notes, "clzee clzee" or "tzeeuu tzeeuu tzeeuu", on average lower-pitched than that of *G. fuliginosa*. Calls include high-pitched whistle, "zeeeep", and nasal "chhhp". Male ground-finches, with rare exception, sing only one song type. In studies of songs of father and sons on Daphne Mayor I (W of Baltra), sons found to learn songs from fathers. Song parameters appear constrained by bill size, this relatively large-billed species having low trill rate, and relatively wide frequency bandwidth.

Habitat. Mostly occurs in scrub and at forest edge. Found at all elevations and in all habitats, but most common in arid and transition zones; numbers in highlands greatest during non-breeding season.

Food and Feeding. A generalist in diet, made possible by its intermediate and variable bill size. Variety of seeds, fruits and insects. Generally, more than 50% (but less than 75%) of diet consists of small seeds; next most important *Opuntia* cactus seeds, remainder (in decreasing order of abundance) *Opuntia* cactus flowers, seeds of *Tribulus*, and arthropods. On Daphne Mayor, after large rains of 1982–1983 El Niño event, small seeds (*Cacabus miersii*) became abundant and large seeds (*Tribulus cistoides*) rare, and selection occurred against individuals with larger and wider bill; after El Niño, population of present species on this small island exhibited decrease in mean bill size owing to natural selection for individuals able to forage more efficiently on smaller seeds; in addition, hybrids with *G. fuliginosa*, with their smaller bills, likewise showed improved success.

Breeding. Nest built by male, a sphere with entrance towards top and on side, made from dry grasses and other vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots. Incubation c. 12 days; fledging 10–14 days.

Movements. Resident; some upslope movement during non-breeding season.

Status and Conservation. Not globally threatened. Abundant and widespread. Present on most islands of the Galapagos Archipelago.

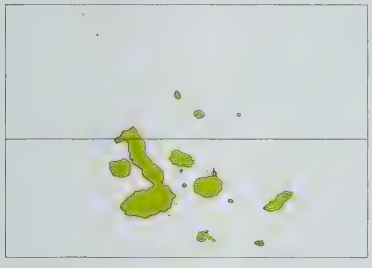
Bibliography. Abbott *et al.* (1977), Armani (1985), Boag (1983, 1984), Boag & Grant (1978, 1981, 1984), Curio & Kramer (1965b), Ford *et al.* (1973), Gibbs (1988, 1990), Gibbs & Grant (1987a, 1987b, 1989), Gibbs *et al.* (1984), Grant, B.R. (1990, 1996, 2003, 2004), Grant, B.R. & Grant (1993, 1996, 1997), Grant, P.R. (1981), Grant, P.R. & Grant (1992, 1994, 1995b, 1997a, 1997b, 2000, 2002a, 2002b, 2006, 2009, 2010), Grant, P.R., Abbott *et al.* (1985), Grant, P.R., Grant, Keller, Markert & Petren (2003), Grant, P.R., Grant, Keller & Petren (2000), Grant, P.R., Grant, Markert *et al.* (2004), Harris (1973), Hendry, Grant *et al.* (2006), Hendry, Huber *et al.* (2009), Huber & Podos (2006), Huber *et al.* (2007), Keller *et al.* (2001, 2002), Kushlan (1983), Lack (1947), Lewin (1983), MacFarland & Reeder (1974), Markert *et al.* (2004), McCarthy (2006), Millington & Price (1985), Podos (2001, 2007), Price (1984a, 1984b, 1985, 1987), Price & Gibbs (1987), Price & Grant (1984, 1985), Price, Grant *et al.* (1984), Price, Millington & Grant (1983), Ratcliffe & Grant (1983), Schluter (1982a, 1982b), Schluter & Smith (1986), Schluter *et al.* (1985), Swash & Still (2000), Vanhooydonck *et al.* (2009).

325. **Small Ground-finch**

Geospiza fuliginosa

French: Géospize fuligineux **German**: Kleingrundfink **Spanish**: Pinzón de Darwin Fuliginoso

Taxonomy. *Geospiza fuliginosa* Gould, 1837, Galapagos Islands.
Recent molecular-genetic research suggests that the Galapagos group consisting of present genus and *Certhidea*, *Platyspiza* and *Camarhynchus*, known collectively as "Darwin's finches", is allied to the tanagers (Thraupidae), being closest to *Coereba*, *Tiaris* and several Caribbean genera. Present species hybridizes rarely with *G. fortis*. Monotypic.
Distribution. Galapagos Is: islands of Pinta (formerly Abington I), Marchena (Bindloe), Fernandina (Narborough), Isabela (formerly Albemarle), Santiago (James), Rábida (Jervis), Pinzón (Duncan), Baltra (Seymour), Santa Cruz (Indefatigable), Santa Fe (Barrington), Floreana (Charles) and satellites, San Cristóbal I (Chatham) and Española (Hood).



Descriptive notes. 10–10·5 cm; 12–17 g. The smallest member of genus, with small and dainty bill slightly longer than it is deep and with culmen relatively straight, giving more clearly triangular shape than more round-topped bill of *G. fortis*; relatively short and weak-looking tail. Male is almost entirely black, slightly browner on wings and tail; crissum white, with black feather centres on undertail-coverts; iris dark; bill black during breeding period, becoming brown with orange tint at base and yellow at tip during transition, and orange-yellow during non-breeding period; legs blackish. Distinguished from otherwise identical *G. fortis* and *G. magnirostris* by bill structure, body size, and voice. Female is dark grey-brown to dark olive-brown with greyish fringing on head and upperparts, giving scaly appearance, or sometimes rather streaked on head, especially crown, and neck; rump to uppertail-coverts more evenly greyish; wings and tail dark brown with bold pale buff fringes; side of head rather streaked, not contrasting with crown, loral region and eyering buff, sometimes with irregular blackish line across central lores; submoustachial region to throat pale buff and somewhat variable, sometimes with tiny dark spots and separated by a row of dense dark streaks on malar region, but sometimes profusely streaked all over; underparts streaked dark on pale buff to whitish background colour, central belly and vent almost plain whitish; bill dark with orange tint at base and yellow tip, varying to entirely orange-yellow (depending on breeding state). Palest (young) females may look almost unstreaked, and similar to *Camarhynchus parvulus*, but habitually have some diffuse streaking on crown, a more distinct face pattern with pale streak above eye, and straighter culmen and gonys. Immature male is intermediate between streaked female and solidly black adult male, head usually solidly black, as is breast, but diffuse streaking present on belly and back, wings more blackish than on female, and wing-coverts and tertials crisply edged buff. Voice. Classic songs tend to repeat 2 buzzy or nasal notes, "clzeeuu clzeeuu" or "chzzuu chzuuu", with several seconds between repetition of the paired notes; notes sometimes tripled, rather than paired. Male ground-finches, with rare exceptions, sing only one song type. Song parameters appear constrained by bill size, this small-billed species having relatively low trill rate, and broad frequency bandwidth.
Habitat. Found in all habitats at all elevations, and most common in arid and transition zones; numbers in highlands greatest in non-breeding season.
Food and Feeding. Varied diet includes small seeds, buds and insects. Bulk of diet consists of small seeds; much of remainder made up of arthropods, with small amounts of *Opuntia* cactus seeds.
Breeding. Nest built by male, a sphere with entrance towards top at side, made from dry grasses and other vegetation. Clutch usually 4 eggs, whitish with pinkish or brown spots. No other information.
Movements. Largely resident; some upslope movements in non-breeding season. Some dispersal between islands apparent; arrives periodically on Daphne I (W of Baltra), where no stable population of this species.
Status and Conservation. Not globally threatened. Common to abundant; widespread and found in all habitats. Occurs on almost all islands of the Galapagos Archipelago.
Bibliography. Abbott *et al.* (1977), Amadon (1967), Armani (1985), Boag & Grant (1984), Christian (1980), Curio (1969), Curio & Kramer (1965b), Downhower (1976, 1978), Dudaniec *et al.* (2006), Grant, B.R. (2004), Grant, B.R. & Grant (1993, 1996, 2002a), Grant, P.R. & Grant (1994, 1997a, 1997b), Harris (1973), Kleindorfer & Dudaniec (2006), Kleindorfer *et al.* (2006), Kushlan (1983), Lack (1947), Lewin (1983), MacFarland & Reeder (1974), McCarthy (2006), Podos (2001), Ratcliffe & Grant (1983), Schluter (1982a, 1982b, 1984, 1986), Schluter & Grant (1982, 1984), Schluter *et al.* (1985), Swash & Still (2000), Vagvolgyi & Vagvolgyi (1989).

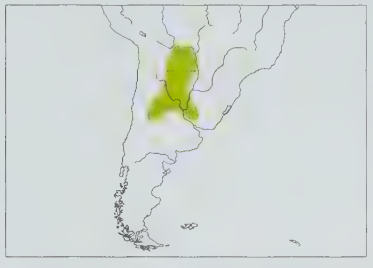
Genus *SALTATRICULA* Burmeister, 1861

326. **Many-colored Chaco Finch**

Saltatricula multicolor

French: Saltatricule du Chaco **German**: Vielfarbenammer **Spanish**: Pepitero-Chico
Other common names: Many-colored Chaco Sparrow

Taxonomy. *Saltator multicolor* Burmeister, 1860, Paraná, Entre Ríos, Argentina.
Molecular data indicate that genus is more closely related to the tanagers (Thraupidae) than to members of present family; furthermore, this species was found to be embedded within genus *Saltator*, as sister-species of Black-throated Saltator (*Saltator atricollis*), with the *Saltator* clade sister to all other Thraupidae. Further research required. Monotypic.
Distribution. SE Bolivia (E Santa Cruz, Chuquisaca and Tarija), W Paraguay (W of R Paraguay), N Argentina E of foothills (S to C Mendoza, S San Luis, S Córdoba and S Santa Fe, and from C Formosa and C Chaco S to S Corrientes and Entre Ríos) and NW Uruguay.



Descriptive notes. 18 cm; 20–25 g. A slim finch with long and relatively wide tail, bill moderately thick at base and with convex culmen and gonys. Male has distinctive face pattern, with forehead and front of face (anterior to eye) black, black continuing down through cheek and bordering white of throat to end on side of neck, pattern further accentuated by bold white posterior supercilium (broadest behind eye, tapering towards nape); small white submoustachial spot at base of lower mandible, narrow but well-defined white lower half of eyering, grey ear-coverts; crown brown, continuing to brownish nape; upperparts pale brown with olive wash, becoming grey on lower back, rump and uppertail-coverts; upperwing similarly brownish, lesser and median upperwing-coverts usually greyish or greyish-brown, flight-feathers and tertials with pale brown edges, greyer on primaries; tail blackish, central feather pair grey, outer rectrices largely white on distal third (creating very obvious white tail corners when in flight, or when seen from below); grey of face continues down to breast side and around blackish "droopy" mask, ending in greyish breastband below white throat; lower pectoral band and side of breast to flanks bright cinnamon-buff; belly, vent and undertail-coverts whitish; iris dark; bill bright yellow, darker culmen; legs dusky. Female is very similar to female, often indistinguishable, but when in direct comparison seen to be slightly duller in coloration, with mask less extensive and paler in colour, also grey of face and breast less vivid. Juvenile is like female, but paler brownish above, and significantly paler on sides and flanks, also bill blackish with dull yellow along cutting edge. Voice. Song, given persistently even through heat of day, a repetitive and simple warble, "vera-vera-vera...". Call a dull-sounding "chup", often doubled as "chu-chup"; other calls include higher-pitched "swiip".
Habitat. Open *chaco* woodland, particularly along road edges, edges of fields and in more open and shrubbier parts.
Food and Feeding. Not well known. Appears to have a mixed diet including insects and seed. Forages both on ground and in low shrubs. Often in pairs or in small mixed flocks with other finches.
Breeding. Season Nov–Mar. Nest a cup of dry grass and fibres, secured to leaves, clump of grass or sometimes small twigs from 20 cm to 1·2 m above ground. Clutch 3 eggs, white with some blackish markings. Commonly parasitized by Shiny Cowbird (*Molothrus bonariensis*). No other information.
Movements. Largely resident; possibly a partial migrant, as suggested by variation in abundance at N end of range in Bolivia.
Status and Conservation. Not globally threatened. Common to abundant throughout most parts of range. Continues to sing through hottest part of day, which can make it one of the most obvious species, at least acoustically, in its *chaco* habitat.
Bibliography. Armani (1985), Blendinger & Ojeda (2001), Burns *et al.* (2003), Canevari *et al.* (1991), Delhey & Scorolli (2002), Hennessey *et al.* (2003), Klicka *et al.* (2007), Mezquida (2003, 2004), de la Peña (1987), Ridgely & Tudor (1989), Storer (1989b), Wetmore (1926).

Class AVES

Order PASSERIFORMES

Suborder OSCINES

Family ICTERIDAE (NEW WORLD BLACKBIRDS)



- Smallish to large passerines with pointed bill, plumage mostly dark, often glossy, many species with bright patches of colour, some richly coloured.
- 16–53 cm.



- New World.
- Forest, mixed woodland, scrub, grassland and agricultural areas, marshes, rocky cliffs and suburban environments.
- 31 genera, 111 species, 259 taxa.
- 14 species threatened; 1 species and 1 subspecies extinct since 1600.

Systematics

The constitution of the family Icteridae has for a long time been subject to many and varying opinions. In 1968, for example, E. R. Blake, in J. L. Peters's *Check-list of Birds of the World*, recognized a total of 91 species in 25 genera. C. G. Sibley and B. L. Monroe, in their 1990 treatment of the world's birds, listed 97 icterid species in 26 genera, whereas A. Jaramillo and P. Burke, in their 1999 monograph of the family, included 103 species in 26 genera. The present treatment recognizes 111 species, divided among 31 genera. The family is commonly referred to as "the New World blackbirds", and includes the caciques, oropendolas, New World orioles, grackles, cowbirds and others.

Since the late nineteenth century, avian taxonomists have come to regard icterids as members of an assemblage of songbirds known as the nine-primaried oscines. This is a large group, in the New World containing the New World warblers (Parulidae), the tanagers (Thraupidae), and many buntings and New World sparrows (Emberizidae). In the 1980s, the status of Icteridae as a family was questioned. Thus, in the classification of the American Ornithologists' Union, in 1983, and that of Sibley and Monroe, in 1990, the group's taxonomic status was downgraded to that of a tribe, Icterini, within a huge family Fringillidae, which comprised all of the nine-primaried oscines.

Icterids form a relatively well-defined group, and there are few disagreements over which species belong to the family. Some authors have regarded the Dickcissel (*Spiza americana*) as an icterid, rather than a cardinal (Cardinalidae), and it has been suggested that the Scarlet-throated Tanager (*Compsothraupis loricata*) could be an icterid and not, as currently considered, a member of the family Thraupidae. Neither of these ideas, however, has gained general acceptance.

The oldest fossil icterids are from the Pleistocene of North America and they give no clues as to the origin of the family. The considerable internal genetic divergence found among the icterids suggests that the family originated around the late Miocene, when North America and South America were separated by an archipelago stretching from present-day southern Mexico south to northern Colombia. This archipelago existed until about 3·5 million years ago, when Central America and the Isthmus of Panama provided a continuous land connection between the two continental masses. Some authors, including E. Mayr, have suggested that Icteridae originated in the North American continent, but others, such as Sibley and J. E. Ahlquist, favour a South American origin. Whatever the case, icterids probably colonized both continents quite early in their evolutionary history, using the Central American or the Caribbean archipelagos as stepping stones. Today, the family is somewhat more diversified in South America than in North America.

Fossil icterids include three extinct genera, *Cremaster*, *Pandanaris* and *Pyelorhamphus*. The first of these consists of the single species *Cremaster tytthus*, described by P. Brodkorb from three leg elements found in Upper Pleistocene sediments of Florida, in the south-east USA. It is supposed to be related either to *Amblycercus* or to *Cacicus*, both genera being absent today from North America. *Pandanaris* is known from Upper Pleistocene deposits of Florida (Reddick) and California (Rancho La Brea), representing the two respective species *Pandanaris floridana* and *Pandanaris convexa*. *Pyelorhamphus molothroides* was described from material in a cave in New Mexico, apparently dating from the late Wisconsin glaciation. The fossil remains of these two genera include maxillae and mandibles indicative of a thick, conical bill. It has been suggested that both *Pandanaris* and *Pyelorhamphus* were generalized blackbirds resembling, and probably related to, modern parasitic cowbirds (*Molothrus*). *Pandanaris floridana* apparently lived in a period cooler than the present one. In addition, 13 extant icterid genera are known from Pleistocene and Holocene deposits, extending from Canada southwards to Brazil, and including the island of Puerto Rico.

The internal subdivisions of the Icteridae are a matter of controversy. Classical taxonomists such as R. Ridgway and C. E. Hellmayr considered that subdivisions would be both arbitrary and impractical. In the early 1950s, a morphological study by W. J. Beecher suggested that cowbirds were the ancestral icterids, and that three lineages evolved from the primitive stock; these were the oropendolas and caciques, the grackles, and the remaining blackbirds, the last including the orioles. Blake, in the 1960s, advanced the idea that the finch-like Bobolink (*Dolichonyx oryzivorus*) was so dissimilar to other icterids that it merited placement in a subfamily of its own. This found some support from the American Ornithologists' Union, which, in its 1983 checklist, recognized three main lineages, one containing just the Bobolink, another incorporating the orioles, caciques and oropendolas, and a third housing the remaining icterids.

More recent molecular studies have been carried by a team consisting of S. M. Lanyon, K. E. Omland and others. These scientists analysed the mitochondrial cytochrome *b* gene of 57 species in 23 of the genera recognized by Sibley and Monroe. A

subsequent study extended the technique to 25 species of oriole, and later to many more. Most of their findings appear robust and plausible, and are often corroborated by morphological and behavioural data. The team identified five lineages of icterids: caciques and oropendolas, orioles, grackles and allies, meadowlarks and allies, and a group containing only the Yellow-billed Cacique (*Amblycercus holosericeus*). Their basic results are followed in the present treatment. Taxonomic problems within the five clades may occur at the generic and specific level.

The Yellow-billed Cacique was left in an uncertain position in the family tree, and doubts were cast even on its classification as an icterid. In its morphology and behaviour, however, this all-black bird with a pale, chisel-shaped bill looks and behaves like an icterid. On the other hand, its peculiar skeletal morphology and cup-like nest suggest that it is highly unlikely to be a cacique, and that it is misnamed as such. Its range extends from Mexico south to Bolivia, it lives in dense vegetation and undergrowth, and it has an extremely wide altitudinal range, occurring from sea-level to as high as 3500 m in the Andes. It is subdivided into three subspecies, which may, in the view of some authors, represent distinct species.

Mitochondrial DNA data indicate that the group consisting of caciques and oropendolas is a natural and monophyletic one. Caciques and oropendolas were traditionally classified in two genera, respectively *Cacicus* and *Psarocolius*. The DNA data, however, support neither a clear-cut division between caciques and oropendolas nor the monophyly of the caciques. In particular, the Solitary Cacique (*Procacicus solitarius*) and the Yellow-winged Cacique (*Cassiculus melanicterus*) are not related to other caciques, but are ancestral to oropendolas. The Yellow-winged Cacique resembles oropendolas in having yellow tail sides, and also in size dimorphism and breeding behaviour, but the all-black, dark-eyed Solitary Cacique certainly does not. The two are placed in separate genera, respectively *Cassiculus* and *Procacicus*. All of the remaining caciques, with the exception of the Yellow-billed, are provisionally retained in *Cacicus*. If the group is to be subdivided, the old generic name *Archiplanus* could be used for three closely related species, namely the Ecuadorian (*Cacicus sclateri*), Selva (*Cacicus koepckeae*) and Golden-winged Caciques (*Cacicus chrysopterus*). The subdivisions and nomenclature of the remaining species are problematic.

Preliminary DNA data reveal that two odd species, the Casqued Oropendola (*Clypicterus oseryi*) and the Band-tailed Oropendola (*Ocyalus latirostris*) of the upper Amazon Basin, are closer relatives of the Red-rumped Cacique (*Cacicus haemorrhous*), and therefore only distantly related to the true oropendolas in the genus *Psarocolius*. There is some corroborative evidence for this finding, as the behaviour and voice of the Band-tailed Oropendola resemble those of Red-rumped Caciques. The external morphology of these two "false" oropendolas is so dissimilar to that of *Psarocolius* that, pending further analyses, they are classified in two monotypic genera, *Clypicterus* and *Ocyalus*. In particular, *Clypicterus* has evolved a swollen casque on its bill, although this somewhat resembles that of the Chestnut-headed Oropendola (*Psarocolius wagleri*). Separation of the two at the genus level is reasonable in terms of morphological change, but from a cladistic perspective it creates complications because the two "false" oropendolas should share the genus of the Red-rumped Cacique, and this last is the type species of the genus *Cacicus*. Some Brazilian authors adhere strictly to cladistic rules and include the two "false" oropendolas in *Cacicus*.

All other oropendolas appear to be clearly monophyletic, and are combined in the genus *Psarocolius*. Although the Chestnut-headed Oropendola has sometimes been separated in a monotypic genus, *Zarhynchus*, such treatment is not supported by the molecular data. Further, all of the large oropendolas with naked facial patches are occasionally segregated in *Gymnostinops*, and, according to DNA data, this group also seems monophyletic; it could, however, be included in *Psarocolius* without forcing the phylogenetic tree, a treatment followed for the sake of nomenclatural parsimony. It would be plausible to use *Gymnostinops* as a subgenus of *Psarocolius*.

The large oropendolas present one of the most persistent taxonomic problems at the species level. At one extreme, it would be possible to recognize just two species, the clear-cut Green Oropendola (*Psarocolius viridis*) from Amazonia and, second, a complex of five different-looking allopatric forms found from the tropical lowlands of Mexico south to lower Amazonia. Three forms occur west of the Andes, these being the Montezuma Oropendola (*Psarocolius montezuma*), the Black Oropendola (*Psarocolius guatimozinus*) and the Baudo Oropendola (*Psarocolius cassini*), which have mostly non-overlapping ranges. The first is rather



*The **Yellow-billed Cacique** occupies an uncertain position within Icteridae, and doubts have been raised as to whether it even belongs in the family. In its morphology and behaviour, this all-black bird with its pale, chisel-shaped bill looks and acts like an icterid, but DNA and skeletal data, and its nest structure, indicate that it is not related to the true caciques. For now,* Amblycercus *is a monotypic genus, but the genetic distance between two of the three races suggests that at least two species may be involved.*

[*Amblycercus holosericeus australis*, Chuspipata, La Paz, Bolivia. Photo: Joe Tobias]



DNA data suggest that there is not a clear-cut division between the caciques and the oropendolas, and also that two species traditionally placed in the cacique genus Cacicus *are not related to other caciques but are ancestral to the oropendolas. The remaining caciques, including the* ***Subtropical Cacique****, are retained in* Cacicus. *The Scarlet-rumped Cacique* (Cacicus microrhynchus) *is often considered to be conspecific with the Subtropical Cacique, and either common name may be used for* Cacicus uropygialis. *The two differ vocally, however, and most authors now treat them as separate species.*

[*Cacicus uropygialis*, Sarapiquí, Costa Rica. Photo: Alex Vargas]

widespread, found from Mexico south to central Panama, whereas the other two have smaller ranges in Panama and the Chocó region of western Colombia. These three trans-Andean forms are usually regarded as three distinct species, as in the present treatment. The Baudo Oropendola differs from the other two in having a pinkish-red, as opposed to pale blue, bare facial patch, thus resembling the Para Oropendola (*Psarocolius bifasciatus*), which occurs far off, around the lower reaches of the Amazon. DNA data are not yet available for testing the relatedness of these two, but if a close relationship is confirmed, the Baudo Oropendola could be the result of a recent colonization from lower Amazonia, or perhaps the relict of a former continuous distribution across northern South America.

The two forms occurring east of the Andes differ strikingly from each other in plumage, but share a pinkish-red facial patch. The widespread Amazonian Oropendola (*Psarocolius yuracares*) is mostly olive-greenish, and extends over most of Amazonia, from Venezuela south to Bolivia. It is replaced only in the lower Amazon Basin by the Para Oropendola, which exhibits a chestnut coloration reminiscent of that of the geographically distant Montezuma Oropendola. The Amazonian and Para Oropendolas are often treated as conspecific, the main reason for uncertainty about their taxonomic status being the existence of intermediate specimens from between the Tapajós and Tocantins rivers, south of the River Amazon. These specimens were formally described by E. Snethlage in 1925 as a new species, under the name *Gymnostinops neivae*. Further specimens with intermediate coloration, mostly chestnut with a variable greenish to olive tinge, and a dusky head, have been collected in this region of Brazil, and on this evidence J. Haffer suggested that the two cis-Andean forms be treated as conspecific. Genetic and behavioural aspects of the interaction between the two, including mating preferences, if any, have not, however, been studied; indeed, even the basic nesting biology of the Para Oropendola remains unknown. Hybridization is not in itself proof of a sister relationship, as illustrated by mitochondrial DNA analysis in a similar case involving North American orioles.

Another pending problem of oropendola systematics concerns the Russet-backed Oropendola (*Psarocolius angustifrons*). In 1937, J. T. Zimmer lumped a string of six, mostly Andean oropendola forms, all with yellow bills, and a black-billed form, the current nominate race, of riparian habitats in western Amazonia. Hellmayr then provided vernacular names for all of the forms of the complex. The six Andean forms, sometimes referred to collectively as the "Yellow-billed Oropendola", extend from northern Venezuela south to central Bolivia, and the Amazonian form, the "Black-billed Oropendola", is found from eastern Colombia south to Peru and western Brazil. Recent fieldwork in the foothills of the eastern Andes of Colombia has revealed that the local form *neglectus*, the "Olive-bellied Oropendola", does not form mixed colonies with the sympatric black-billed nominate race, the two behaving as separate species. Recent DNA studies agree with this finding, as they indicate considerable sequence divergence between the "Black-billed Oropendola" and the four northern Andean forms that range from Venezuela south to Ecuador; moreover, the songs of some of the north Andean forms are distinctive. On the other hand, the DNA divergence between *alfredi*, known as the "Pale-billed Oropendola" or "Alfred's Oropendola", and the "Black-billed Oropendola" was relatively small and the songs of the two are similar, suggesting that they are conspecific. In fact, intermediate-looking specimens are reported from eastern Ecuador.

Although often considered to be conspecific with the Subtropical Cacique (*Cacicus uropygialis*), the Scarlet-rumped Cacique (*Cacicus microrhynchus*) is nowadays treated by most authors as a separate species. Further, it has been suggested that its two subspecies differ vocally from each other and should be regarded as two species, but further research is required before such a decision is taken. Similarly, the two mountain caciques are often combined, but they seem to be sufficiently distinct to be treated as separate species. The Southern Mountain Cacique (*Cacicus chrysonotus*), as well as differing in plumage details from the Northern Mountain Cacique (*Cacicus leucoramphus*), appears to call with a slower, softer series of notes than the latter. A third possible split, a division of the Yellow-rumped Cacique (*Cacicus cela*) into trans-Andean and cis-Andean species, is as yet premature, pending further information on the west Ecuadorian race *flavicrissus*.

The detailed molecular phylogeny presented by Omland and Lanyon supports the view that the American orioles form a mono-





The majority of icterid species have an extended culmen that covers part of the forehead. In some genera, particularly the caciques and oropendolas, this expands into a well-developed casque that may cover the frontal part of the head. Because of its peculiar bill shape, the ***Chestnut-headed Oropendola*** *has sometimes been separated in a monotypic genus,* Zarhynchus. *DNA analysis, however, indicates that it belongs to a clade containing the "mountain oropendolas", the Dusky-green Oropendola* (Psarocolius atrovirens) *and north Andean races of the Russet-backed Oropendola* (P. angustifrons). *The large oropendolas with naked facial patches, such as the* ***Para Oropendola****, are occasionally segregated into the genus (or subgenus)* Gymnostinops. *Five* "Gymnostinops" *species are recognized here, but these large oropendolas present a taxonomic problem at the species level. It would be possible to recognize just two species, the Green Oropendola* (P. viridis) *from Amazonia, and a complex of five different-looking allopatric forms found from the tropical lowlands of Mexico south to lower Amazonia. Two of these five, the Para Oropendola of the lower Amazon Basin and the more widespread Amazonian Oropendola* (P. yuracares), *are often considered conspecific. They share a pinkish-red facial patch. The Amazonian Oropendola is mostly olive-greenish, while the Para Oropendola has a chestnut coloration reminiscent of another member of this species group, the geographically distant Montezuma Oropendola* (P. montezuma).

[Above: *Psarocolius wagleri ridgwayi*, Canal Zone, Panama. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com.

Below: *Psarocolius bifasciatus*, Photo: Roland Seitre]





The genus Icterus *is the largest in the family, with 34 species recognized here. There are many more species in Mexico, Central America and the Caribbean islands than in mainland South America, with just two species in southern South America and none in Chile. Molecular data suggest that there are three lineages within* Icterus. *One contains most of the North American orioles, including many Mexican species. The second holds the troupials, and the third is a lineage of slender-bodied, small-billed orioles found mostly in the Caribbean, Central America and northern South America, such as the* ***Black-cowled Oriole*** *(above) and the* ***Yellow Oriole*** *(below). The Black-cowled Oriole was formerly regarded as the mainland race of what was then called the "Greater Antillean Oriole"* (Icterus dominicensis), *but was separated on DNA evidence. Subsequently, the four island races were also elevated to species status on the basis of mitochondrial DNA and differences in plumage and vocalizations. Females of some oriole species have lost the colourful male-like plumage and are much duller. This dichromatism is strongest in migrant* Icterus *species. In the sedentary Yellow Oriole, the female is similar to the male, though with an olivaceous tinge in yellow areas of the plumage. Females of the apparently resident Black-cowled Oriole, however, are variable: some are dull, some are brighter and more like the male, while some, mainly in the south of the range, are almost identical to the male.*

[Above: *Icterus prosthemelas*, Costa Rica. Photo: Tom J. Ulrich/VIREO.

Below: *Icterus nigrogularis trinitatis*, Trinidad. Photo: George M. Jett]

phyletic group, and all are classified in the genus *Icterus*, the largest in the family. Omland and Lanyon's data suggested the existence of three monophyletic lineages within the orioles. One lineage, clade C, contains most of the North American orioles, including many Mexican species, but excepting the Orchard Oriole (*Icterus spurius*); the second, clade B, holds the troupials; and the third is a lineage of slender-bodied, small-billed orioles, found mostly in the Caribbean, Central America and northern South America. This last lineage, clade A, corresponds quite well with a grouping previously suggested, on the basis of morphological details, by Beecher and sometimes identified by the generic name of *Bananivorus* or *Pendulinus*. A recent molecular study of the orioles, this time involving DNA from the Z sex chromosome, likewise recovered the three oriole clades. The main discrepancy was the position of the little-known Bar-winged Oriole (*Icterus maculialatus*) from the highlands of northern Central America, placed near clade A according to mitochondrial DNA, but near clade C in analysis of the Z chromosome.

These three oriole clades have more species in Mexico, Central America and the Caribbean islands than in mainland South America. Recent molecular data and the use of the "molecular clock" suggest that clade A probably invaded South America from the Antilles around 2 million to 3 million years ago. Perhaps the other two oriole clades are also relatively recent invaders of South America. If this is the case, the scarcity of orioles in southern South America, where only two species occur, with none in Chile, would be an effect of geological time. This idea is reinforced when one compares the rarity of oriole pollination in the flora of Argentina with its frequency in the flora of Mexico.

The species-level taxonomy of the Baltimore Oriole (*Icterus galbula*) and Bullock's Oriole (*Icterus bullockii*) has been subject to many interpretations. The ranges of the two species overlap in the Great Plains of North America, from south Alberta and Saskatchewan, in south Canada, south to Oklahoma and Texas, in the southern USA. The width of the overlap zone varies from 160 km to 240 km, and hybrids and back-crosses are relatively common along this strip. Introgression of heterospecific genes outside the hybridization belt is uncommon, with a tendency for the plumage of Bullock's Oriole to occur farther away from the overlap zone than that of the Baltimore Oriole. Mitochondrial DNA analysis indicates that the species concerned are not sister-taxa. This is an important result, as it shows that hybridization is not an entirely reliable indicator of a close phylogenetic relationship.

Two Mexican orioles with divergent or unusual coloration, the Black-backed Oriole (*Icterus abeillei*) and Fuertes's Oriole (*Icterus fuertesi*), have often been regarded as subspecies of, respectively, Bullock's Oriole and the Orchard Oriole. Mitochondrial DNA data indicate only small genetic distinctiveness in both populations, but the Black-backed Oriole is not closely related to Bullock's Oriole, and is the sister-species of the Baltimore Oriole.

Analyses of mitochondrial DNA have uncovered deep divergences among insular populations of Caribbean orioles, indicating prolonged isolation. Traditional taxonomic treatments combined all orioles found in the Bahamas, Cuba, Hispaniola and Puerto Rico into one species, the "Greater Antillean Oriole", under the name *Icterus dominicensis* (*sensu lato*), usually including also the similar-looking Black-cowled Oriole (*Icterus prosthemelas*) of south Mexico and Central America. Molecular data suggested that this arrangement was incorrect, as the Greater Antillean and mainland taxa were not even sister-species. Within the orioles of the Greater Antilles, the Puerto Rican population, formerly treated as a subspecies, had a sequence divergence of 5·4%, indicating a long period of isolation. Further, DNA data show the Puerto Rican Oriole (*Icterus portoricensis*) to be more closely related to the three oriole species in the Lesser Antilles, which have traditionally been treated as three separate species. In 2005, O. H. Garrido and co-workers reviewed the morphometrics, plumage and vocal characters of the remaining orioles in the Greater Antilles, those in the Bahamas, Cuba and Hispaniola, and advised that each be elevated to the rank of a full species.

Among South American orioles, the taxonomy of the troupials, formerly treated as a single species, has been clarified with the recognition of three species. In this respect, it is relevant to note that, in the state of Pará, Brazil, breeding feral populations of both Campo (*Icterus jamacaii*) and Orange-backed Troupials (*Icterus croconotus*) were present around the city of Belém, but no mixed pairs or intermediate specimens



The ***Cuban Blackbird*** *is sometimes included within the mainland genus* Dives, *with the Melodious Blackbird* (Dives dives) *and Scrub Blackbird* (D. warczewiczi). *Its distinctive skeletal morphology, song and nest-site choice, however, indicate that its placement in the separate monotypic genus* Ptiloxena *is appropriate. According to molecular data, the* Dives *species, along with the Jamaican Blackbird* (Nesopsar nigerrimus), *are the more ancestral members of the "quiscaline blackbirds", the grackles and their allies. The female Cuban Blackbird is like the male, though duller. The male is distinguished from the similar male Shiny Cowbird* (Molothrus bonariensis) *by its much larger size.*

[*Ptiloxena atroviolacea*, Bayamo, Cuba. Photo: Eladio M. Fernández]



The grackles and allies, sometimes called the "quiscaline blackbirds", are represented almost everywhere in the Americas, from the tropics northwards to the arctic tundra, and in the high Andean plateaux up to 4000 m. Quiscalus *grackles have an extremely long, curiously shaped tail. The* ***Carib Grackle*** *was formerly placed in a separate genus,* Holoquiscalus, *with the Greater Antillean Grackle* (Quiscalus niger). *But mitochondrial DNA analysis indicates that the Carib Grackle, which is widespread in the Lesser Antilles and adjacent mainland South America, has a closer relationship with the restricted-range Nicaraguan Grackle* (Q. nicaraguensis) *than with other members of the genus.*

[*Quiscalus lugubris lugubris*, Tobago.
Photo: Wil Leurs/AGAMI]

were reported. In contrast is a problematic complex which shows extensive variation in plumage; it is made up of the Epaulet (*Icterus cayanensis*), Moriche (*Icterus chrysocephalus*) and Variable Orioles (*Icterus pyrrhopterus*). Plumage coloration in the complex is essentially black, but the pattern varies from black with small chestnut epaulets to black with contrasting yellow patches on the crown, epaulets, rump and thighs. Hybrids between the two Amazonian taxa, the Moriche and Epaulet Orioles, have been reported from Suriname, possibly explaining why DNA data show that the two forms are paraphyletic. On the other hand, co-existence without hybridization has been reported in Guyana and Brazil, and even, locally, within Suriname. South of the Amazon, there is a group of four taxa, *pyrrhopterus*, *tibialis*, *periporphyrus* and *valenciobuenoi*, connected by extensive areas of intergradation, and traditionally treated as subspecies of the Epaulet Oriole. DNA data suggest a modest amount of genetic divergence, 1·1%, and no paraphyly between the Amazonian and southern groups. In addition, the southern forms share smaller size, a slender body shape and markedly acrobatic foraging habits. As a result of all this, they are now combined in a separate species, the Variable Oriole.

The grackles and their allies, sometimes referred to as the "quiscaline blackbirds", are the most numerous and diverse of the icterids. The group is represented almost everywhere in the Americas, from the tropics northwards to the arctic tundra and in the high Andean plateaux up to 4000 m. According to the molecular data, the more ancestral members of this group are the genera *Nesopsar* and *Dives*, with a mainly Caribbean and Central American distribution. The Jamaican Blackbird (*Nesopsar nigerrimus*) is a very specialized icterid, representing perhaps an earlier radiation within the grackle group; DNA data reveal that it lacks close living relatives. The Cuban Blackbird (*Ptiloxena atroviolacea*) is sometimes included within the mainland genus *Dives*, though on rather weak grounds. Although no DNA data are available, this species' distinctive skeletal characters provide, according to M. S. Webster, a strong argument against this treatment, and its considerable vocal differences support its placement in the monotypic genus *Ptiloxena*.

In a detailed study of skeletal characters in 1991, M. Björklund found that the genus *Quiscalus* was not monophyletic, whereas the 1999 molecular-genetic study by K. P. Johnson and Lanyon provided strong support for the monophyly of the genus. More recently, in 2008, A. F. L. A. Powell and co-workers undertook a detailed examination of *Quiscalus*, together with its sister-genus *Euphagus*, based on an analysis of mitochondrial DNA gene sequences of cytochrome *b* and ND2, in order to reconstruct the relationships within this group of icterids. They found that the two genera composed a clade within the Icteridae. Unlike earlier analyses, that by Powell and colleagues included two grackles with very small geographical ranges, namely the extinct Slender-billed Grackle (*Quiscalus palustris*) of the Valley of Mexico, last recorded in 1910 (see Status and Conservation), and the Nicaraguan Grackle (*Quiscalus nicaraguensis*). The results indicated that the Slender-billed Grackle was closest to one of two major haplotype clades of the Great-tailed Grackle (*Quiscalus mexicanus*), the other being sister to the Boat-tailed Grackle (*Quiscalus major*). The Nicaraguan Grackle appeared to be sister to the Carib Grackle (*Quiscalus lugubris*).

The molecular phylogeny of Lanyon and colleagues has indicated that all parasitic cowbirds share a common ancestor and should be placed together in the single genus *Molothrus*. This applies equally to the Giant Cowbird (*Molothrus oryzivorus*), which was once known as the "Rice Grackle" and classified in genus of its own, *Psomocolax* or *Scaphidura*. Webster found considerable skeletal peculiarities in Giant Cowbirds, which in some characters were close to caciques and oropendolas. Allometric changes related to the large size of the Giant Cowbird, evolutionary convergence of host and parasite owing to the chicks of the two growing in the same nest, and mimicry may, however, be responsible for the similarity. The taxonomic status of only one cowbird has been questioned. This is the Bronze-brown Cowbird (*Molothrus armenti*), isolated in Caribbean Colombia, and usually treated as a distinctive subspecies of the Bronzed Cowbird (*Molothrus aeneus*). It differs from the latter, however, in its smaller size, in its dark brown, rather than black, plumage coloration and in its reduced sexual dichromatism, as well as being vocally distinct.

According to molecular data, the marsh blackbirds traditionally included in the genus *Agelaius* should be separated into a North American and Caribbean lineage and two South American lineages. Similarities between Nearctic and Neotropical species are attributed to convergent evolution. The generic name *Agelaius*



Bright iris coloration in the icterids is usually due to specific pigments, but the red irides of the Bronzed Cowbird, known also as the Red-eyed Cowbird, are coloured by red blood cells. The ***Bronzed Cowbird*** *and the Giant Cowbird* (Molothrus oryzivorus) *were each formerly placed in other genera, but molecular-genetic evidence suggests that all the parasitic cowbirds share a common ancestor and should be placed together in the single genus* Molothrus. *Mitochondrial DNA indicates that they belong with the North American quiscalines, even though molecular data suggest that the Screaming Cowbird* (M. rufoaxillaris), *a South American species, is possibly the oldest extant species.*

[*Molothrus aeneus loyei*, Pima County, Arizona, USA. Photo: Brian E. Small]

belongs to the North American and Caribbean clade, while the South American lineages have the generic names *Agelasticus* and *Chrysomus*. *Agelaius* blackbirds include one widespread species, the Red-winged Blackbird (*Agelaius phoeniceus*), and four similar species with smaller ranges in California and the Caribbean. Molecular analysis of Red-winged Blackbird populations shows that the species' geographical expansion is rather recent, and that most of its huge range was occupied only in postglacial times. A controversial form of this species is the subspecies *gubernator*, found in wetlands on the Mexican plateau; this is sometimes treated as a separate species under the name of "Bicolored Blackbird", but is now believed to hybridize with several northern races. The "bicolored" male plumage also occurs in two Californian races but their female plumages are quite different from those of the Mexican birds. The five South American blackbirds formerly included in *Agelaius* are more diverse in appearance than the five North American ones, having only one species in which the male is all black except for contrasting epaulets. Molecular data sug-



Molecular data indicate that the "marsh blackbirds" traditionally included in the genus Agelaius *should be separated into a North American and Caribbean lineage and two South American lineages. The generic name is retained for the five species of the North American/ Caribbean clade, including the* ***Tawny-shouldered Blackbird****. The South American species are now divided between two genera, the stocky, thick-billed* Chrysomus *and the slender, thinner-billed* Agelasticus.

[*Agelaius humeralis humeralis*, Najasa, Cuba. Photo: Zhao Chao]



*The **Velvet-fronted Grackle** gets its name from the feathers on its forehead and lores, which are stiff and plush-like. Five subspecies are recognized, at least two of which, the "Bolivian Grackle"* (boliviensis)*, shown here, and the "Violaceous Grackle"* (violaceus)*, may merit full species status. Where its range overlaps with that of the Carib Grackle* (Quiscalus lugubris)*, the Velvet-fronted Grackle can be distinguished by its smaller size, smaller bill, drabber coloration, tail shape, more pleasant song and other vocalizations, and dark brown eye colour.*

[*Lampropsar tanagrinus boliviensis*, near Trinidad, Beni, Bolivia. Photo: Daniel Alarcón]

gest that the five Neotropical species fall into two clades. One of these, the genus *Chrysomus*, contains two thick-billed and stocky species, apparently more granivorous than insectivorous, the males of which do most of the nest-building work. The three other species, now placed in *Agelasticus*, share a rather slender form and a thinner bill, and are more typical icterids in that it is the females that undertake the task of nest-building.

The two robust brown-and-yellow species of *Pseudoleistes* with the rather insipid English name of "marshbirds", together with the Saffron-cowled Blackbird (*Xanthopsar flavus*), form another group of Neotropical quiscalines, possibly related to *Chrysomus*. DNA data indicate that the Saffron-cowled Blackbird, formerly placed in *Agelaius*, is closer to *Pseudoleistes*. Because of its smaller size, distinctive slender form, sexual dichromatism and voice, it is placed in the monotypic genus *Xanthopsar*.

Four other genera of Neotropical quiscaline icterids are found in woodlands and savanna. These are *Gnorimopsar*, *Oreopsar*,



Analysis of mitochondrial DNA suggests a relationship between the morphologically very different Velvet-fronted Grackle (Lampropsar tanagrinus)*, above, the Red-bellied Grackle* (Hypopyrrhus pyrohypogaster) *and the **Oriole Blackbird**. The female Oriole Blackbird shares the male's highly distinctive chrome-yellow and black plumage, and both sexes sing. The male and female of the Red-bellied Grackle are also similar in appearance. Females of all three of these related species are slightly smaller than the males, but with nothing like the size disparity found in some* Quiscalus *species, which can be greater than 50%.*

[*Gymnomystax mexicanus*, Llanos, Venezuela. Photo: Jean-Louis Le Moigne/NHPA]

Curaeus and *Agelaioides*, which contain a total of six species with mostly plain black or brown plumage. The bill shape of these genera is somewhat variable, ranging from finch-like, in the genus *Agelaioides*, to elongate, as in *Curaeus*. All are rather generalist, gregarious icterids exhibiting some behaviour patterns that are unusual in the family, such as hole-nesting, except for *Curaeus*, and various degrees of co-operative breeding. The genus *Curaeus* has an oddly disjunct distribution, with one species in tropical east Brazil and the other in the southern-temperate region of South America. The tropical form is the rare Forbes's Blackbird (*Curaeus forbesi*), formerly regarded as a species of *Gnorimopsar* or *Agelaius*, and even as an intergeneric hybrid between the former and *Chrysomus*. Its present position in *Curaeus* is based mostly on bill shape, no molecular data being available. The two baywings constituting the genus *Agelaioides* have the most drab and inconspicuous coloration of any member of the family. The Pale Baywing (*Agelaioides fringillarius*), confined to north-east Brazil, is often treated as a subspecies of the more widespread Greyish Baywing (*Agelaioides badius*), but differs significantly in its vocalizations; it is probably better regarded as a separate species. Mitochondrial DNA data suggest a close relationship between *Agelaioides* and the monotypic *Oreopsar*, which possibly should be merged, but they are retained as separate genera pending an analysis of the Pale Baywing. Molecular data indicate, unexpectedly, that the Scarlet-headed Blackbird (*Amblyramphus holosericeus*) is related to *Curaeus*. This finding is somewhat controversial, because the Scarlet-headed Blackbird is one of the most colourful members of the family; is unusual in its very specialized diet and bill shape; and lives mostly as scattered territorial pairs in marshes.

The final lineage of Neotropical quiscalines is a heterogeneous and not well-known group that includes the two mountain grackles (*Macroagelaius*), the Velvet-fronted Grackle (*Lampropsar tanagrinus*), the unusual Oriole Blackbird (*Gymnomystax mexicanus*) and the Red-bellied Grackle (*Hypopyrrhus pyrohypogaster*). Molecular data suggest that these four genera are related, but it is not clear how close the affiliation is. Forbes's Blackbird, tentatively included within *Curaeus*, but without DNA data, could alternatively fit into this group.

The meadowlarks and allies comprise just ten species, all found in open environments, mostly grassland and marshes. A very odd member of the meadowlark clade is the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), a large North American marsh blackbird in the monotypic genus *Xanthocephalus*. It was formerly thought to be related to *Agelaius*, although the behavioural comparisons made by G. Orians and J. Christman in 1968 revealed that Yellow-headed Blackbirds' displays were different from those of Nearctic *Agelaius* species. The isolated taxonomic position of this icterid suggests that it may be a surviving member of a past Nearctic radiation of the meadowlark clade.

According to molecular data, the Bobolink, a grassland species remarkable for its long migratory flights between North America and South America (see Movements), is related, albeit only distantly, to the meadowlark clade. This is plausible, as the Bobolink resembles the smallest Neotropical meadowlarks, namely the Red-breasted (*Sturnella militaris*) and White-browed Blackbirds (*Sturnella superciliaris*), in its nest architecture, ecology and behaviour, in its elongate tertial feathers, and even in its non-breeding plumage.

All eight species of meadowlark are terrestrial, long-billed and stocky icterids. The genus is represented in all mainland American countries, but is absent from many Caribbean islands. No other icterids are more adapted for living in meadows, grasslands and steppes, sometimes in semi-desert country. The smallest species in the group, the Red-breasted and White-browed Blackbirds, were formerly separated in the genus *Leistes*. In 1968, however, L. L. Short reviewed the taxonomy of the group and suggested that all the species be combined in a single genus, because *Leistes* was connected to the "typical" meadowlarks by intermediate species such as the Pampas Meadowlark (*Sturnella defilippii*), and shared many morphological and behavioural traits with them. Short's views have been supported by recent analyses of mitochondrial DNA. This taxonomic change meant that the taxon hitherto named *Pezites militaris* would have become *Sturnella militaris*,but this combination was not applicable for this species, as it was preoccupied. Consequently, the Long-tailed Meadowlark (*Sturnella loyca*) took on its current nomenclature, using the next available name.

Meadowlark taxa having a yellow breast are usually grouped into two very similar species, the Eastern Meadowlark (*Sturnella magna*) and the Western Meadowlark (*Sturnella neglecta*), which



The genus Curaeus *has an oddly disjunct distribution, with one species, Forbes's Blackbird* (Curaeus forbesi), *in tropical east Brazil and the other, the* ***Austral Blackbird****, in the southern-temperate region of South America. Forbes's Blackbird was placed in this genus because its bill shape is similar to that of the Austral Blackbird, but no DNA data are available. Two races of the Austral Blackbird are recognized. A third has been proposed, based upon a supposedly slightly recurved bill on birds from Riesco Island, off southern Chile, but recent observers have not reported peculiarities in bill shape.*

[*Curaeus curaeus curaeus*, Melipilla, Chile. Photo: Manuel Marín]



The genus Agelasticus *is often subsumed in* Agelaius *or* Chrysomus. *Mitochondrial DNA analysis indicates that the relationship of the* ***Yellow-winged Blackbird*** *to its two congeners is not close. It differs also in certain ecological, vocal and plumage characteristics, and has been considered for its own genus. A highland subspecies of the Yellow-winged Blackbird,* alticola, *regularly nests around the shores of Lake Titicaca, at 3810 m above sea-level. No other icterid has been recorded at such high elevations.*

[*Agelasticus thilius petersii*, Lagoa dos Patos, Tavares, Rio Grande do Sul, Brazil. Photo: Edson Endrigo]

differ from each other mostly in vocalizations. J. C. Barlow, S. A. Rohwer and other ornithologists, using morphological and vocal data, argued that there existed a third species, Lilian's Meadowlark (*Sturnella lilianae*), which has usually been treated as a desert-adapted subspecies of the Eastern Meadowlark. Recent DNA data support the elevation of *lilianae* to full species rank. Further, the Eastern Meadowlark has a good number of distinctive subspecies in the Caribbean and the northern Neotropics. DNA research has indicated a significant genetic divergence of the Cuban subspecies *hippocrepis*, suggesting a long isolation, and further information will perhaps show that this taxon, too, merits treatment as a full species.

Morphological Aspects

Icterids range in total length from about 15 cm to 53 cm, and in body mass from 20 g to approximately 560 g. The variation in body size found among icterids well exceeds that of closely related families such as the New World warblers or the tanagers.

Most icterids exhibit sexual size dimorphism, the males being larger and heavier than the females. Extreme cases of size dimorphism occur with most oropendolas, and also in the Boat-tailed and Great-tailed Grackles. In the case of the Montezuma and Crested Oropendolas (*Psarocolius decumanus*), the female's mass is, respectively, 47% and 56% of that of the male; for the



The two Pseudoleistes *marshbirds are closely related and very similar in appearance. The* ***Brown-and-yellow Marshbird*** *differs from the Yellow-rumped Marshbird* (Pseudoleistes guirahuro) *in its browner and less colourful appearance, and its brown rump. Both are highly social species, which breed co-operatively. With these species, group singing is far more frequent than solo singing. DNA data indicate a close affinity between the marshbirds and the Saffron-cowled Blackbird* (Xanthopsar flavus). *The Saffron-cowled Blackbird is, however, smaller and less robust, with strongly marked sexual dichromatism. The marshbird sexes are similar to each other.*

[*Pseudoleistes virescens*, Buenos Aires, Argentina. Photo: Juan María Raggio]





The two baywings of the genus Agelaioides *have the most drab and inconspicuous coloration of any member of the family. The* ***Greyish Baywing*** *(left) and the* ***Pale Baywing*** *(right) have often been treated as conspecific, with the latter regarded as a race of the more widespread Greyish Baywing. As well as in plumage, however, they differ in vocalizations and some details of social behaviour.*

[Left: *Agelaioides badius badius*, São Lourenço do Oeste, Santa Catarina, Brazil. Photo: Rudimar Narciso Cipriani.

Right: *Agelaioides fringillarius*, Hotel Fazenda Pai Mateus, Cabaceiras, Paraíba, NE Brazil. Photo: Luiz Claudio Marigo]

two grackles, the corresponding value is about 54–62%. With all of these species the male is strongly polygynous, defending a harem of nesting females. Sexual size dimorphism is probably a result of strong sexual selection, either because females choose the largest males or because the largest males are dominant and exclude the smaller males from mating, or for both reasons.

The members of this family have a strong conical bill, often sharply pointed, and ranging from short and finch-like to elongate. The pointed bill and associated muscles constitute the basic tools for gaping, a typical foraging technique of icterids (see Food and Feeding). Bill deformities are relatively frequent among the Icteridae, and may be due to genetic or developmental factors, injury or disease. The type of a species described by the French naturalists N. F. de Lafresnaye and A. d'Orbigny as "*Icterus maxillaris*" involved a specimen with a bill deformity.

The majority of icterid species have an extended culmen that covers part of the forehead, in some genera expanding into a frontal casque. On many, particularly the caciques and oropendolas, the casque is well developed and may cover the frontal part of the head. The most highly developed casque is found in the monotypic genus *Clypicterus*, the Casqued Oropendola. The basic function of this conspicuous structure is not well known, but it is possibly used in displays.

Crests or elongated head feathers are possessed mostly by oropendolas, and also by the Yellow-winged Cacique, the latter more related to oropendolas than to true caciques (see Systematics). Naked facial areas are present on large oropendolas of the "*Gymnostinops* group" (see Systematics). An extremely long tail, curiously keel-shaped or boat-shaped, has evolved in the *Quiscalus* grackles, particularly the Boat-tailed and Great-tailed Grackles, while the Giant Cowbird male has a conspicuous erectile ruff that he displays to females. Males of these icterids are polygynous, and their "ornamental" features are believed to have evolved through sexual selection.

The predominant plumage colour in the family is black, often with a gloss or iridescence in shades of purple, blue and green. Other plumage colours regularly present include yellow, orange, red, white, and shades of brown and green; blue is absent. Colourful shoulder patches have evolved independently in several icterid genera. In addition, both sexes of all *Psarocolius* oropendolas and of the Yellow-winged Cacique have extensive yellow tail patches. The patches are particularly visible when oropendolas are flying away, and may work as signals to maintain flock cohesiveness, notably useful for fledglings and dependent juveniles. Yellow tail patches have evolved also in the unrelated genera *Clypicterus* and *Ocyalis*, and these could perhaps be examples of social mimicry.

Recent advances in technology have enabled researchers to detect invisible ultraviolet coloration in the plumage of many birds. The most interesting discovery among icterids is the existence of ultraviolet patches in the crown and supercilium of the male Pale-eyed Blackbird (*Agelasticus xanthophthalmus*), the head of which appears solidly black to the human eye. Cryptic coloration, or camouflage, is present particularly in the dorsal plumage of meadowlarks, an icterid group adapted to a terrestrial life in grassland and steppe.

Extensive molecular research undertaken on the genus *Icterus* has resulted in a phylogenetic tree that shows some interesting results as regards the evolution of coloration in the group. Although there is an overall agreement between colour patterns and phylogenetic placement, several cases of colour reversal and convergent evolution in plumage are apparent. Perhaps some parallel changes in sympatric orioles also reflect mimicry of some sort.

Sexual dimorphism in coloration, possibly better named as sexual dichromatism, occurs in many icterids, the females often being far less colourful or more cryptic than the males. Sexual dichromatism is evident particularly among the quiscalines and the meadowlarks, and also some orioles, but is absent or far less obvious among oropendolas and caciques. It may be thought to be the result of sexual selection for colourful plumage in males, but the sum of evidence for this idea is weak. In the case of the polygynous oropendolas and caciques, the sexes are similar in plumage. Sexual dichromatism is found among polygynous quiscalines, but also among monogamous ones. With orioles, marked dichromatism is more frequent among migratory Nearctic species, but any association between migration and dichromatism is weakened by the situation with the Montserrat Oriole (*Icterus oberi*), a strongly dichromatic species confined to a small tropical island.

With some quiscalines, such as the Unicolored Blackbird (*Agelasticus cyanopus*), the Red-winged Blackbird and the Shiny Cowbird (*Molothrus bonariensis*), sexual dichromatism varies geographically, and the sex that exhibits the greater degree of intraspecific variation is the female. Female Unicolored Blackbirds can be strikingly different from the all-black males, sometimes having colourful yellow underparts, or they can be much more male-like. Female Shiny Cowbirds are usually dark brown, but occur also in a male-like morph, "*melanogyna*", which is black like the male, though lacking the male's strong purplish gloss.



*The **Bolivian Blackbird** can be found in mixed flocks including both the Greyish Baywing* (Agelaioides badius) *and the Chopi Blackbird* (Gnorimopsar chopi). *Its calls are reminiscent of those of both. In general aspect, skeletal morphology and behaviour, it resembles the Chopi Blackbird, but mitochondrial DNA data indicate that it could be a sister-species to the Greyish Baywing.* Oreopsar *should possibly be merged with* Agelaioides, *but is retained as a monotypic genus pending an analysis of the Pale Baywing* (A. fringillarius).

[*Oreopsar bolivianus*, near Cochabamba city, Bolivia.
Photo: Daniel Alarcón]

This fact suggests that selection in females may play an important role in the evolution of sexual dichromatism. A similar trend occurs within the five blackbird species in the genus *Agelaius*. The males of all five are invariably black with contrasting colourful epaulets. Females of the two polygynous species lack epaulets and are mostly brownish and streaked, somewhat cryptically coloured; in the three Caribbean, monogamous species, however, the females are black and may even show epaulets.



A recent phylogenetic analysis by C. Hoffman and co-workers, based on sexual dichromatism among orioles, also stresses the particular importance of evolutionary changes in the female plumage. In some oriole species, females have lost the colourful male-like plumage and are much duller. A drab olivaceous plumage would make the females more cryptic and probably reduces predation. The existence of seasonal dichromatism lends some support to this theory. Seasonal dichromatism occurs among males of migratory Nearctic icterids such as the Bobolink and in some orioles, whereby males in the non-breeding season assume a cryptic or drab female-like plumage.

Few passerine families surpass Icteridae in variability of iris colour. The eyes of icterids can be bright blue, almost white, yellow or red, in addition to the usual brownish hues. Within a given species, iris colour may change with sex and age. The subject has not been systematically studied, but eye colour is probably important in social communication. In their small area of range overlap, in the south USA, Boat-tailed and Great-tailed Grackles are best told apart by eye colour. Geographical variation in iris colour has been reported for some icterids, examples being the Russet-backed Oropendola, Boat-tailed Grackle and Giant Cowbird. Bright iris coloration is usually due to specific pigments, namely purines and pteridines, but the red irides of the Bronzed Cowbird, known also as the Red-eyed Cowbird, are coloured by red blood cells.

Some ornithologists have reported that icterids give off a strong or unpleasant smell. According to H. Sick, oropendolas have a smell suggestive of cockroaches (Blattodea), apparently emanating from the uropygial gland. E. Schäfer reported that Venezuelan oropendolas had an odour like that of musk; he further reported that his retrieving dog picked up specimens of the Russet-backed Oropendola subspecies *oleagineus* with visible reluctance. The subject requires a detailed research study.

With one exception, adult icterids undergo a single, complete annual moult, which takes place after the breeding season. The exception is the Bobolink, which has two complete moults, a post-breeding one and a pre-breeding one. The male of this species is notable for the fact that it has two distinct plumages, one a striking black-and-white breeding plumage and the other a very different brown and streaky non-breeding plumage, the latter similar to that of the female. In contrast, the majority of the family

*Unlike all other icterids, which have a single annual moult, the **Bobolink** has two complete moults, post-breeding and pre-breeding. The male's breeding plumage is shown here; in its streaky brown non-breeding plumage, it resembles the female. The finch-like Bobolink is so dissimilar in many respects to other icterids that it was once considered for a subfamily of its own. In its nesting habits and some other aspects of behaviour and morphology, it resembles smaller members of the meadowlark genus* Sturnella. *Cytochrome-b sequence data show that it is closer to* Sturnella *and the Yellow-headed Blackbird* (Xanthocephalus xanthocephalus) *than to other members of the family.*

[*Dolichonyx oryzivorus*, Ontario, Canada.
Photo: Glenn Bartley]

acquire their brighter-looking breeding appearance as a result of the abrasion of the greyish, buffish or olive feather tips of the fresh plumage. Contrary to earlier opinions, the Rusty Blackbird (*Euphagus carolinus*) has recently been found to have a partial pre-breeding moult, involving the feathers of the head. Although some other icterids, such as female Red-winged Blackbirds and some grackles, undergo a similar partial pre-breeding moult of varying extent, it is thought very unlikely that this strategy is used by more than a very few icterids.

An interesting aspect of moult is the way in which the tail feathers are replaced. Most passerines shed the tail feathers centrifugally, from the central pair outwards, but about half of the Icteridae shed theirs centripetally, replacing the outer rectrices first and then progressing inwards. Only the caciques, the oropendolas, the orioles and the Bobolink exhibit the "traditional" centrifugal moult of the tail. *Quiscalus* grackles often shed their tail feathers more or less simultaneously, so that individuals can appear tail-less for a couple of weeks after the end of the breeding season. This phenomenon is sometimes exhibited also by some other members of the family.

Habitat

There are no icterids adapted to the treeless tundra, the extreme deserts or the highest mountains above 4500 m, although in South America families containing more species, such as the tyrant-flycatchers (Tyrannidae) or the ovenbirds (Furnariidae), can be found in some of those biomes. Nevertheless, Icteridae, a family of 111 species, is represented in most habitats in the Americas, sometimes surpassing the closely related tanagers and New World warblers in this respect. Another characteristic of most icterid species is a relative lack of specialization, and a considerable plasticity, in habitat choice. For instance, although mangroves are an important habitat for several icterids, particularly the grackles, there are no species specialized on or confined to this biome. Exceptions to this rule are noted below.

The geographical distribution of the family was summarized by P. Lowther. Four areas in the Americas have the highest numbers of icterid species. Within Canada and the USA the maximum diversity is reached in the central prairies. In Mexico, there is a concentration of species in the southern state of Oaxaca. In Colombia, a high diversity of icterids is present in the Cordillera Oriental. Lastly, the Río de la Plata basin, extending from Paraguay and north-east Argentina east to south-east Brazil and Uruguay, holds up to 21 species. In the middle of this extensive basin, the Argentinian province of Corrientes has 20 species of icterid. Two main biogeographical units in South America, the *cerrado* and the Atlantic Forest, both centred in eastern Brazil, have few



Meadowlarks with a yellow breast are usually grouped into two very similar species, the Eastern Meadowlark (Sturnella magna) *and the Western Meadowlark* (S. neglecta), *which differ mostly in vocalizations.* ***Lilian's Meadowlark*** *was formerly considered a race of the Eastern Meadowlark, but differs in having a shorter tail with a distinctive pattern formed by the white outer rectrices. Its vocalizations are also different. DNA data revealed a deep genetic divergence, supporting* lilianae*'s treatment as a separate species. Some Eastern Meadowlark races may belong with Lilian's Meadowlark, while* S. m. hippocrepis, *the "Cuban Meadowlark", also shows a significant genetic divergence and may merit species rank.*

[*Sturnella lilianae*, Hereford, Arizona, USA. Photo: Charles W. Melton]



The smallest Neotropical meadowlarks, the ***White-browed Blackbird*** *and the Red-breasted Blackbird* (Sturnella militaris), *were previously placed in a separate genus,* Leistes. *The two share many behavioural and morphological traits with the "typical" meadowlarks, however, and are connected with them by intermediate species such as the Pampas Meadowlark* (S. defilippii). *DNA data support their inclusion in* Sturnella. *The two are sometimes considered conspecific, but their ranges overlap in south-east Peru, north-east Bolivia and north-east Brazil with no evidence of interbreeding.*

[*Sturnella superciliaris*, Area Natural de Manejo Integrado San Matías, SE Santa Cruz, Bolivia. Photo: Daniel Alarcón]



*Most icterid species are gregarious, and even those that breed as solitary pairs may form flocks outside the breeding season. The **Yellow-hooded Blackbird** nests colonially and is usually found in small groups. Non-breeding birds, however, can form flocks of several hundreds. The flock sizes of Neotropical icterids never rival those of North American species such as the Red-winged Blackbird* (Agelaius phoeniceus)*, below, which can contain hundreds of thousands of individuals. Although largely resident, flocks of Yellow-hooded Blackbirds may make local movements when the dry season renders their marsh habitat unsuitable.*

[*Chrysomus icterocephalus icterocephalus*, Cayenne, French Guiana. Photo: Tanguy Deville]

icterid species. As both regions have high biodiversity scores for other oscine groups, such as tanagers, this anomaly requires some explanation.

The various subdivisions of the Icteridae have different geographical ranges and centres of diversity. Caciques and oropendolas are tropical to subtropical, occurring from Mexico south to central Argentina, and reaching their highest diversity in western Amazonia and the nearby Andes. The most remote island colonized by the group is Tobago, separated from the nearest land by a sea channel 42 km wide. Caciques and oropendolas are absent from all the main Caribbean islands; possibly their larger size and their arboreal habits make them unsuccessful overseas colonists. The oriole genus *Icterus* is particularly diverse in Mexico and northern Central America, and has successfully colonized several Caribbean islands. Orioles live in xeric to humid habitats, but are poorly represented, with just two species, in southern South America; no members of this group occur in Chile or Patagonia. It is probable that orioles entered South America later than other icterids, as suggested by the results of recent DNA studies. The remaining icterid subclades, namely the grackles and allies and



*The global population of the **Red-winged Blackbird** is estimated at a minimum of 200 million, making it probably the most numerous bird in North America. Flocks can be correspondingly large; in winter, congregations of millions of birds have been reported, mixed with other blackbirds and grackles. These winter flocks can include birds from a number of different breeding populations. Outside the breeding season, flocks can be of a single sex. Although they use the same roost sites, males and females may be segregated at roosts, arriving and leaving separately.*

[*Agelaius phoeniceus fortis*, Bosque del Apache National Wildlife Refuge, New Mexico, USA. Photo: Dave Maslowski/ Maslowski Productions]

the meadowlarks, are more evenly distributed in both the Nearctic and the Neotropics, being found in tropical to cool-temperate biomes. Both icterid subgroups have successfully colonized relatively distant islands, such as the Lesser Antilles and the Falklands, but not the Galapagos or the Juan Fernández archipelagos.

In North America, the most northerly icterid, the migratory Rusty Blackbird, breeds in the boreal coniferous and mixed forests of Alaska, Canada and the extreme north-eastern USA. Its northernmost localities, north of the Arctic Circle, are the Kotzebue Sound and the Mackenzie Delta. This blackbird nests in clearings, marshes and bogs within the forest. The tundra biome, north of the tree-line, lacks native icterids. The moist deciduous woodlands of eastern North America are the summer quarters of the Baltimore Oriole, and similar environments in western North America are the main habitat of Bullock's Orioles. Both oriole species are found mostly in the canopy. Open areas east of the Rocky Mountains are inhabited by Common Grackles (*Quiscalus quiscula*), while Brewer's Blackbirds (*Euphagus cyanocephalus*) breeds in similar habitat also west from the mountains. Both species can be found in very open woodland. Brewer's Blackbird has the highest altitudinal records for Nearctic icterids, having been recorded at up to 3300 m.

Boat-tailed Grackles live in tidal marshes along the coast of the eastern USA. Subtropical and tropical sea coasts are the usual environment of Great-tailed Grackles, which frequent estuaries, brackish lagoons and mangrove swamps. On the tiny coralline islands of San Blas, near the Caribbean coast of Panama, the latter species was found to be the only land passerine present; here, it fed mostly on human refuse, and its nesting sites were in coconut palms (*Cocos nucifera*). Other grackles frequent many types of marshland in the interior of Mexico and Central America, although, in Mexico, the Slender-billed Grackle is now, sadly, extinct (see Status and Conservation). The Nicaraguan Grackle, however, still survives around the lakes and rivers of south-west Nicaragua and adjacent north Costa Rica.

Tropical and subtropical forests are the main biome of most caciques and oropendolas. Forests in Amazonia are traditionally classified into floodplain-forest, represented by *várzea* and *igapó*, and upland forest, or *terra firme*. The *várzea* environment is seasonally flooded by sediment-rich rivers flowing from the Andes, examples being the Putumayo, Napo, Ucayali and Madeira Rivers. *Várzea* soils are the most fertile in all Amazonia, but they occupy only 60,000–65,000 km², less than 1% of the huge Amazon Basin. Many peculiar species of plant occur there and nowhere else. The *igapó* formations are subject to more permanent floods, but from nutrient-poor black-water rivers flowing from the Guianan or the eastern Brazilian highlands, the Rio Negro being a typical example. *Terra firme* forests, the most extensive in Amazonia, are not subject to seasonal flooding.

In Amazonia, Band-tailed Oropendolas use mostly *várzea* forest, whereas Green Oropendolas are more restricted to *terra firme*. Some Amazonian marsh icterids, such as the Yellow-hooded Blackbird (*Chrysomus icterocephalus*) and the Oriole Blackbird, favour mainly the lush grasslands and scrub of the *várzea* and avoid the *igapó* marshes and islands. In contrast, Velvet-fronted Grackles seem to prefer the flooded woodlands along black-water rivers.

Caciques and oropendolas exploit the forest canopy and the upper strata for foraging, but will sometimes descend to ground level or almost so. Colonial-nesting species, including the Yellow-rumped and Red-rumped Caciques and many oropendolas, would seldom nest in unbroken forests, except in large clearings or along rivers. Of all the main forest areas in the Neotropics, only the Atlantic Forest of eastern Brazil and neighbouring countries is poor in icterids, with usually the Red-rumped and Golden-winged Caciques as the only representative of the family.

Other icterids inhabiting tropical forest include the Jamaican Blackbird, many Caribbean orioles, and the mountain grackles of the northern Andes and the Guianan highlands (tepuis). The Jamaican Blackbird is one of the most specialized of all icterids, as it forages mostly in epiphytic bromeliads in wet mountain forest.

The Andean subtropical forests are used by fewer oropendola species, but many specialized solitary caciques occur in this environment. In the Andes, the Yellow-billed Cacique, an inappropriately named species (see Systematics), is found mostly in bamboo thickets. Tropical savannas are the home of several icterids, such as the Melodious Blackbird (*Dives dives*) in the pine (*Pinus*) savannas of Honduras and Nicaragua, and the Oriole Blackbird in the *llanos* of the River Orinoco. Chopi Blackbirds (*Gnorimopsar chopi*) are found in the humid *chaco* savannas, often in palm groves, and are one of the few members of the family that can be seen in the *cerrado* savannas of central



Except for a few that live as territorial pairs, icterids roost communally, and several species may roost together. In studies in the eastern USA, the ***Common Grackle*** *appeared to function as the nucleus in the formation of roosting congregations. The grackles occupied the roost-sites first, and Red-winged Blackbirds* (Agelaius phoeniceus), *Brown-headed Cowbirds* (Molothrus ater) *and two non-icterids commonly found sharing roosts, the Common Starling* (Sturnus vulgaris) *and American Robin* (Turdus migratorius), *joined later. In late summer, Common Grackles often roost in cat-tail* (Typha) *marshes with other blackbirds, but prefer deciduous trees or pines* (Pinus) *in wintering locations in the southern USA.*

[*Quiscalus quiscula*, Brinkley, Arkansas, USA. Photo: Marie Read]



*For the polygynous male **Yellow-rumped Cacique**, access to females is determined by dominance, which is positively correlated with weight. Comparably sized males and those of similar rank fight more often than males that differ widely in size or rank. Female Yellow-rumped Caciques compete for access to nest-sites that are safe from predators. Weight is again the major factor determining female fledging success, since heavier females tend to win aggressive encounters and control the best nest-sites. Adolescent male Yellow-rumped Caciques avoid aggressive interactions with other males, but are very aggressive towards adult females and fledglings.*

[*Cacicus cela cela*,
Rio Roosevelt Lodge,
Novo Aripuanã,
Amazonas, Brazil.
Photo: Edson Endrigo]

Brazil. The Solitary and Golden-winged Caciques may occur in gallery forest and isolated forest patches in open country.

Many orioles are found in dry or xeric forests. Scott's Oriole (*Icterus parisorum*) inhabits the fringes of deserts in the south-western USA and northern Mexico. It does, however, require the presence of trees or other tall plants, such as desert yuccas (*Yucca*), for nesting. The Venezuelan Troupial (*Icterus icterus*) lives in xeric woodlands and scrub on the Caribbean coast of Venezuela and nearby islands. Similarly, the Campo Troupial lives in the semi-desertic scrub and deciduous forest of north-eastern Brazil, a habitat known as *caatinga*. The very rare Forbes's Blackbird lives in relict mesic forests within the *caatinga*.

Thorn-woodlands and thornbush savannas in central Argentina are inhabited by Greyish Baywings and Screaming Cowbirds (*Molothrus rufoaxillaris*). In the Andes of north-western Argentina, the former species lives near the desert in the dry intermontane valleys, even foraging in creosote bushes (*Larrea*), but it needs trees for nesting and roosting. No icterids are found in extreme deserts, such as the Atacama, in north Chile, or in the high-altitude *punas* of the central Andes. Although Scrub Blackbirds (*Dives warczewiczi*) live along the almost rainless coast of Peru, they are found there mostly at oases or riparian areas, or around irrigated farmland. The Bolivian Blackbird (*Oreopsar bolivianus*), is confined to that country, where it lives in dry Andean valleys below the *puna*; despite its generic name, which can be loosely translated as "mountain blackbird", its main adaptation to mountain conditions is that it nests in rocky cliffs. The southern temperate *Nothofagus* forests are inhabited by the Austral Blackbird (*Curaeus curaeus*), the southernmost representative of the family. This icterid, however, is seldom found far from clearings and the forest edge, and it occurs also in the Mediterranean-type scrub and woodland of central Chile.



*Males of polygynous icterids such as the **Red-rumped Cacique**, which play little or no part in nesting or care of the young, occupy themselves instead with displaying, resting and long bouts of feather maintenance. A male Amazonian Oropendola* (Psarocolius yuracares) *can spend up to 18% of his time at the colony in preening.*

[*Cacicus haemorrhous affinis*,
Itatiaia,
Rio de Janeiro, Brazil.
Photo: Edson Endrigo]

Wetlands are extremely important for many icterids, particularly those in the grackle group. Throughout the Americas, species in the genera *Agelaius* and *Chrysomus* are the typical marsh-dwelling blackbirds, both nesting and roosting in or near marsh vegetation. One species, the Yellow-winged Blackbird (*Agelasticus thilius*), has a highland subspecies, *alticola*, that regularly nests around the shores of Lake Titicaca, straddling the Peru–Bolivia border, at 3810 m above sea-level. It is found also, probably rarely, at up to 4000 m; no other icterid has been recorded at higher elevations. Other marsh blackbirds include the showy Yellow-headed and Scarlet-headed Blackbirds of, respectively, North America and South America.

Good examples of the colonizing capabilities of icterids are the "highland enclaves" of species otherwise confined to marshes and grasslands in the lowlands. The subspecies *alticola* of the Yellow-winged Blackbird has already been mentioned. In addition, the Yellow-hooded Blackbird has one highland enclave at 2600 m on the Cundinamarca Plateau of Colombia, and even the



Allopreening, or mutual preening, has been observed for a number of icterid species, including the ***Greyish Baywing****. In captivity, a baywing was observed to solicit preening by sidling towards another bird while holding its bill pointing downwards and its feathers sleeked. If the other responded, it raised its bill and fluffed the feathers of its head and neck. Icterids may also solicit preening from other species. Cowbirds* (Molothrus) *display the "allopreening-invitation posture", head down and feathers fluffed, towards potential hosts. This may be appeasement, or the cowbird recalling being preened by its foster-parent as a nestling.*

[*Agelaioides badius badius*, Costanera Sur Ecological Reserve, Buenos Aires, Argentina. Photo: Roberto Mario Güller]

rare Saffron-cowled Blackbird demonstrates this colonizing trait, with populations in grasslands at 900–1000 m at the top of the mountains of Rio Grande do Sul, in south-east Brazil.

Throughout their ranges, the parasitic cowbirds frequent open areas and avoid dense forests. Because they do not build a nest and rear their own young, they may have disjunct feeding and breeding areas during the reproductive season. In the Sierra Nevada, in California, radio-tracking studies revealed that Brown-headed Cowbirds (*Molothrus ater*) commuted seven kilometres every day from feeding grounds to sites with abundant host nests. Giant Cowbirds are found in savannas and the edges of tropical forests, and forage also in open habitats along main rivers, while Screaming Cowbirds frequent light woodland mixed with grassland. Shiny Cowbirds occur in most open habitats, and commonly visit marshes during the breeding season.

Grasslands of several types, including both tall and short grass, are the typical biome of meadowlarks. Lilian's Meadowlark is adapted to desert grasslands, being found only in the south USA and adjacent north Mexico. The Long-tailed Meadowlark, on the other hand, is restricted to the southern Neotropics, one of its four subspecies, *catamarcana*, reaching 3200 m in the southern Andes, where it inhabits wet or marshy grassland just below the level of the bleak *puna* highlands. The Red-breasted and White-browed Blackbirds, both formerly placed in the genus *Leistes* but now classified as *Sturnella* meadowlarks (see Systematics), prefer wet grassland in the lowlands. One member of this genus, the Pampas Meadowlark, is entirely adapted for a life in the pure grassland of treeless country.

Wet grassland is the typical habitat of the Brown-and-yellow Marshbird (*Pseudoleistes virescens*) and the Saffron-cowled Blackbird, both of which can live also in treeless areas, roosting and nesting in or near marshes. Finally, the Bobolink, a long-distance migrant, breeds in damp meadows in North America, after which it flies southwards to central South America, where it utilizes the same kind of habitat, including rice fields.

As a family, icterids have been remarkably successful in invading man-made environments. Examples of highly adaptable species can be found in all icterid groups. Tropical plantations of bananas, cacao and other foods are regularly visited by Crested and Montezuma Oropendolas. Oriole species, such as the Orchard and Baltimore Orioles, inhabit city parks and orchards, and members of this family found in suburban environments with large gardens, lawns and golf courses include Common and Great-tailed Grackles, Brewer's Blackbirds, Cuban Blackbirds and baywings. Many marsh blackbirds in the genera *Agelaius* and *Chrysomus* can be found in rice fields, which are exploited also by Bobolinks and by Red-breasted and White-browed Blackbirds. Farmland and pastures are attractive to all parasitic cowbirds, as well as to meadowlarks. Even some rare or globally threatened icterids may be found in, or will use, somewhat modified environments. Saffron-cowled Blackbirds can survive in agricultural land, and the rare Forbes's Blackbird nests in introduced mango (*Mangifera*) trees. As an exception, the declining Pampas Meadowlark has not been able to survive in the crop fields that have replaced most of its native grasslands, and it is now listed as Vulnerable (see Status and Conservation).

General Habits

With a few exceptions, icterids are relatively easy to observe and to study. As already mentioned (see Habitat), many species frequent open areas such as grassland, marshes, dry scrub and savannas, where they are rendered conspicuous by their coloration and voice. Some are strikingly conspicuous in plumage, a good example being the Orange-backed Troupial in the dusty, brownish winter scrub of the dry Chaco, or the Scarlet-headed Blackbird with a background of lush green marsh vegetation. Those icterids having drab brownish or olivaceous plumage are often females of sexually dichromatic species (see Morphological Aspects). The baywings in the genus *Agelaioides* have subdued brownish and greyish plumage in both sexes, but are conspicuous because of their voice and behaviour.

Species living in forest or woodland biomes often become more conspicuous through their habit of utilizing the edges and canopy. Only the Yellow-billed Cacique skulks in dense undergrowth and bamboo patches, where it is seldom observed but is, nevertheless, detectable because of its characteristic songs and calls. The Solitary Cacique also frequents thick undergrowth, but it commonly builds its large nest in more exposed locations.

Most of the terrestrial icterids walk or run on the ground, but the more arboreal species move by hopping or jumping. The plum-



The plumage-maintenance behaviour of icterids commonly involves much water-bathing, but dust-bathing and anting are less often reported. The ***Common Grackle****, however, has been observed anting and indulging in anting-like behaviour with other objects, such as marigold flowers* (Calendula officinalis). *These flowers have antibacterial properties and also contain insecticidal pyrethrum and also sitosterol, a chemical known to inhibit egg-laying in mites. A male Common Grackle was seen anting with half a lime, preening itself while holding bits of the fruit in its bill.*

[*Quiscalus quiscula*, SW Ohio, USA. Photo: Dave Maslowski/ Maslowski Productions]

age-maintenance behaviour commonly involves much water-bathing, but dust-bathing and anting are less commonly reported. Preening is frequent, and allopreening, involving the mutual care of body plumage by two or more individuals, is performed by a few species.

Many field guides characterize icterids as sociable or gregarious birds, and this is, indeed, true of most species in the family. Icterids breed in colonies far more frequently than any of the related families of tanagers, New World warblers or New World sparrows. Even species that breed as solitary pairs or family groups may form flocks in the non-breeding season. Post-breeding flocks are sometimes segregated according to sex and age, the females and juveniles moving separately from the males. Icterid flocks can be huge. In North America, those of such species as the Red-winged Blackbird can contain hundreds of thousands of individuals. In the Neotropics, flocks contain hundreds or thousands of individuals, only rarely more. Mixed flocks consisting of individuals of two or more icterid species also occur.



The "Bill-tilt" or "Head Up" display, used in aggressive interactions, has been recorded for a wide range of icterid genera. Both sexes of the ***Great-tailed Grackle*** *use the display, though usually only in the presence of their own sex. It is much more commonly performed by males. In silence, the birds sleek their feathers and raise the bill to the vertical or beyond. Bill-tilting may be used also in flight. As it approaches its opponent, the bird momentarily closes its wings, and extends its head and neck upwards until its body is nearly vertical.*

[*Quiscalus mexicanus prosopidicola*, near McAllen, Texas, USA. Photo: Stephen J. Krasemann/DRK]

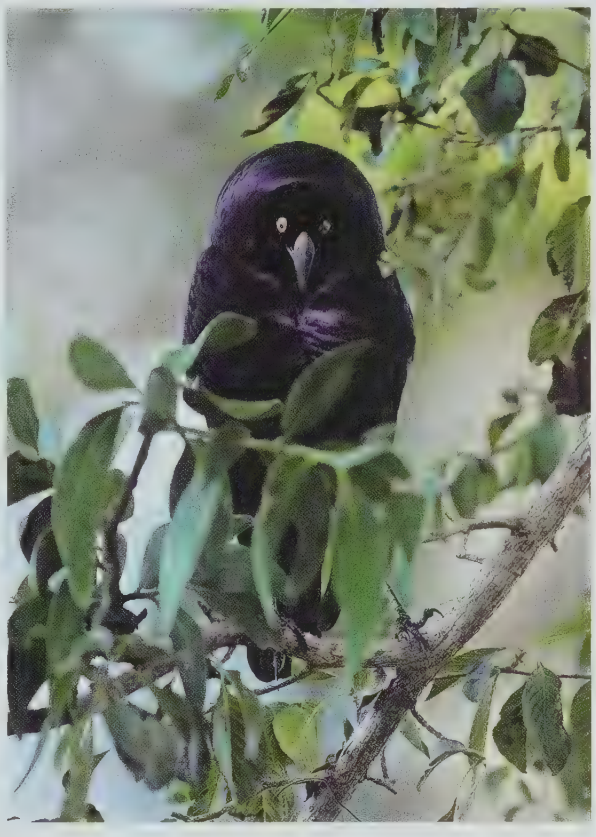
New World blackbirds also join birds from other families to form mixed flocks. In the Neotropics, caciques and oropendolas often consort with jays (Corvidae). Other passerines that flock with icterids include tanagers and some cotingas (Cotingidae). Some Andean icterids that commonly move in mixed flocks include the two mountain caciques, the Scarlet-rumped Cacique and the Red-bellied Grackle. Neotropical icterids seldom associate with antbirds (Thamnophilidae) and woodcreepers (Dendrocolaptidae) that follow army ants (Formicidae), but Yellow-billed Caciques have been reported as doing so.

A general and characteristic habit of the family is that of roosting communally in dense vegetation. The few exceptions involve species that live as permanent territorial pairs. Some species roost gregariously in marsh vegetation, while others roost in native or exotic bamboo or, in Amazonia, in patches of *Gynerium* canes. Not all icterids, however, select these types of roosting location. For example, wintering Shiny Cowbirds in Argentina commonly roost in trees in towns and cities, but they will choose even leafless trees under streetlights, places that attract no other icterids. Greyish Baywings in Argentina rarely, if ever, roost in marsh vegetation, and they also avoid leafless trees. A medium-sized orange tree in a patch of deciduous woodland may attract wintering individuals from a large area. On the other hand, popular roosting sites in stands of evergreen plants such as bamboo may be shared by several species. Roost-sites are usually traditional, and are used year after year.

During the winter months, icterid roosts in North America can contain amazing numbers of individuals. Surveys carried by the US Fish & Wildlife Service in the mid-1970s revealed that 438,000,000 icterids were roosting at 723 main sites, giving an average of more than 600,000 icterids per main roost-site. The more numerous species attending these roosts were the Red-winged Blackbird, Common Grackle and Brown-headed Cowbird. Huge concentrations of this nature are often regarded as an environmental problem to humans and their agricultural crops (see Relationship with Man). In the Neotropics the roosts are smaller, probably because Neotropical icterids are sedentary or do not migrate in big flocks. The largest roosts observed nowadays in Argentina during the austral winter contain about 2000 individuals of up to three species.

Birds that forage in flocks of any kind may benefit from enhanced detection of predators, whether aerial or terrestrial. A potential disadvantage is that, if resources are limited, feeding competition among flock-members may arise. Species in mixed flocks may eat different foods and have different foraging techniques, thereby minimizing this problem.

Groups or flocks of New World blackbirds foraging on the ground often exhibit "roller-feeding" behaviour. The individuals foraging at the rear end of the group fly over their flockmates to the front, and stay in position until, as the process is constantly repeated by the rearmost flock-members, they finally find them-



*The displaying male **Giant Cowbird** fluffs out his body feathers and erects the ruff of feathers around his neck, giving him an owl-like appearance. He arches his neck and leans his head forwards and down, until his bill rests on his fluffed-out breast feathers. He may also bob up and down by flexing his legs. Icterids that communicate mostly by postures and plumage features have fewer vocal signals. The Giant Cowbird is generally rather silent. Great-tailed* (Quiscalus mexicanus) *and Boat-tailed Grackles* (Q. major) *beat their wings during displays, but the odd noises heard at this time are apparently not made by the wings.*

[*Molothrus oryzivorus oryzivorus*, Aguapé Lodge, Aquidauana, Mato Grosso do Sul, Brazil. Photo: Edson Endrigo]



*Male icterids in several genera have a perched display, the "Song Spread", in which the head is lowered, the body feathers raised, and the wings and tail spread while the bird sings. This display shows off the epaulets of the male **Red-winged Blackbird** to advantage, although they are probably directed at other males rather than at females. The size of the epaulets is a reliable predictor of dominance rank. When some males in a population had their epaulets artificially blackened, 64% lost their territories, while only 8% of males with normal epaulets lost theirs. Nevertheless, males with epaulets blackened were still able to attract and mate with females.*

[*Agelaius phoeniceus phoeniceus*, Québec, Canada. Photo: Daniel Houx]



The male ***Orchard Oriole*** *sings in flight, as well as from perches. The female of this species may also sing. Icterid species in which the sexes have similar songs occur mainly in the tropics and include most of the* Icterus *orioles. The female Streak-backed Oriole* (Icterus pustulatus) *not only produces songs of similar complexity to the male's, but sings more frequently. Some closely related* Icterus *species have very dissimilar songs, but more distantly related orioles can sound very similar. Orchard, Bullock's* (I. bullockii) *and Hooded Orioles* (I. cucullatus) *have largely non-overlapping ranges and differ from one another in plumage colours and patterns, yet have strikingly similar songs, quite different from the lazy whistles typical of many other oriole species.*

[*Icterus spurius*, Carver County, Minnesota, USA. Photo: Stan Tekiela/DRK]

selves again at the back; after a short time they fly to the front again, and the entire procedure is repeated. The resulting pattern suggests that the flock is slowly "rolling" over the fields. Some icterids exhibit more sophisticated group behaviour. As an example, several South American species that breed co-operatively, particularly those that forage on the ground, such as marshbirds, baywings and Chopi Blackbirds, have developed elaborate sentinel behaviour. Typically, one or two group-members take up position on elevated perches and spend their time in watching for possible predators, including visiting ornithologists. While keeping a lookout, the sentinels may produce a series of calls, perhaps meaning that no threats are imminent. If a potential predator is detected, or if the ornithologist comes too close, the sentinels produce different types of call as an alarm.

Icterid displays that have been studied relate mostly to North American species, but a few displays and postures are more or less widespread throughout the family. A frequent aggressive or threat posture, in which the head and bill are raised vertically, is called the "Bill Up" or "Head Up". Sometimes the bird gives this threat while slowly flying towards a rival. The Bill Up is often performed by the *Quiscalus* grackles. An unusual variation of this threat display is given by the Greyish Baywing, which holds a twig or a leaf at the tip of its raised bill.

Voice

Few bird families in the Americas rival the icterids in the complexity and diversity of their vocalizations. Within the New World nine-primaried oscines, only the New World sparrows come close. Ornithologists have attempted to quantify the vocal repertoire of icterid species, the total number of different sounds produced by each one, but there is considerable subjectivity on how to assess every variant. Students of avian behaviour define song as the more elaborate vocalizations used for sexual attraction and/or aggressive contests, for instance in territorial defence. The rest of the repertoire consists of several calls, classified as alarm calls, contact calls, begging calls, and so on, depending on the context and the behaviour that they can elicit. In some cases, however, the distinction between songs and calls may be considered rather arbitrary.

In the USA, it is claimed that Red-winged Blackbirds have 20 different vocalizations, Brewer's Blackbird 13 and Eastern Meadowlarks 12. For the same species, Orians gives figures of, respectively, 18, 9 and 9. According to Schäfer, the Russet-backed Oropendola in Venezuela produces 16 different vocalizations. Greyish Baywings in Argentina have a minimum of nine recognizable vocalizations, eight basic calls and the song; the calls are the contact call, contact whistle, terrestrial alarm, aerial alarm, mobbing call, distress call, feeding call, and begging call, and the song has three possible variants, including group song. As with other bird species, some calls are rather stereotyped and invariable, the aerial alarm call being an example, whereas other calls change gradually according to motivation, as is the case with the terrestrial alarm call. Further, the begging calls of chicks change considerably with age, and more than one type may be recognized.

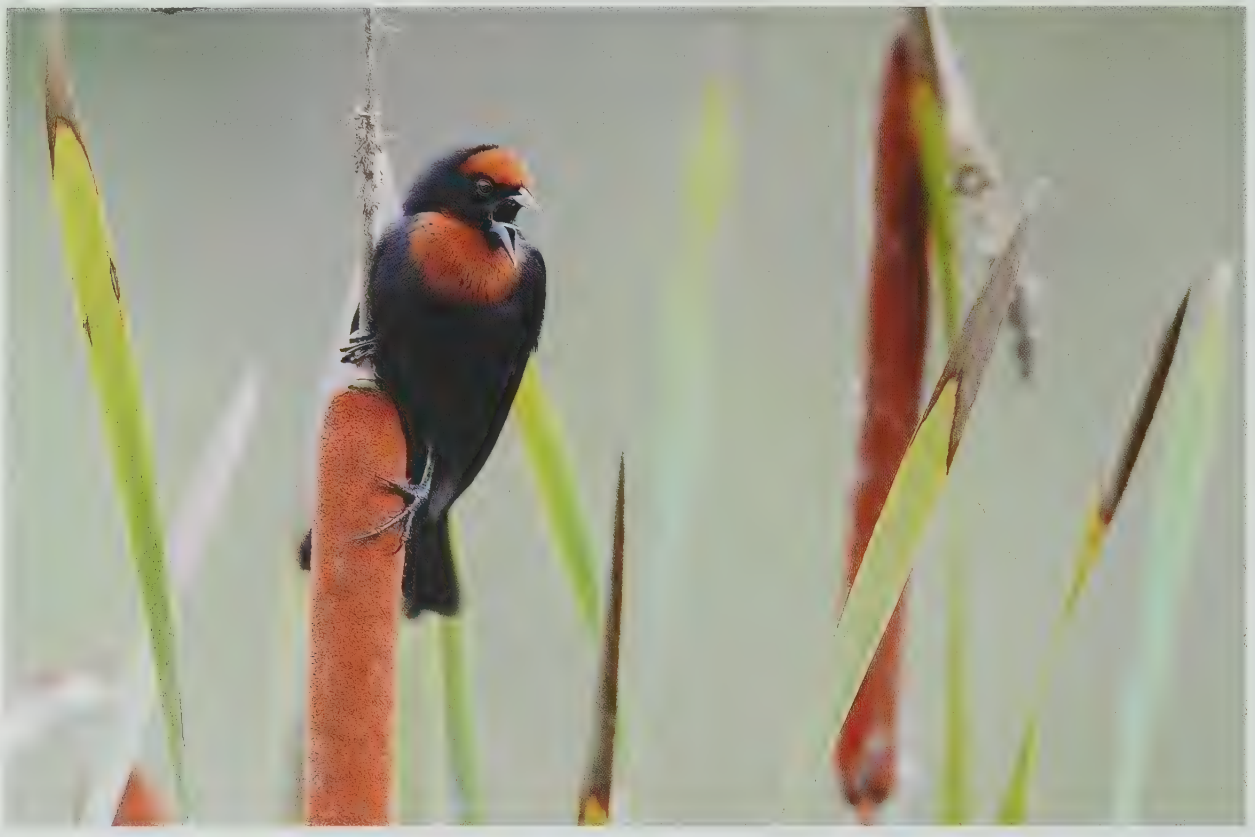
Despite the difficulties of quantifying repertoires, there are real differences not only among species but also, in some cases, between the sexes. According to Orians, male Red-winged Blackbirds have 18 different vocalizations, whereas females have only six. The corresponding values for the closely related Tricolored Blackbird (*Agelaius tricolor*) are 17 and six, males apparently lacking only aerial alarm calls. The tendency for males to have a richer repertoire suggests the operation of sexual selection, favouring more types of sound in polygynous male icterids. Monogamous icterids, on the other hand, have fewer vocalizations and the two sexes are similar in repertoire size. A striking example is provided by the monogamous Red-shouldered Blackbird (*Agelaius assimilis*) of Cuba, which lacks the "sexual inequality" in vocal repertoire that is a feature of its close relative the polygynous Red-winged Blackbird.

Another recognizable trend is that icterids that communicate mostly by means of postures and the use of plumage features have fewer vocal signals. In other words, visual displays replace acoustic displays. This is the alleged case with Yellow-headed Blackbirds, whose males are polygynous but produce only eight types of vocalization. According to Schäfer, the ex-



Some caciques and oropendolas are renowned for their loud, bizarre and virtuosic vocalizations, with many odd harmonics and sudden modulations. It has been suggested that the sound "kshárá-chee", which forms part of the song of the ***Yellow-winged Cacique****, can, with a little imagination, be transformed into the name "cacique". The song has been described as beginning with various liquid notes, followed by a sound like that made by a rusty-hinged barn door when swinging open. Among many differences between the Yellow-winged Cacique and the "true" caciques are the former's possession of a crest, its nesting habits and its habitat, in all of which it is closer to the oropendolas* (Psarocolius). *Oropendola songs are audible at hundreds of metres. A study found that the length of notes within the songs of oropendolas was correlated with the degree of size dimorphism between the sexes. Males of more dimorphic species are generally larger than the males of less dimorphic oropendolas, presumably have greater lung capacities than do smaller males, and thus are able to expel more air and produce longer continuous sounds.*

[*Cassiculus melanicterus*, Puerto Angel, Oaxaca, Mexico. Photo: Edward Vercruysse]



*The male **Chestnut-capped Blackbird** has two song types, sometimes produced in alternate sequences. One, often delivered with the wings and tail spread, starts with clicks, warbles or whistles and ends in a descending nasal buzz. The other is more individual and less stereotyped, and can be quite musical and flute-like. There is much variation among the songs of the males of this species, even within a single colony. The songs of the two races of Chestnut-capped Blackbird are similar, although that of the northern race,* frontalis, *is harsher in tone.*

[*Chrysomus ruficapillus frontalis*, Pedra Azul, Espírito Santo, Brazil. Photo: Edson Endrigo]

tent of the vocal repertoire of the "yellow-billed group" of the Russet-backed Oropendola (see Systematics) is correlated with a low frequency of visual contacts in the dense subtropical forest in which the species lives. The prediction of both trends would be that polygynous icterids living in dense forest, which include many caciques and oropendolas, will have the largest sound repertoires.

Most elaborate singing is usually produced by males, and this is quite obvious in polygynous colonial species such as the oropendolas or the large grackles. Females' songs can be divided into two kinds: those that are basically similar to the male's songs, and those that are divergent, often simpler, but functionally equivalent to the male song. Among Nearctic species, distinctive female songs are a characteristic of the Red-winged, Yellow-headed and Rusty Blackbirds. A well-known example of divergent female song is the chatter or rattle heard from many female blackbirds, including cowbirds. The Shiny Cowbird female uses the chatter mostly during the breeding season, when it presumably helps to attract males. It is used also during aggressive interactions between females, or even when females attack males. Oddly, males of this cowbird species sometimes incorporate chatters within their elaborate flight song. If this broader definition of female song is used, it can be said that females of many, perhaps the majority of, icterid taxa sing.

Icterid species in which the sexes have similar songs occur mostly in the Neotropics. The similarity is found, for instance, in most *Icterus* orioles, in the solitary-nesting caciques, among the grackle clade, including the Greyish Baywing and the Scrub, Chopi and Saffron-cowled Blackbirds, and among meadowlarks, principally the Long-tailed Meadowlark. Moreover, some oriole females may sing more elaborate songs, or have a higher song production, than males of the species. A recent phylogenetic analysis strongly suggests that, among icterid genera that have moved from the Neotropics to the Nearctic Region, females have lost the male-type songs and have evolved simpler but equivalent vocalizations.

The vocal diversity of icterids is as rich as are most behavioural traits found in the family, and even congeneric species may display considerable divergence in songs. One of the simplest of icterid songs is produced by male Screaming Cowbirds, the song of which is an explosive and harsh whistled or warbled sound, lasting for less than a half-second, and audible at hundreds of metres. Males sing from an exposed perch during a "Song Spread" display, known also as the "Ruff-out" display, in which the wings and tail are held open (see Breeding). Female Screaming Cowbirds duet with the mate by producing a harsh rattle, the notes so compressed in time as to be perceived as a single blast of noise. The song of the related Giant Cowbird is likewise simple, consisting of a brief series of whistles, or a single modulated whistle, with a rasping quality. The male Shiny Cowbird, on the other hand, has two types of song. One, given only by perched individuals, is a series of low-pitched gurgles followed by two or three high-pitched whistles. The second song, sometimes delivered in flight, is a descending whistle followed by a string of variable, fast twittering and rattling notes. Flight songs, commonly known also as twittering songs, can last for three or more seconds. The male Brown-headed Cowbird has a similar perched song, but its flight song is reduced to a whistle. Females of the Shiny and Brown-headed Cowbirds closely resemble each other in producing slower rattling or chattering calls, which are functionally equivalent to the male's songs. It would appear that, within the parasitic cowbirds, song resemblance mirrors the molecular phylogeny (see Systematics).

The song diversity of the Icteridae may be a result of variation not only in the type and number of syllables, whether discrete notes or note groups, and of phrases, in the form of groups of syllables, but also in the harmonic structure of each note. An interesting example of variation in harmonic structure is provided by three South American blackbirds belonging to the same clade. The Greyish Baywing has a complex and variable structure of phrases, but many of its notes emphasize just one harmonic. The richer song of the Chopi Blackbird is similar, but with a strong emphasis on consonant harmonics. Lastly, all notes of the song of the Austral Blackbird have a strong harmonic structure, with a peculiar nasal, oboe-like timbre.

Some members of this family produce a "continuous" song, a seemingly endless succession of variable sounds, such as whistles, buzzes, twitters and the like, lacking a definite pattern of repetition. Baywings and Austral and Chopi Blackbirds commonly produce such songs. During the breeding period, however, male baywings also sing shorter and more stereotyped songs, repeated every time they visit the nest. In one study, it was possible to



*The harsh and explosive song of the male **Screaming Cowbird** lasts for barely half a second and can be heard for hundreds of metres. It is often preceded by a low growl, audible only at close range. The female may answer with a loud rasping rattle, in a kind of duet. As in the male's song, the notes of the female's are so compressed that they are apprehended by human ears as a single blast of noise. Unlike other cowbirds, Screaming Cowbirds are apparently exclusively monogamous and the male accompanies the female constantly. As females inspect host nests, males typically perch above them, vocalizing and performing the "Song Spread" display.*

[*Molothrus rufoaxillaris*, Aguapé Lodge, Aquidauana, Mato Grosso do Sul, Brazil. Photo: Edson Endrigo]

recognize some ringed male baywings at a distance by these repetitive songs. Song duets between the male and the female, each sex with a different vocalization, are known to be performed by such diverse icterids as the Yellow-billed Cacique, the Golden-winged Cacique, the Yellow-tailed Oriole (*Icterus mesomelas*), the Melodious Blackbird and the Screaming Cowbird.

Several icterid species have more than one basic type of song. Nearctic species with two song types include the Yellow-headed, Brewer's and Rusty Blackbirds. The Eastern, Western and Pampas Meadowlarks deliver one kind of song from a perch and a different song in flight, as also does the White-browed Blackbird. Males of this last species also produce a softer and more complex song, often while pursuing females. Male Chestnut-capped Blackbirds (*Chrysomus ruficapillus*) have two song types, sometimes rendered in alternate sequences. One song starts with clicks or whistles and ends with a nasal buzz; breeding males assume a puffed-out posture during this song, spreading the wings and tail in display (see Breeding). The other song is less stereotyped and often quite musical, being either a series of loud, short and tremulous whistles around a sustained pitch, like a flute playing coloratura, or a sequence of flute-like notes ascending the scale. Breeding males raise and flutter their wings while singing, usually addressing a nearby female. Three general song types are used by male Yellow-rumped Caciques in Panama, each one associated with a different aspect of behaviour; one, low-pitched and more musical, is used in flight.

Group singing is an activity of most icterids that flock, and is commonly heard at roosting sites. Among species of southern South America, it has been further developed by both marshbirds, the Chopi Blackbird and the Greyish Baywing. In the case of the highly social Yellow-rumped Marshbird (*Pseudoleistes guirahuro*) and the Brown-and-yellow Marshbird it is far more frequent than solo singing. Group singing by Greyish Baywings involves continuous singing by individuals of both sexes, in a kind of random polyphony. The regularity of the performance by this species is responsible for its common Argentinian name of *músico*, meaning "musician", because of its alleged resemblance to the sound made by an orchestra when tuning up, each instrument practising a different theme. Group singing by baywings may occur during agonistic encounters between groups, at any time and away from roosts.

Mimicry, the vocal copying of sounds produced by other species, has been reported for some species of *Cacicus* and some *Icterus*, but it may also be a feature of other species, such as the Chopi Blackbird. The ornithologist Sick mentioned an imitation of the cry of a giant otter (*Pteronura brasiliensis*) by a Yellow-rumped Cacique that was so well rendered as to confuse a party of hunters. With this cacique, mimicry is performed mostly, or only, by the southern, nominate race, which also faithfully copies



*Several icterid species have more than one basic type of song. The **Eastern Meadowlark** delivers one song from a perch and a different song in flight. The female produces a chatter, which is possibly equivalent to male song. Both this species and the Western Meadowlark (Sturnella neglecta) produce pleasant whistling notes, but the song of the Western species is more complex and musical, and song is one of the main criteria for separating these very similar species in the field. Geographically distant populations of Eastern Meadowlarks, however, have divergent song types, and those in northern South America, where Western Meadowlarks are absent, are said to have a song variant that is less easy to distinguish.*

[*Sturnella magna argutula*, Brazoria County, Texas, USA. Photo: Brian E. Small]

such birds as parrots (Psittacidae) and woodpeckers (Picidae). There is no satisfactory explanation for the discrepancy in the performing of mimicry among icterids so closely related as to be classified as races of a single species.

Another remarkable mimic is the Variable Oriole, which copies the calls of hawks, mostly those of the Roadside Hawk (*Buteo magnirostris*), and the contact and alarm calls of such birds as the Guira Cuckoo (*Guira guira*), the Rufous Hornero (*Furnarius rufus*) and the Great Kiskadee (*Pitangus sulphuratus*). The imitations are remarkably accurate, but are uttered in a softer voice than that of the model. This oriole also mimics the scolding calls of Chalk-browed Mockingbirds (*Mimus saturninus*), and at times it may be answered by the mockingbirds. Mimicry is a feature of other orioles, too. Many icterids give buzzy, nasal or rasping songs containing frequency-modulated tones or notes. Instead of producing sounds at a constant pitch, they introduce a pattern of fast modulations above and below a basic tone. Above a fixed level of modulation human ears perceive such sounds as being unmusical and rough, and this is the case with most icterid sounds of this type. Frequency-modulated songs are common among marsh and grassland species in the grackle and meadowlark groups. Songs of many *Agelaius* and *Chrysomus* blackbirds end in prolonged nasal or buzzy sounds, and most grackles produce rasping, rattling or dissonant sounds. The Greater Antillean Grackle (*Quiscalus niger*) and the Carib Grackle, however, produce more musical songs, and the Melodious and Chopi Blackbirds, two species with rich, pleasant musical songs, belong to this group. Meadowlarks are a variable group in terms of the tonal quality of their songs, with some accomplished songsters, such as the Western and Eastern Meadowlarks. Although in the meadowlark group, the Yellow-headed Blackbird produces particularly unmusical songs, one of which has been likened to the noise of an unwinding clockwork machine.

Some caciques and oropendolas are renowned for their loud, virtuoso and bizarre vocalizations, with many odd harmonics and sudden modulations, quite difficult to describe verbally or musically. A detailed analysis of cacique and oropendola songs by J. Price and Lanyon involved the use of 29 variables to describe the songs. Songs of several species have been described as being liquid gurgles, and others as hollow whistles. The Amazonian Oropendola incorporates sounds suggesting arpeggios played on some plucked instrument, but one with wooden strings, simultaneously with others that resemble chords played on large bamboo pipes. Songs of male Montezuma Oropendolas in Costa Rica may include remarkable crescendos, growing simultaneously in intensity and range of pitch, and ending in a shrill whistle. Oropendola songs are audible at hundreds of metres. From a distance they may sound more pleasant, because much of the harshness and noise that surrounds the fundamental tones is then lost.

Orioles as a group deliver rather musical songs. The Yellow-backed Oriole (*Icterus chrysater*), a songster of repute, produces whistled songs within a rather narrow pitch range. Sometimes its notes are arranged in paired sequences, ascending and descending, suggesting a pattern of questions and answers. Other orioles include in their songs non-whistled notes, such as trills, warbles and even harsh sounds. Some *Icterus* species outstanding for their songs include the Spot-breasted Oriole (*Icterus pectoralis*) and the Campo Troupial, in addition to the Yellow-backed Oriole.

Orians advanced the theory that icterids having small, clumped territories communicate mostly with frequency-modulated tones, because such sounds may be more easily heard and located by conspecifics living at short distances. Icterids that live in large, dispersed territories would, rather, use pure, more musical notes with a lower degradation rate; such sounds would carry the message even to distant neighbours. In order to assess the validity of this hypothesis, it is necessary to test the correlation between territory size and tonal quality of songs with a group of closely related species, such as the orioles or the caciques. The songs of oropendolas degrade with distance, this being compatible with Orian's views on short-distance and long-distance communication. The evidence for some species that live in groups, such as the two baywings and the Chopi Blackbird, will be ambiguous. All three species produce more musical sounds than those of most members of the grackle group, but the Austral Blackbird, also a group-living icterid and in the same South American clade, communicates with mostly nasal, less musical sounds.

In the context of the oscine passerines, icterids learn a good deal of their sound repertoire, particularly the songs. In the case of one of the best-known species, the Red-winged Blackbird, males can continue to learn songs, and probably from many conspecific adults, until their second year. Song-learning by the



Throughout the year, the ***Rusty Blackbird*** *takes advantage of whatever food is abundant. Insects, mainly beetles (Coleoptera) and grasshoppers (Orthoptera), and the adults of aquatic insects emerging after metamorphosis, are a primary food in summer, and nestlings are fed with adult dragonflies (Odonata). Rusty Blackbirds will also take molluscs, frogs and salamanders. Outside the breeding season, seeds, including grass seeds and cereals, and tree seeds such as acorns and pine nuts* (Pinus), *become important. In harsh weather Rusty Blackbirds may also kill and eat small birds, including sparrows and finches.*

[*Euphagus carolinus*, Chicago, Illinois. Photo: Rob Curtis/ The Early Birder]

parasitic cowbirds has attracted some attention, because juvenile cowbirds do not learn songs from their host species. With sedentary cowbirds, such as the Screaming Cowbird, the young start to flock with conspecific adults in their second month of life, and probably begin to learn from them. Song-practising juvenile Screaming Cowbirds sometimes form small groups, and possibly learn from one another. Experiments have shown that male Brown-headed Cowbirds reared in total isolation develop normal songs, an unusual fact for oscine passerines. Nevertheless, the isolated males could later modify their song through learning and interactions with conspecifics of both sexes. Males may learn song elements from conspecifics in their first year, but they do not develop full singing until the following year.

As would be expected, the songs of any icterid species can show variation at several levels. Thus, a single individual can have several different songs, the individual repertoire; in addition, songs can vary among individuals, and between populations at a microgeographical scale, involving dialects, and they can vary on a large geographical scale. The individual repertoires of male Red-winged Blackbirds, for example, include about five song variants. F. Feekes noticed that individual male Yellow-rumped Caciques in Suriname produce two song types, but these changed gradually with time, so that lifetime repertoires were vast. This cacique is an outstanding mimic, and probably continues learning as an adult. Considerable song variation among individuals is evident too in the dwindling populations of the rare Saffron-cowled Blackbird.

Microgeographical variation in characteristics of the song is a feature of many icterids. The existence of different local variants, or dialects, should be kept in mind when interpreting statements made in field guides and other literature on this family. As with human languages, dialects develop mostly among icterids having relatively isolated and sedentary populations. With Red-winged Blackbirds in North America, for instance, the northern populations, which are mostly migratory, exhibit little geographical variation in song, but dialectal variants are frequent in the resident populations of this species in Florida and California. Feekes described an unusual type of dialect system for Yellow-rumped Caciques. This icterid nests in colonies and, although individual differences in song occur, the songs of males frequenting the same colony are similar to one another, and different from those of males in other colonies. These colony-shared song types could work as "passwords", used by local males to detect outsiders.

A well-known example of geographical variation in icterid songs concerns the insular Greater Antillean and Carib Grackles. The systematist R. K. Selander found that each island has its own different song type, at times quite distinctive. In the case of the Carib Grackle, songs from Trinidad, for instance, have little in common with songs from Martinique. The Eastern and Long-tailed Meadowlarks, two species with extensive distributions, likewise have divergent song types in some populations.

Some characteristics of songs and calls may be inherited. One of the simplest rules of song variation is related to size: a decrease in body size is correlated with an increase in pitch, as is the case also with musical instruments. The widespread Shiny Cowbird has a rather small subspecies, *minimus*, in the Caribbean, and the flight song of this race has a noticeably higher pitch than that of songs of the nominate race. In other cases, geographical variation in pitch and tonal quality of sounds may be related to the acoustical properties of different environments, with natural selection for more efficient sound transmission. Forest environments would select for smaller pitch ranges and more pure-toned, musical songs. Besides natural selection, sexual selection, or mate choice, is a probable influence on the evolution of icterid signals.

Mechanical sounds made by icterids consist mostly of noises produced by flapping of the wings. Many large orioles and grackles, as well as Giant and Screaming Cowbirds, can produce an audible wing sound when flying. Great-tailed and Boat-tailed Grackles beat their wings during displays, but the odd noises heard at this time apparently are not made by the wings. Mechanical sounds are quite well developed in oropendolas and caciques. The male Crested Oropendola ends its song with a rhythmic series of up to 30 wing-flaps, lasting two to three seconds. Males of some populations of Red-rumped Caciques produce hissing sounds, somewhat reminiscent of noises made by bellows, while flapping the wings, even during short flights. The role of the wings in the production of this noise has not been researched.

From the viewpoint of systematics, icterid voices, particularly the songs, have been suggested as tools for assessing whether



Most members of the family will use the feet to pin down prey while they deal with it. The ***Chopi Blackbird*** *eats millipedes (Diplopoda) and other arthropods, and also small vertebrates. One was watched as it fed on a still-warm immature Yellow-billed Cardinal* (Paroaria capitata) *in the Brazilian Pantanal. The blackbird was not seen to kill the young bird, but predation was thought highly likely, since a local resident reported having seen 2–3 Chopi Blackbirds attacking a young cardinal two weeks earlier.*

[*Gnorimopsar chopi chopi*, Serra da Canastra National Park, São Roque de Minas, Minas Gerais, Brazil. Photo: Edson Endrigo]



Two species of cowbird, the ***Giant Cowbird*** *and the Shiny Cowbird* (Molothrus bonariensis), *are recorded as gleaning food, presumably ticks (Ixodida), from capybaras* (Hydrochoerus hydrochaeris). *Cowbirds follow these and other large mammals to exploit the insects which they disturb, often using the mammal's back as a perch. The large rodents sometimes lie on their side, apparently as an invitation to the birds to clean the parasites from their belly. The Giant Cowbird has also been recorded as picking food from the side, shoulder and neck of a resting marsh deer* (Blastocerus dichotomus).

[*Molothrus oryzivorus oryzivorus*, Pantanal, Mato Grosso, Brazil. Photo: Luiz Claudio Marigo]

to treat populations under one species or several species. Some cases of potential splitting, like that of the northern population *vitellinus* of the Yellow-rumped Cacique, are quite compelling. Given the complexity of many icterid songs, the fact that they develop through learning, and their individual and dialectal variations, the subject is somewhat controversial. Nevertheless, song is one of the main criteria for separating Eastern and Western Meadowlarks in the field.

Food and Feeding

As a family, the New World blackbirds feed on small animals, and on seeds, nectar and fruits. The relative importance of these items in the diet varies considerably among species and groups. Large icterids, mostly the grackles, prey on small vertebrates, but none of them has specialized on this type of food. Common Grackles will wade in shallow water after fish and tadpoles, and Boat-tailed and Common Grackles may also catch fish by plunging from the air. Unicolored Blackbirds catch small fish near the water surface, probably by searching under floating vegetation. Small arboreal frogs (*Hyla*) are frequent prey items of Crested and Russet-backed Oropendolas in Venezuela, and have been found in the stomach contents of Scarlet-headed and Red-breasted Blackbirds in Brazil. Cuban Blackbirds commonly prey on small *Anolis* lizards.

Small birds, including other passerines, hummingbirds (Trochilidae) and even an injured Dunlin (*Calidris alpina*), have been reported as prey of Boat-tailed Grackles in Louisiana. Common Grackles have captured passerines as large as House Sparrows (*Passer domesticus*). Similarly, Rusty, Brewer's and Chopi Blackbirds kill and eat small birds, the first species mostly during harsh winter weather. Grackles are well-known nest predators, and even a large oriole such as a troupial may eat eggs and small chicks. Common Grackles sometimes consume small mammals, mostly mice (Muridae), and North American meadowlarks have been recorded as feeding on the carcasses of road-killed vertebrates.

Molluscs in the form of snails and bivalves are commonly eaten by Boat-tailed Grackles, which use the method known as "gaping" (see below) to extract them from mud and sand. Crustaceans are taken by several species: crayfish (Astacoidea) are eaten by Boat-tailed and Common Grackles, and near the fjords of southern Chile Austral Blackbirds may feed mostly on shrimps (Caridea). Spiders (Araneae) are important animal prey for most icterids. Stomach contents of the Brown-and-yellow Marshbird, a highly insectivorous species of the South American *pampas*, consisted of 80% insects and 12% spiders. Marshbirds forage on the ground and consume spiders, mostly terrestrial wolf spiders (Lycosidae), particularly during the austral winter. Scorpions (Scorpiones) have been recorded in the diet of Montezuma Oropendolas in Costa Rica.

It can be safely stated that arthropods are the main animal food of the icterids, but the percentage of arthropods in the diet, and the types consumed, are too variable for meaningful generalizations to be made. Some icterids could be ranked as mostly insectivorous when arthropods exceeded 50% of the items found in stomach contents; among these are the Brown-and-yellow Marshbird (see above), the Eastern Meadowlark, the White-browed Blackbird and, in the breeding season, the Bobolink. Less insectivorous, more vegetarian species include Rusty and Brewer's Blackbirds, the Common Grackle, the Red-winged Blackbird, the Brown-headed Cowbird and baywings. In the case of the cowbird and the two baywings, the percentage of arthropods in the diet was less than 30%. It should be noted that icterid chicks, even those of the most granivorous species, are fed mostly with arthropods .

Grasshoppers (Orthoptera) are consumed mostly by grassland icterids. It is speculated that, in the past, enormous flocks of Tricolored Blackbirds tracked grasshopper outbreaks in California, and bred near the swarms. Breeding Greyish Baywings often bring large mantids (Mantidae) to chicks in the nest, while Red-winged and Yellow-headed Blackbirds in the marshes of the north-western USA capture mostly emergent larvae of dragonflies (Odonata) as nestling food. Several families of beetles (Coleoptera), particularly weevils (Curculionidae), furnish important prey for most icterids. Among butterflies and moths (Lepidoptera), the larval stages consisting of the caterpillars and pupae are probably more important prey items than adults. Nevertheless, Black-backed Orioles are well-known consumers of the toxic adults of monarch butterflies (*Danaus plexippus*) that spend the winter months in Mexico.



Before European settlement of North America, the ***Brown-headed Cowbird*** *probably relied on large grazing ungulates, in particular the American bison* (Bos bison), *to maintain the open short-grass habitats in which it feeds. The Brown-headed Cowbird was confined mostly to the grasslands of the Great Plains of central North America, and is still particularly abundant there. The association with large mammals has enabled this and other cowbird species dramatically to extend their ranges as land has been cleared to provide grazing for livestock. But although domestic cattle have largely replaced bison as the cowbird's foraging associate, the recent restoration of bison in their former territories has increased opportunities for cowbirds to interact with this native grazer. A study in 27,000 ha of short-grass prairie pasture in north-east New Mexico found that female cowbirds breeding in pinyon–juniper* (Pinus–Juniperus) *woodlands commuted an average of 7·24 km to prairie sites to feed during the afternoons. Mean commuting distance was related to distance of the nearest bison from the breeding grounds. Because bison ranged widely over the grassland, females in the bison-grazed landscape commuted farther and had larger feeding areas and overall home ranges than those in areas grazed by cattle. When few bison were within 10 km of the cowbird breeding ranges, cowbirds foraged with wapiti* (Cervus canadensis) *or without ungulates. Dependence on the erratic movements of bison herds could have precluded normal nesting at a fixed site, and has been proposed as the origin of brood-parasitic behaviour by cowbirds.*

[*Molothrus ater artemisiae*, National Bison Range Wildlife Refuge, Moise, Montana, USA. Photo: Donald M. Jones/ DRK]



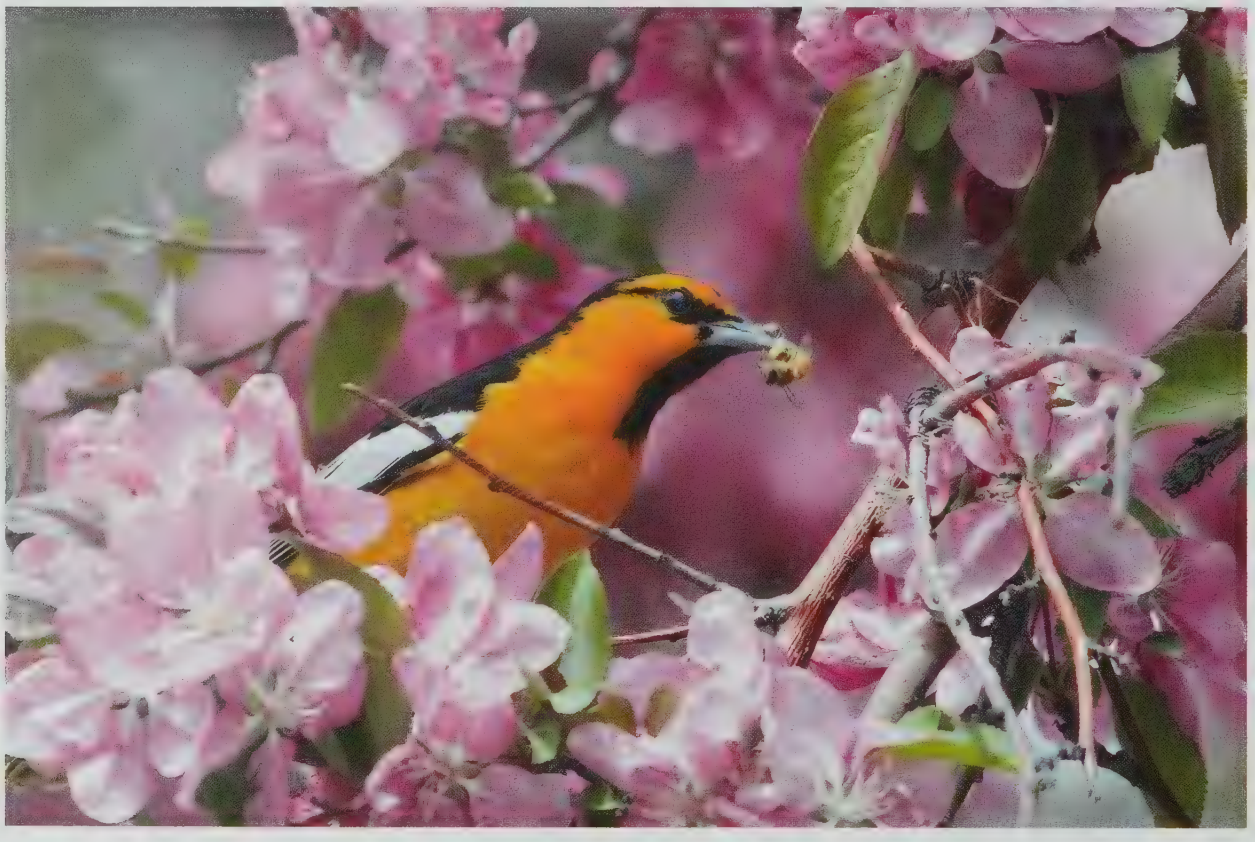
*Like other oropendolas, the **Amazonian Oropendola** is usually found feeding in the upper strata of trees. Male Amazonian Oropendolas are much larger (average 51 cm, 449·6 g) than females (42 cm, 259·2 g), and the sexes may differ in the foods that they take and the foraging tactics used. In the Montezuma Oropendola* (Psarocolius montezuma)*, females are able to take insects from curled dead leaves near the ends of thin branches. These are inaccessible to the heavier males, which need stronger perches from which to feed.*

[*Psarocolius yuracares yuracares*, Yasuní Research Station, Orellana, Ecuador. Photos: Nick Athanas]

Several members of the family catch insects that accompany grazing mammals. Although interactions with wild herbivores have been reported, it is nowadays mostly domestic livestock that are exploited. The behaviour is particularly common among the parasitic cowbirds, but it has been reported also for other species such as the Nicaraguan Grackle and the Cuban Blackbird. Kleptoparasitism has been reported from the south-east USA, where Boat-tailed Grackles in Florida were seen to steal food from ibises (Threskiornithidae).

Consumption of seeds varies considerably both among and within species, as well as seasonally and geographically. Icterids having a short, finch-like bill are the more granivorous. Seeds reportedly accounted for 88% of the stomach contents of Greyish Baywings in eastern Argentina. Grass seeds and seeds of herbaceous plants are important for open-country icterids, whereas those living in woodland and forest consume seeds of several tree genera. Rusty Blackbirds, for instance, eat acorns (*Quercus*) and pine seeds.

Icterids frequently use a peculiar feeding technique known as "gaping", a method known to be utilized also by some other birds, including corvids and starlings (Sturnidae). The bird, as it searches for hidden food, forcibly introduces its closed bill into the substrate, such as the soil and then, thanks to an elaborate jaw musculature, it opens the bill against the resistance of the substrate,



Although omnivorous, eating small fruits and enough nectar to be a secondary pollinator of the shaving-brush tree (Pseudobombax ellipticum) *in Mexico, **Bullock's Oriole** eats mostly insects. Its stomach contents were found to be 79% animal matter and 21% vegetable. This oriole gleans in foliage and also picks insects from spider webs. Even in the breeding season it can be found foraging in flocks of up to 20 birds. In contrast, the Baltimore Oriole* (Icterus galbula)*, with which Bullock's was once considered conspecific, is rarely social when foraging on its breeding grounds.*

[*Icterus bullockii bullockii*, Crooked River Ranch, Oregon, USA. Photo: Kevin Smith/VIREO]

creating a sort of gap or crevice. In most icterids, the muscles that raise and lower the mandibles, namely the protractors and the depressors, are remarkably strong. Species that feed on the ground, such as the meadowlarks and the marshbirds, employ the gaping technique mostly for extracting soil invertebrates. Arboreal icterids, especially caciques, use gaping as a means of opening up dry or decaying wood, such as small branches and bark, so that they can then extract insects, often carpenter ants (*Camponotus*) and their larvae. A more specialized use of the technique is demonstrated by the Scarlet-headed Blackbird. This icterid inserts its chisel-shaped bill into the vertical stems of water plants, including reeds and species of *Cyperus* sedge and *Thalia* (Marantaceae), opening them in order to extract concealed larvae. The Jamaican Blackbird utilizes gaping to extract prey from epiphytic bromeliads, and Saffron-cowled Blackbirds employ the method to extract small animals from the thorny basal leaves of *Eryngium*, plants that look much like terrestrial bromeliads. Other icterids use gaping as a means of opening pine cones, closed flowers and large fruits. Some species sometimes use the bill in a woodpecker-like fashion to excavate bark and soft wood.

Most members of the family use the feet for holding prey or other food items. Common Grackles feeding on crayfish commonly use this technique. In Argentina, Greyish Baywings frequently grasp masses of thistle seeds (Asteraceae) with the feet, holding them against a perch, and tear apart the non-edible silky pappus. In the same way they have been seen to tear apart large insects and the larval cases of hesperiid butterflies.

Flower nectar is an important food mostly for orioles, and almost all members of the genus *Icterus* regularly visit flowers to obtain it. In the process of drinking nectar, many orioles pollinate the flowers. This mutualistic interaction has been studied in respect of several leguminous trees in the genus *Erythrina*, most of which produce orange, red or crimson flowers. The numerous species of *Erythrina* in the Mexican flora that are adapted to pollination by resident and migratory orioles reflects a past and present abundance of oriole species in Mexico. Flocks of migratory Nearctic orioles, involving mostly Baltimore and Orchard Orioles, are important pollinators of many *Erythrina* species in their winter quarters in Central America. Orioles, like all icterids, usually obtain nectar while perched. Consequently, species of *Erythrina* specialized for oriole pollination produce flowers that can be easily reached by a perched bird; the flowers face towards the trunk and are sited on bare stout branches. Other plants visited by icterids produce red brush-shaped flowers, as illustrated by the showy vine *Combretum fruticosum*. Pollinators of this liana in western Mexico included five species of oriole, particularly the Streak-backed Oriole (*Icterus pustulatus*), and the Mexican Yellow-winged Cacique.

By contrast, in their quest for nectar orioles sometimes damage the flowers pollinated by other animals, thus complicating the reproduction of the plant. In the late dry season in central South America, trees of the genus *Tabebuia* produce masses of pink or yellow blossom, but the flowers are frequently subject to destruction by Variable Orioles, which perforate or slice the corollas with their bills. As these orioles do not form large flocks, the damage to the plant is relatively small.

Caciques and oropendolas regularly visit large flowers, particularly the creamy-white cup-shaped blooms of balsa trees (*Ochroma pyramidale*). In the Chapare province of Cochabamba, in central Bolivia, Crested and Amazonian Oropendolas and the yellow-billed race *alfredi* of the Russet-backed Oropendola, along with Yellow-rumped Caciques, visited flowering balsa trees in large mixed flocks during the early morning hours. Balsa trees are short-lived and found in second-growth vegetation, and they are now abundant in Chapare as a result of deforestation. Their flowers are nocturnal, lasting for less than one day, and are pollinated primarily by bats (Chiroptera). Oropendolas and caciques are able to obtain the nectar remaining at the bottom of the flower only during the early morning, after which the flowers wilt or fall.

Some *Erythrina* species in South America are possibly pollinated by the Crested Oropendola, an assiduous and non-destructive visitor. Recent studies have shown that this oropendola and the Red-rumped Cacique are important pollinators of the flowers of a species of *Mucuna*, a large genus of tropical lianas in the legume family (Fabaceae). In eastern Amazonia, Yellow-rumped Caciques are one of the avian pollinators of the bacuri (*Platonia insignis*), an important tropical fruit tree of the family Clusiaceae. The flowers of this tree are large and pinkish, with numerous stamens.

Flower nectar can be a secondary food source for icterids in other groups, but the role of these birds as pollinators is less well known. Outside the tropics, Austral Blackbirds are reported as



One Cacicus *species, the Golden-winged Cacique* (Cacicus chrysopterus), *has occasionally been noted as catching insect prey on the wing, and an individual of this species was described as "extremely vigorously engaged in catching termites (alates) [Isoptera] out of the air". But there are likely to be few opportunities for sallying within the foliage, where these large passerines do most of their foraging. More typically of the genus, the* **Scarlet-rumped Cacique** *probes into crevices, bromeliads, dead leaves and similar substrates in search of insects. Despite its substantial size and weight, this species is quite acrobatic and often hangs upside-down while foraging.*

[*Cacicus microrhynchus pacificus*, San Isidro Lodge and Reserve, Ecuador. Photo: Barry Miller/VIREO]



*The **Rusty Blackbird** often wades in shallow water to catch prey. It plunges its bill, and occasionally its whole head, into the water after insect larvae, crustaceans including crawfish (Astacoidea), molluscs and even the occasional fish. Rusty Blackbirds also probe in the mud at the water's edge. On drier land, they flip leaves with the bill in search of arthropods and small vertebrates. The Rusty Blackbird's dependence on wooded wetland and wet woodland habitats may explain why, while other North American blackbird species are expanding their ranges and numbers as a result of anthropogenic changes to the landscape, this species is in long-term decline.*

[*Euphagus carolinus*, New Jersey, USA. Photo: Scott Whittle]

taking nectar from the huge, stiff inflorescences of the bromeliad *Puya* in Chile. In Argentina, the nectar of introduced Australian trees such as *Eucalyptus globulus* and *Grevillea robusta* is consumed by Red-rumped Caciques, Greyish Baywings, Chopi and Chestnut-capped Blackbirds, and even Shiny and Screaming Cowbirds. Other parasitic cowbirds, such as the Giant and Bronzed Cowbirds, may visit flowers of *Erythrina* and those of the flame vine *Combretum fruticosum*.

Tree sap has been reported as an unusual food item for the Variable Oriole in the Argentinian Chaco. The oriole simply exploits the sap flowing from holes excavated by White-fronted Woodpeckers (*Melanerpes cactorum*) in three species of tree. This food item seems to be used only during the austral winter, when alternative food resources are scarce.

So far as is known, no icterid is entirely frugivorous, although fruits such as berries do figure in the diet of most species.



*More aquatic than other marsh blackbirds, the **Unicolored Blackbird** catches small fish and tadpoles near the water surface, often perching on floating vegetation such as water-cabbage* (Pistia). *It also picks prey from the undersides of floating leaves. As well as fish up to 3 cm long, beetles (Coleoptera) and dipteran flies, its stomach contents have included 50% seeds, such as those of aquatic grasses, and maize and other cereals from fields surrounding the marshes. Other regular fish-eaters in the family include Common* (Quiscalus quiscula) *and Boat-tailed Grackles* (Q. major), *which catch fish both by wading and by plunging from the air.*

[*Agelasticus cyanopus cyanopus*, Pantanal, Mato Grosso, Brazil. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]



The mass spawning of horseshoe crabs (Limulus) *provides an irresistible opportunity for the* ***Boat-tailed Grackle*** *to eat the eggs, and overturned and helpless adult crabs, too. Rusty Blackbirds* (Euphagus carolinus) *also have been seen to gorge on this briefly abundant food source. Other invertebrates taken by Boat-tailed Grackles include marine and aquatic molluscs, shrimps (Caridea) and crayfish (Astacoidea). These grackles prey on the eggs and chicks of many bird species. They readily eat carrion and are said to pick pieces of flesh from trapped muskrats* (Ondatra zibethicus).

[*Quiscalus major torreyi*, Delaware Bay, New Jersey, USA. Photo: Doug Wechsler/ VIREO]

Oropendolas are probably the most frugivorous members of the family, and the stomach contents of many individuals in this group have been found to consist solely of fruit pulp. In late August, Montezuma Oropendolas on the Caribbean coast of Costa Rica consumed fruits of at least six species of tree and palm, including cultivated plants such as pejibaye palms (*Bactris gasipaes*) and African akees (*Blighia sapida*). Similarly, the Golden-winged Cacique consumed fruits of at least five plants in a forest in the Brazilian state of São Paulo, and in Argentina this species feeds also on cactus fruits and those of spiny terrestrial bromeliads. Jamaican Orioles (*Icterus leucopteryx*) consume the fruits of at least seven native plants. At the northern end of the family's range, in the boreal forests of North America, Rusty Blackbirds consume berries of several species, such as American holly (*Ilex opaca*) and flowering dogwood (*Cornus florida*). At the opposite geographical extreme, in the southern beech (*Nothofagus*) forests, Austral Blackbirds frequently feed on berries of maqui (*Aristotelia chilensis*).

In Quintana Roo, in south-east Mexico, several tree species may germinate from faecal matter deposited by Montezuma Oropendolas. Overall, however, the role of frugivorous icterids as seed-dispersers remains almost unknown and requires extensive study.

The extreme sexual size dimorphism of such icterids as the Montezuma Oropendola suggests that the sexes may differ in the foods that they take and the foraging tactics used. Webster found that female oropendolas searched for hidden prey in aerial litter far more frequently than males. In the Costa Rican forests, such aerial litter in the form of dry curled leaves accumulated mostly at the tips of rather thin branches, a fact that precluded its use by the heavier males.

The little-known ***Southern Mountain Cacique*** *is thought to be mainly insectivorous, but also takes some fruit and nectar. Caciques have been seen to swallow fruit up to the size of small figs* (Ficus), *and thereby act as seed-dispersers, but they mandibulate and discard the seeds of larger figs. Two* Cacicus *species which occupy the same Atlantic Forest reserve in south-east Brazil were found to differ in their seasonal diets. The Red-rumped Cacique* (Cacicus haemorrhous) *and the Golden-winged Cacique* (C. chrysopterus) *both ate fruit and arthropods, but the Red-rumped switched largely to fruit in the wet season, while the Golden-winged remained primarily insectivorous all year.*

[*Cacicus chrysonotus*, Manu road, Cusco, Peru. Photo: Andy & Gill Swash/ WorldWildlifeImages.com]

Breeding

It is possible that no other passerine family in the Americas surpasses the Icteridae in the variety of its breeding and nesting habits. Parental investment ranges from the very minimum, as shown by the parasitic cowbirds, to the extremes demonstrated by the oropendolas, which spend weeks in weaving elaborate nests and, afterwards, months of nestling and post-fledging care.

The variability starts at the level of nest dispersion. Most orioles nest solitarily, but the Orange Oriole (*Icterus auratus*) of the Yucatán Peninsula often breeds in colonies of up to 35 nests. An intermediate stage, the dispersed colony or semi-colony, is presented by Bullock's and Orchard Orioles in North America, and possibly by related Neotropical species, too. The caciques are mostly solitary nesters, like the orioles, but colonies of Red-rumped and Yellow-rumped Caciques can contain more than 100





Wild fruits eaten by the ***Baltimore Oriole*** *include the berries of* Rubus, Prunus *and* Amelanchier *species on its breeding grounds, and* Bursera simaruba *arils and* Cecropia *"catkins" on the wintering grounds. Baltimore Orioles also take orchard crops such as grapes and cherries, and puncture the skins of large fruits such as oranges and banana to get at the pulp and juice. Although they cause some damage to commercial fruit crops, they also consume large numbers of pests, including* Malacosoma *tent caterpillars. The different techniques used by Baltimore Orioles and Yellow-backed Orioles* (Icterus chrysater) *to handle* Bursera simaruba *fruits were compared in Panama. Baltimore Orioles removed the pulp from the nutlet, which they usually dropped on the ground, whereas Yellow-backed Orioles left them on the tree. The two orioles were slow and inefficient compared with other icterids feeding on the same fruit, including an oropendola* (Psarocolius) *and a cacique* (Cacicus), *which both swallowed the fruits whole and had much shorter handling times and higher feeding rates. It was suggested that fruit is important for caciques and oropendolas, but that orioles' consumption of fruit is more opportunistic and that efficient handling of fruit is less important for them.*

[*Icterus galbula*, Texas, USA. Photo: Rolf Nussbaumer/ naturepl.com]



There are few detailed data on the diet of the ***Scrub Blackbird****. Along with insects and seeds, its stomach contents have contained fruit pulp, including cultivated mangoes* (Mangifera). *The Melodious Blackbird* (Dives dives), *with which the Scrub Blackbird was previously considered conspecific, is a frequent and assertive member of mixed groups at fruiting trees. Both species forage mainly on the ground and make much use of a technique known as "gaping", which is common among icterids. They push the closed bill into a substrate such as soil or bark, or between the scales of pine cones* (Pinus) *or leaves of bromeliads, then force the mandibles apart with the powerful jaw muscles to create a gap from which prey can be extracted.*

[*Dives warczewiczi warczewiczi*, Buenaventura, Ecuador. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]

nests, and both may breed in such thick clusters that some interweaving of neighbouring nests occurs. Solitary nesting is exceptional among oropendolas, but colony sizes and the degree of nest clumping vary among species. The largest oropendolas, such as the Montezuma Oropendola, often form discrete clusters of nests within the colony.

Quiscaline blackbirds range from being solitary nesters to forming some of the largest breeding aggregations reported for any passerine species. Tricolored Blackbird colonies of 100,000–300,000 nests were reported in California in the 1930s and 1940s, although nowadays the species is much less abundant. Most meadowlarks and allies nest solitarily or in semi-colonies, the largest aggregations having been reported for the Yellow-headed Blackbird, with several hundred nests.

Colonial icterids may not defend all-purpose territories, and they often obtain their food in undefended spaces away from the colony, while foraging in groups or flocks. Clumped nests easily attract predators, and the ideal colony sites would be appear to be those located in safer places such as tall isolated trees, small islands, or even swamps. Orioles, caciques and oropendolas not infrequently nest near aggressive insects, such as wasps (Vespidae) or ants, that deter climbing predators, or they share the nest tree with birds, such as some jays or tyrant-flycatchers, that are aggressive to hawks and other avian predators. Sometimes humans play the role of nest guardians, as some caciques and oropendolas breed near buildings or within towns.

Caciques and oropendolas will also nest in mixed colonies, with nests of two or more species in the same tree or in neighbouring trees. Mixed colonies of Red-rumped and Yellow-rumped Caciques occur in parts of northern Amazonia, and were studied by Feekes in Suriname. Similarly, oropendolas, particularly the Crested, Green and Amazonian Oropendolas, have been reported as nesting in mixed colonies. Some races of the Russet-backed Oropendola form mixed colonies with Crested Oropendolas and/ or Yellow-rumped Caciques. On the other hand, some Russet-backed populations, such as the nominate race in lowland Amazonian Peru and *alfredi* in central Bolivia, are reported to be aggressive, even predatorial, towards Yellow-rumped Caciques and other breeding oropendolas, and therefore nest more commonly in separate, single-species colonies.

The benefits and disadvantages of mixed colonial nesting are not well understood, and warrant more study, ideally by comparing reproductive success for each species in single-species colonies with that in mixed colonies. A scarcity of large isolated trees, including trees with aggressive wasps or growing in unusual safe sites, is probably the main reason for mixed colonial nesting. Once the mixed colony is founded, the different species may help each other in producing alarm calls, or in detecting nest predators. Caciques and oropendolas, however, are seldom as aggressive in mobbing or deterring predators as some tyrant-flycatchers. Disadvantages of mixed colonies include increased food competition in the neighbourhood of the nesting trees and, probably, an increase in the stealing of nest materials by females of the different species. These two factors should affect the smaller species, the caciques, more strongly. Perhaps small mixed colonies are beneficial in pristine areas, where oropendolas and caciques are naturally scarce, but much less so in human-modified areas, where their numbers have increased.

A few orioles may nest together in the same tree, particularly in southern Mexico and Central America when using acacia (*Acacia*) species that harbour aggressive ants. Solitary orioles of two species sometimes nest within the colonies of Orange Orioles in Yucatán. Mixed colonies of marsh-nesting North American icterids are reported. Red-winged and Yellow-headed Blackbirds, however, interact negatively when breeding, the large Yellow-headed aggressively displacing the smaller Red-winged Blackbirds from the deeper nesting marshes. Boat-tailed and Great-tailed Grackles will form mixed colonies in the small area where their ranges overlap in North America. In South America, Saffron-cowled and White-browed Blackbirds can sometimes be found nesting together in semi-colonies in patches of grassland.

Icterid mating systems cover all the possibilities from monogamy to polygamy, including promiscuity. Monogamy is probably the commonest system in the family, being typical for the majority of orioles, and also for several quiscalines, particularly



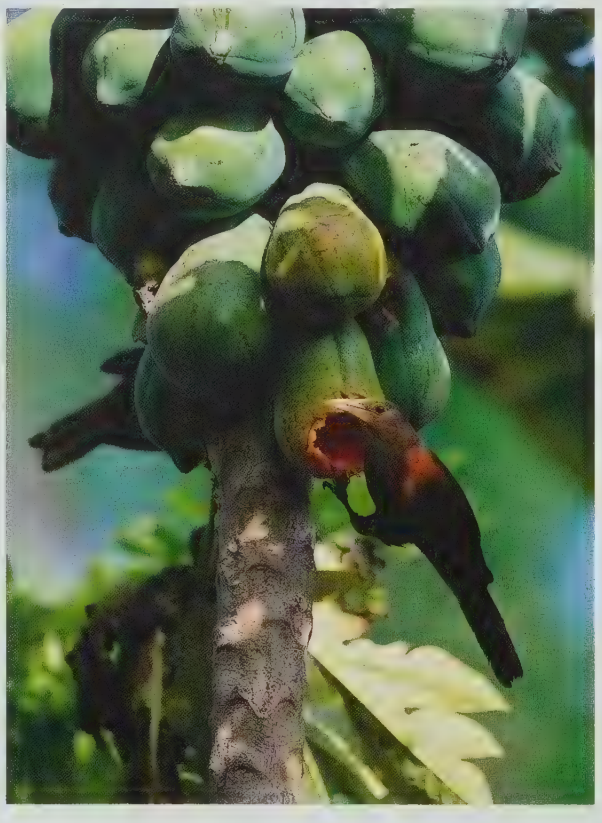
A number of Icterus *species include cactus fruits in the diet, but their visits to these fruits are usually brief. Apart from the nutrient content, which is relatively low for its bulk, the juicy pulp may be an important source of water in arid environments. The* ***Black-vented Oriole*** *opens up the fruits by pecking through the skin, then swallows the pulp, leaving or discarding the seeds. In Guatemala, an Altamira Oriole* (Icterus gularis) *was seen to pluck and toss away several areoles (the clusters of spines emerging from bumps on the skin of the fruit) before eating the pulp, and two Streak-backed Orioles* (I. pustulatus) *were seen to eat simultaneously from the same cactus fruit.*

[*Icterus wagleri wagleri*, Jaumave desert, NE Mexico. Photo: Claudio Contreras/ naturepl.com]

in the Neotropics, and for the solitary-nesting caciques. Polyandry seems to be rare, but it may exist among species indulging in co-operative breeding. Polygyny is widespread within the family, but only the oropendola genus *Psarocolius* is fully polygynous. A limited form of polygyny is practised by the non-territorial Brewer's Blackbird, whereby a minority of males may each consort with two or three females nesting within a breeding colony. The simplest type of polygyny is successive, or serial, polygyny, in which males have several short-term monogamous bonds during a breeding season. In this system a male consorts with a female only during the nest-building and egg-laying periods, deserting the fertilized female and its nest when incubation starts and copulations are no longer needed. Successive polygyny is recorded for colonially nesting Yellow-rumped and Red-rumped Caciques, several oropendola species, the Nearctic and Neotropical quiscalines, and polygynous meadowlarks, including the Bobolink. In harem polygyny, the male defends a space or territory in which several females are nesting simultaneously. This system is practised by such species as the Montezuma Oropendola and the Boat-tailed and Great-tailed Grackles, and by many populations of the Red-winged Blackbird. Males of this last icterid have harems containing two to 33 females. Detailed studies with colour-marked individuals have shown that males of some oropendolas and grackles may switch from successive polygyny to harem polygyny, depending on the temporal availability of unmated females.

Promiscuity occurs when the sexes meet only during copulation, no pair-bond being formed. It has been reported for Brown-headed and Shiny Cowbirds, but cowbird mating systems are variable, even within species. The cowbirds include a rather strict monogamist in the form of the Screaming Cowbird. Extra-pair copulations, a hidden form of promiscuity, were first reported for Red-winged Blackbirds. Males of this species nesting in large colonies practise a visible haṛem polygyny, but the harem females are unfaithful and copulate with neighbouring males, or with outside males of lower social status. This fact was discovered when the high-ranking harem masters were sterilized as a form of population control, but fertile eggs were still produced in the colony. Extra-pair copulations occur among other colonial-nesting icterids, such as Montezuma Oropendolas and Boat-tailed and Great-tailed Grackles, but the best tool for its detection, genetic fingerprinting of eggs and chicks, has been carried out on only a limited number of species.

Many male icterids, in several genera, have a perched courtship display in which the head is lowered, the body feathers raised, and the wings and tail opened and spread. Because a song is simultaneously produced, this display is often named the "Song Spread", but such names as "Ruff-out" or "Bow" are also used. It is performed by many quiscalines and caciques and, in particularly exaggerated form, by the larger oropendolas, but the dis-



Oropendolas (Psarocolius) *are probably the most frugivorous members of the Icteridae, and the stomach contents of many individuals in this genus have been found to contain nothing but fruit pulp. In Chapare, in Bolivia, the race* alfredi *of the* ***Russet-backed Oropendola*** *feeds on many cultivated fruits, from oranges to papayas* (Carica). *The birds break through the papaya's skin by thrusting in their bill and gaping, then eat the pulp until only a bell-shaped fragment of the empty skin is left.*

[*Psarocolius angustifrons alfredi*, Madidi National Park, Bolivia. Photo: Luiz Claudio Marigo]



Nectar from the flowers of trees of the genus Erythrina *is an important food source for many icterids, including the* ***Crested Oropendola****. Despite its large bill, the Crested Oropendola manages to remove the nectar without damaging the flowers, and this species may be an important pollinator, perhaps even the primary pollinator, of some species of* Erythrina. *In a dry forest in western Brazil, the Crested Oropendola was the second most regular visitor to the flowers of* Erythrina dominguezii, *after the Yellow-chevroned Parakeet* (Brotogeris chiriri), *which destroyed the flowers while consuming the nectar.*

[*Psarocolius decumanus decumanus*, San José de Chiquitos, Santa Cruz, Bolivia. Photo: Daniel Alarcón]

play appears to be given only very rarely by some other species, such as the Greyish Baywing.

Parental duties of both sexes follow rather simple rules in this family. With the vast majority of icterid species, it is the female alone that builds the nest. Males of some monogamous species may help in the task of nest-building, and in the case of a few species, the Melodious Blackbird being one example, the sexes may do more or less equal shares of the work. Nest-building mostly by males is a characteristic of two closely related South American blackbirds that nest in marshes, the Chestnut-capped and Yellow-hooded Blackbirds. Males of both species build several nests that may be accepted and completed by different females. Lastly, parasitic cowbirds, as they lay in the nests of other birds, do not, of course, build nests of their own.

Icterids are one of very few passerine families that construct pensile nests, the best-known family being the weavers (Ploceidae) of Asia and Africa. Nest-weaving is a complex process, involving a careful selection of fibrous materials, a series of movements for interlacing the material into a resistant fabric, and the firm attachment of the structure to a branch or leaf. Detailed studies by V. H. Schaefer revealed that weaving skills are affected by experience, but weaving behaviour probably involves a strong genetic component. Woven pensile nests are found only in two icterid clades, the orioles being one and the caciques and oropendolas the other, which might (or might not) reflect common ancestry.

The nests of orioles are far more heterogeneous than those of caciques and oropendolas. Some oriole species, such as Scott's Oriole, may build semi-pensile nests, attached to lateral branches or other vegetation. The structures woven by most tropical and subtropical small orioles in the "*Bananivorus* or *Pendulinus* group" (see Systematics) are shallow bags stitched to the underside of palm leaves. Only some of the larger orioles construct elongated pendent nests that closely resemble those of caciques and oropendolas.

Within the orioles, the three troupials show a clear trend towards the abandoning of nest-building. As shown by C. A. Lindell and C. Bosque in their study in Venezuela, different troupial populations display a remarkable gradation in nesting habits, from conventional nest-building to almost obligate nest piracy. Only in the coastal race of the Venezuelan Troupial does nest-building co-exist with the use of other birds' nests. The two other troupial species seem have lost the habit of nest-building entirely, and usually usurp the covered nests built by furnariids and by other icterids such as caciques. The many types of nest built by the orioles would suggest that the weaving of pensile nests has actually evolved independently in the oriole clade and the cacique–oropendola clade.

All known nests of caciques and oropendolas have been pendent elongate bags, almost invariably placed in trees. The Dusky-green Oropendola (*Psarocolius atrovirens*) is the exception, as it often suspends its nests from cliffs in the Andes, a habit first described by G. Niethammer, in 1956. The nests of true oropendolas, those in the genus *Psarocolius*, are relatively uniform in shape and materials, but those of *Cacicus* caciques vary in size, shape and materials, probably reflecting the polyphyly of this group. The Golden-winged, Ecuadorian and Selva Caciques weave nests mostly with dark fibres of the fungus *Marasmius*, a habit that seems to reflect the close phylogenetic relatedness among them (see Systematics).

Nests of most quiscaline blackbirds are open cups built with interlaced plant material, often reinforced with an inner coating of mud. A few nests of the little-known Velvet-fronted Grackle are unusual in each being a deep pouch suspended over water, but the available information is preliminary and incomplete. The habit of nesting in tree holes, rare among icterids, has been reported for Common Grackles in North America. Hole-nesting is more frequent among Yellow-shouldered Blackbirds (*Agelaius xanthomus*) in Puerto Rico, and in South America among the baywings and the Chopi Blackbird. The last-mentioned species also occupies covered nests build by other birds, again mostly furnariids. Two icterid populations nest in holes in cliffs. One is a population of Yellow-shouldered Blackbirds breeding in the sea cliffs of Mona Island, in the Caribbean between Hispaniola and Puerto Rico, and the other is the Bolivian Blackbird, found only in dry Andean valleys.

Meadowlarks build a cup-shaped nest of grass and stems on the ground, where the structure is hidden by dense vegetation. The nests may be further covered by a dome of looser plant material. Bobolink nests follow this pattern. The marsh-nesting Yellow-headed Blackbird, however, builds a neat cup-shaped nest over deep water, in aquatic plants or in nearby willows (*Salix*).

Icterid eggs exhibit considerable variation in size, shape and colour. As with other passerine families, there is a positive correlation between egg size and the size of the laying female. The eggshells of the parasitic cowbirds are particularly thick. Although the eggs of some species are unmarked white or bluish-white, most icterid eggs are spotted and blotched in shades of brown, purplish-brown and blackish. Irregular curved blackish lines, described as "curls" or "scrawls", are typical of many icterid eggs.

Clutch size ranges from one to six eggs, occasionally more. Single-egg clutches are generally rare, but are reported fairly often for the Dusky-green Oropendola of the Bolivian and Peruvian highlands. Clutches of two eggs are produced mostly by colonial-nesting caciques and oropendolas, species found in the tropics and subtropics. A. Cunningham and S. Lewis reported that, although Montezuma Oropendolas commonly lay two eggs, they usually raise only one chick, and this has been recorded for other species, as well.

Incubation is undertaken by the female alone, and she is sometimes fed on or near the nest by her mate. Males of the Rusty Blackbird and the two marshbirds, for example, commonly feed the sitting female, and Brewer's and Saffron-cowled Blackbirds do so at least occasionally. The incubation period for most members of the family is in the range 11–15 days, frequently 12–14 days. In the case of the larger caciques and oropendolas, however, it is longer, lasting for 17–19 days, while the female Russet-backed Oropendola incubates for 19–20 days. With most icterid species, the nestlings are fed by both parents. Exceptions to this general rule include the polygynous oropendolas, in which the females take on the responsibility of chick-feeding, as well as the tasks of nest-building and incubation of the eggs. Similarly, the nestlings of the Boat-tailed Grackle, the Red-winged, Yellow-hooded and Chestnut-capped Blackbirds and the meadowlarks are provisioned mostly or exclusively by the female parent. Among co-operative breeders such as the Red-bellied Grackle and Chopi Blackbird, the parents are usually assisted by helpers in the feeding of the nestlings. The chicks of most icterids remain in the nest for a period ranging from about 10 days to 14 days, varying with species, but the young of some, such as the Bobolink, leave the nest after only nine days. In contrast, others, such as the Chopi Blackbird, depart when 16–18 days old. The nestling period of some *Quiscalus* grackles and the Venezuelan Troupial is significantly longer, lasting for up to at least 23 days, and that of some caciques is up to 28 days, while some young Russet-backed Oropendolas do not leave the nest until 32 days of age, some Crested Oropendolas only at 34 days, and chicks of Chestnut-headed and Montezuma Oropendolas not until 35 days.

Within the Icteridae, six species of cowbird are obligate brood parasites. Parental care by the female parasite is reduced to the forming of the eggs, followed by the finding of nests of appropriate hosts and depositing the eggs in these. Cowbird eggs are incubated, and the chicks reared, only by the host. Parental care by male cowbirds may be non-existent, or may consist only of helping the female, either by finding nests or by distracting or attacking host individuals. This last type of behaviour has been reported mostly for Giant Cowbirds.

It is possible that cowbird parasitism was known to the original native American peoples. People living in rural areas today are aware of its existence, and some popular Spanish and Portuguese names for the Shiny Cowbird make reference to the species' parasitic lifestyle. Nevertheless, cowbird parasitism was first described by the Spanish naturalist F. de Azara in his famous book on the birds of Paraguay and Río de la Plata, published during 1802–1805. Apparently, most of Azara's information on cowbirds was obtained by his friend and informant Father Pedro Noseda, priest at the mission of San Ygnacio Guazú, in Paraguay. Research on cowbird brood parasitism has increased enormously since then, but it is on the Shiny and Brown-headed Cowbirds that most data have accumulated.

Specialization in cowbird parasitism is usually measured in terms of the number of host species in whose nests cowbird eggs have been reported. The most specialized is the Screaming Cowbird, with only three known regular hosts, all them icterids of the South American quiscaline group. This species' main host in most of Argentina and Uruguay is the Greyish Baywing, but the Chopi Blackbird is possibly more important in Paraguay and Brazil; less significant is the Brown-and-yellow Marshbird. The Giant Cowbird is known to parasitize seven species of icterid, all colonial-nesting caciques and oropendolas. In addition, it has been recorded parasitizing two jay species, but the evidence is complete only for the Green Jay (*Cyanocorax yncas*), and two records of Giant Cowbird parasitism on large orioles in Nicaragua likewise require further evidence. The number of known hosts for the Giant Cowbird could thus increase to eleven species. The two more specialized cowbirds seem not to be so numerous as the generalist species, but Screaming Cowbirds are relatively common in central Argentina and are currently expanding their range in Brazil.

The Bronzed Cowbird is less specialized, and its eggs have been found in the nests of more than 80 species of passerine birds of several families, including Icteridae. The breeding biology of the closely related Bronze-brown Cowbird, however, is almost unknown. Both Shiny and Brown-headed Cowbirds are extreme generalists, with 200 or more species of known hosts. Of course, the hosts of generalized cowbirds include members of numerous bird families, but non-passerines are seldom reported as victims. Important host families for Brown-headed Cowbirds include tyrant-flycatchers, vireos (Vireonidae), New World warblers and New World sparrows. In South America, Shiny Cowbirds lay in the nests of furnariids, tyrant-flycatchers, mockingbirds (Mimidae), thrushes (Turdidae), icterids and New World sparrows. Acquisition of new host species has been well documented for the Brown-headed and Shiny Cowbirds, as both species have colonized new areas in historical time.

The DNA phylogeny indicates that parasitic cowbirds are a monophyletic group (see Systematics), and therefore brood parasitism evolved only once in the Icteridae. Several ideas have been advanced with regard to how cowbirds became parasites. The parasitic cowbirds are inserted within the North American quiscaline clade, even if the molecular data suggest that the Screaming Cowbird, a South American species, is possibly the



*Where the **Western Meadowlark** and the Eastern Meadowlark* (Sturnella magna) *overlap in range, the Western prefers drier habitats. But it still needs to drink, making use of ephemeral puddles and tanks supplied for livestock (where it occasionally drowns). Lilian's Meadowlark* (S. lilianae) *lives in even more arid environments and was for long regarded as a desert-adapted form of Eastern Meadowlark. No icterids are found in extreme deserts, such as the Atacama or the high-altitude* punas *of the central Andes. Even the Scrub Blackbird* (Dives warczewiczi), *which lives along the almost rainless coast of Peru, is found mostly at oases or watercourses, or around irrigated farmland. In semi-arid regions, icterids such as orioles obtain much of the water which they require from their food, including fruit and nectar.*

[*Sturnella neglecta*, Texas, USA. Photo: Rolf Nussbaumer/ naturepl.com]



Many male icterids perform the perched display known as the "Song Spread", shown here by the ***Greater Antillean Grackle****. The Common Grackle* (Quiscalus quiscula) *performs this display at greatest intensity early in the season, while pair-bonds are still being formed. Male grackles also direct the Song Spread at other males. In the Common and Carib Grackles* (Q. lugubris), *females, too, perform the display, though never with the same intensity. Various elements of the display, such as the depth of the bow and whether the plumage is raised or sleeked, differ among species and genera.*

[*Quiscalus niger brachypterus*, Cabo Rojo, Puerto Rico. Photo: Eladio M. Fernández]

oldest extant species of parasitic cowbird. The fossil record does not contradict the notion that parasitic cowbirds first evolved in North America, as several species of extinct cowbird-like icterid are known from the Upper Pleistocene of the USA (see Systematics). Speculation on the origin and evolution of brood parasitism by cowbirds can be tested with the new DNA phylogeny.

One set of hypotheses assumed that the Greyish Baywing was the ancestor of the parasitic cowbirds, and that parasitic cowbirds first evolved in South America. This hypothesis was first advanced by W. H. Hudson, in 1920. Hudson selected the Greyish Baywing as the ancestor for two main reasons: it often breeds in other birds' nests, and it looks quite cowbird-like in its external morphology. He suggested that a progressive decay of the parental instincts occurred in this lineage, starting with the loss of nest-building behaviour. He also discovered that Screaming Cowbirds were parasitic on Greyish Baywings and that chicks of the two species were remarkably similar in plumage and voice. Hudson reasoned that the chick resemblance was a shared ancestral character, and therefore a proof of the common origin of the two species. The alternative idea, that chick resemblance between host and parasite was due to mimicry, was rejected on the grounds that chicks of most brood parasites do not resemble host chicks and yet receive parental care from their foster parents.

H. Friedmann, in 1929, expanded Hudson's ideas and placed them in an evolutionary frame. He presented a cowbird phylogeny in which the Greyish Baywing occupied the ancestral position, giving origin to the Screaming Cowbird, the first parasitic cowbird. A behavioural imbalance between nest-building and egg-laying instincts, even if mediated by hormone imbalance, would have occurred during the evolution of parasitic habits in this lineage. Friedmann's views became textbook classics, and few authors since then have questioned their importance.

More recently, in 1996, A. F. Skutch elaborated a hypothesis also based on Hudson's and Friedmann's views. For Skutch, however, the main factor responsible for the evolution of brood parasitism was intense competition between closely related icterids for the use of closed nests or nesting cavities. The competitors would be the Greyish Baywings and the ancestral Screaming Cowbirds. The less aggressive species, in his view the Screaming Cowbird, evolved parasitism on the most successful competitor, the Greyish Baywing.

The traditional view of baywings as ancestors of the parasitic cowbirds collapsed when Lanyon, in 1992, showed that baywings were not closely related to the Screaming Cowbird, or to any other parasitic cowbird. Mitochondrial DNA indicated that baywings are members of the South American quiscaline icterids, whereas *Molothrus* belongs with the North American quiscalines. The close resemblance, in plumage and voice, between baywing chicks and Screaming Cowbird chicks turned out to be a remarkable case of mimicry.

If cowbirds are of Nearctic origin, an old hypothesis on the origin of cowbird parasitism, posited by O. Widmann in 1907, becomes worthy of reconsideration. Widmann's hypothesis was based on the foraging dependence of all extant parasitic cowbirds on grazing mammals. It is widely believed that in pre-European times Brown-headed Cowbirds followed the large nomadic herds of grazing American bison (*Bos bison*) on the North American prairies, seizing insects disturbed by the mammals, and this they still do in some bison reserves. Cowbird dependence on such a mobile and erratic source of food could have precluded or impeded normal nesting at a fixed site. Recent studies of Brown-headed Cowbirds in a bison reserve found that radio-tracked females commuted an average daily distance of seven kilometres from their breeding grounds to the bison herds. This daily movement probably had an adverse effect on egg formation and egg deposition by the cowbird females. Ancestral cowbirds may have evolved parasitism in order to circumvent this constraint. As intermediate strategies between parasitic and non-parasitic breeding do not occur among living icterids, most ideas on the origin of parasitism will perhaps remain untested.

Adaptations of cowbirds to parasitic breeding are not very many. Female cowbirds have been called "passerine chickens", because they produce far more eggs per season than "normal-breeding" icterids. Cowbird eggs are variable, but, unlike those of parasitic cuckoos (Cuculidae), they seldom match the eggs of particular hosts. Moreover, chicks of the generalist cowbirds do not resemble host chicks in appearance or behaviour. Screaming Cowbird chicks mimic those of the species' main host, the Grey-

ish Baywing, but chicks of Screaming Cowbirds parasitizing other hosts do not mimic the latter's chicks. The Giant Cowbird chick is unique in having a well-developed pale frontal casque that perhaps mimics that of its oropendola nestmates.

An important report by N. G. Smith, published in 1968, presented information suggesting a mutualistic interaction between Giant Cowbirds and their hosts the Yellow-rumped Cacique and the Chestnut-headed Oropendola in Panama. The host nests were sometimes subject to severe infestation by ectoparasitic flies of the genus *Philornis*, which caused host-chick mortality. When Giant Cowbird chicks were present, however, they were able to remove the fly larvae from both themselves and their nestmates. In such cases, the cowbird chicks were beneficial to their hosts. Giant Cowbird adults, and their eggs and chicks, were accepted in *Philornis*-infested colonies, but not in others. Presence or absence of these flies in a colony was somehow related to the presence or absence of some wasp nests in the colony. Although details of this possible mutualism were correct, such as the chick mortality caused by the flies, the information was not confirmed elsewhere. Studies in Peru and Costa Rica revealed other host species to be invariably aggressive towards Giant Cowbirds. In Misiones, in north-east Argentina, Giant Cowbird chicks can be severely infested by botflies.

Cowbird parasitism is almost invariably detrimental to the hosts. Cowbirds, while laying their own eggs, typically remove those of the host or puncture them with their sharp bill. Cowbird eggs have short incubation times, only 10–12 days, and commonly hatch before the surviving host eggs do. Because of this earlier start, cowbird chicks can easily outcompete host chicks and cause them to starve, although this is not always the case with chicks of very large hosts.

As would be expected, many cowbird hosts have evolved defences to combat parasitism. These include aggression against cowbirds approaching the nest, and, more remarkably, the ability to remove cowbird eggs from the nest. Species that remove cowbird eggs were termed "rejecters" by S. Rothstein, who performed many elegant experiments on the subject; "accepter species" are those that incubate the cowbird's eggs. Among North American birds, the rejecters usually have a long bill and are able to carry the cowbird eggs away from their nests. Successful rejecter species are now seldom molested by cowbirds. Accepter species may survive simply through their sheer numbers and extensive distributions, as illustrated by the Rufous-collared Sparrow (*Zonotrichia capensis*). For accepter species that face conservation problems, however, cowbird parasitism can be an additional cause of population decline. In the USA, Brown-headed Cowbird populations are subject to local control (see Status and Conservation) in order to protect the most sensitive species, such as Kirtland's Warbler (*Dendroica kirtlandii*).

Co-operative breeding could be seen as the reverse of brood parasitism, as it involves the participation of individuals other than a mated pair in the feeding and care of the young. These additional individuals, commonly known as "helpers", may take part also in other parental duties, such as nest-building, feeding of the incubating female, incubation of the eggs, nest-guarding, and the mobbing of potential predators. Co-operative breeding by icterids was first recorded for Greyish Baywings, by R. Fraga in 1972, and has been reported so far for 16 species in nine genera of South American quiscalines, all belonging to the same lineage. Recent information, unfortunately incomplete, suggests that the Selva and Ecuadorian Caciques may have helpers at the nest. Two nests of the former species in Amazonian Peru were attended by unmarked trios of unknown sex, which visited nests from the start of the nest-building stage. Although, in both cases, nest-building was performed by possibly one member of the trio, the other individuals entered or inspected the nest. The trios co-operated in attacking other birds, mostly other caciques and oropendolas, around the nest-site. In the case of the Ecuadorian Cacique, during a shorter period of observation, several individuals were seen around one active nest.

The available data confirm the suspicions of Orians that co-operative breeding is particularly frequent among South Ameri-



The Song Spread display is exhibited in its most exaggerated form by the oropendolas. This ***Russet-backed Oropendola*** *is giving the display at highest intensity. These birds may also barely raise the wings, or raise them without spreading them, with little more than a cursory bob. The song given during the displays is both shorter, at 0·7–1·7 seconds, and simpler than that of most of its congeners, but it is individually and regionally variable. In the Montezuma Oropendola* (Psarocolius montezuma), *the male falls forward and hangs momentarily from the perch with tail raised and wings spread, giving a brief, incongruously squeaky call.*

[*Psarocolius angustifrons alfredi*, Amboró National Park, Santa Cruz, Bolivia. Photo: Daniel Alarcón]







*The **Yellow-headed Blackbird** nests in reedy marshes in semi-colonies of grouped male territories. Each male defends a territory of 100–600 m², to which the more successful attract a number of females (up to eight have been recorded). The male arrives on the breeding grounds first and, when the female appears, he greets her with a version of the Song Spread display, which is used also in agonistic encounters with other males. This display as performed by this species is said to be asymmetrical, with the right wing held out to a greater extent, and the head and neck turned to the left, so that the bird sings over its left shoulder (lower left photo). The wings are held at their highest at the climax of the song. Other courtship displays include ritualized nest-building movements by the male. During this period the male may chase the female aggressively, pecking and seizing hold of her. The males play no part in the building of the nest itself, but do share in the work of feeding the young. Males of this blackbird expel the smaller Red-winged Blackbird* (Agelaius phoeniceus) *from prime nesting sites in the deep-water marshes.*

[*Xanthocephalus xanthocephalus*, Mono Lake basin, California, USA. Photos: Marie Read]



*The **Giant Cowbird** is a known brood parasite of two colonial species of cacique, the Red-rumped* (Cacicus haemorrhous) *and Yellow-rumped Caciques* (C. cela)*, and at least five species of oropendola* (Psarocolius). *This female Giant Cowbird was inspecting the nest of a Red-rumped Cacique in late afternoon, only to find the owner in residence. Male Giant Cowbirds are reported as sometimes attacking or distracting potential host birds. The Giant Cowbird chick is unique in having a well-developed pale frontal casque that perhaps mimics that of its oropendola nestmates.*

[*Molothrus oryzivorus oryzivorus*, Iguazú National Park, Misiones, Argentina. Photos: José Calo]

can icterids. No members of the North American quiscaline clade are known to breed co-operatively. Among North American icterids, helping behaviour has been reported mostly for the Bobolink: extra males have been found to feed the chicks in a few nests of this species.

Co-operative breeders in avian families that are better studied than Icteridae have several things in common, notably delayed breeding by both sexes, permanent presence of juveniles in the parental group or territory, and tolerance of extra individuals by the breeding pair, at least during the nestling period. As with social insects, kinship between group-members and chicks is frequent among co-operative breeding birds, allowing for the operation of kin selection. For elucidating the finer details of co-operative breeding, long-term studies of individually marked birds are needed. Nevertheless, Greyish Baywings have delayed breeding, as males ringed as chicks remain in the group but do not breed in their first two years of life. Further, individuals marked as chicks were often seen to help at the nests of their male or female parent. Future



The genus Icterus *includes species which weave some of the most elaborate of all avian nests, with the exception of the weavers (Ploceidae) of Asia and Africa. The nests of the **Altamira Oriole** and of some other large orioles are tightly woven, elongated pouches, closely resembling the nests of caciques and oropendolas. Between the two extremes are smaller tropical and subtropical species such as the Black-vented Oriole* (Icterus wagleri)*, which builds a shallow, hammock-shaped nest, slung from a branch or stitched to the underside of a palm or banana leaf.*

[*Icterus gularis mentalis*, Bentsen State Park, Texas, USA. Photo: Rob Curtis/ The Early Birder]



*While the female **Red-rumped Cacique** builds the nest, the male perches near her, displaying and singing. Dominant male Red-rumped Caciques are successively polygynous, and the pair-bond ends with the start of incubation. The female of the nominate race takes 5–11 days to build the pensile nest, which is 34–45 cm long, whereas that of the race* affinis *(shown here) is up to 65 cm long and the work takes an average of 18 days. Nest-weaving is a complex process, starting with the firm attachment to a branch or leaf, and continuing with the selection of suitable materials and the intricate movements required to interlace them into a fabric.*

[*Cacicus haemorrhous affinis*, Iguazú National Park, Misiones, Argentina. Photo: José Calo]

studies of co-operatively breeding icterids may reveal the characteristic variability of this family in patterns of social structure and in the parental and extra-parental roles of both sexes.

Movements

Most members of this family are resident, but some undertake migrations of one kind or another. The champion of icterid migrations is the Bobolink. Every year, populations of this species travel thousands of kilometres from breeding grounds in northern North America southwards to non-breeding quarters in central South America; just a few winter in Florida, in the south-east USA. During the course of a year, the Bobolink's northernmost locality is around 52° N in Saskatchewan, in Canada, and its southernmost is at 36°18' S at Punta Rasa, in north-east Buenos Aires, in Argentina. The southbound migratory flocks move mostly through Cuba, the Bahamas and Jamaica. Most Bobolinks



*Using grass stems and other fine vegetable fibres, the **Altamira Oriole** weaves an elongated pensile nest 35–65 cm long, the biggest nest of any oriole species. The nest of this resident of the tropics takes up to 26 days to build, in contrast to the smaller pouch built by the migratory, temperate-breeding Baltimore Oriole* (Icterus galbula), *which takes 5–6 days. The adult Altamira Orioles land at the top of the nest, where the entrance is, and must then crawl head downwards to reach the bottom. It has been suggested that the extreme length of the nest is a defence against predators and brood parasites.*

[*Icterus gularis mentalis*, Bentsen State Park, Texas, USA. Photo: Andy & Gill Swash/ WorldWildlifeImages.com]



*DNA analysis shows that the **Solitary Cacique** is related to the* Psarocolius *oropendolas, rather than to the* Cacicus *caciques. Unlike the polygynous oropendolas, however, the Solitary Cacique is monogamous, and family-members may remain together as a group for some months after the young have fledged. The partners defend the territory and the nest together. In territorial conflicts between pairs, all the individuals may vocalize for 30 minutes or more. The female alone builds the nest, a purse-shaped structure open at the top and wider at the bottom, which can be up to 120 cm long. Old nests in the same tree may indicate that good sites, including those over water, are reused.*

[*Procacicus solitarius*, Pre-Delta National Park, Entre Ríos, Argentina. Photo: Julián M. Alonso]

cross the Caribbean from Jamaica to the Colombian or Venezuelan coasts, a distance of about 700 km, making this the largest sea crossing regularly taken by any icterid. This species' migration is mostly nocturnal, and the night-flying birds keep contact with one another by means of repeated calls. Occasional stragglers have been recorded in the Galapagos Islands and in western Europe, the latter mainly in September–October in Britain and Ireland.

In tandem with their seasonal shift in latitude, from northern temperate regions to warm temperate and subtropical climates Bobolinks correspondingly change their preferred habitat from wet meadows, when nesting, to marshes, savannas, rice fields and flooded grasslands. In 1906, the naturalist S. Venturi reported migrating flocks containing more than 5000 individuals spread over 3 hectares of marsh in the Argentinian Chaco. Nowadays, Bobolinks are less abundant, although flocks of several thousand are still reported.

Another migratory icterid with non-overlapping breeding and wintering ranges is the Rusty Blackbird. This blackbird breeds mostly in Alaska and Canada, and spends the winter months mostly in the eastern USA from New England and the Great Lakes south to Florida and the Gulf Coast. A few individuals reach northern Mexico. It is one of the few icterids reported outside the Americas, with stragglers observed in Greenland and the Russian Far East. Migrating Rusty Blackbirds have landed on ships 200–400 km off the New England coast. This species, unlike the Bobolink, migrates by day. The Rusty Blackbird's sole congener, Brewer's Blackbird, is migratory in the northern and eastern parts of its breeding range, from where it moves southward to as far as central Mexico.

North American orioles of deciduous woodland, namely the Baltimore, Bullocks's and Orchard Orioles, are highly migratory, vacating their breeding ranges entirely, or almost so, after nesting. Recent research has shown that some Hooded Orioles (*Icterus cucullatus*) and Orchard Orioles that breed in temperate North America apparently move to subtropical west Mexico and breed for a second time, before migrating farther south. Baltimore and Orchard Orioles migrate mostly to Middle America south of Tehuantepec, but a not insignificant number regularly reach northern Colombia and north-west Venezuela. A few Baltimore Orioles winter in southern California, on the south-east coast of the USA, and in the Bahamas and the Greater Antilles, and the species has straggled north to Greenland and east to the British Isles, Norway and the Netherlands. Bullock's Oriole winters mostly in the area from central Mexico south to central Guatemala, a few individuals reaching the Pacific coast of Costa Rica. There are several records of this species from Alaska.

Yellow-headed Blackbirds undertake considerable migratory movements, withdrawing from most of their breeding range in central-west North America. The winter quarters extend from central California and Louisiana, in the USA, south to most of Mexico, rarely to Costa Rica and Panama, and exceptionally to the Bahamas and Cuba. Stragglers have been seen in Greenland. This icterid migrates by day, and males winter farther north than females.

Migration patterns of the Red-winged Blackbird have been studied through extensive ringing efforts. Maps by R. A. Dolbeer showing the movements of single individuals during the period 1924–1979 revealed not only north–south movements but also some east–west ones. The average distances covered were 600–1000 km, and females travelled 200–300 km farther than males. The blackbirds also shifted their successive wintering grounds in the southern USA by 50–150 km. If these shifts alter the return rates to the breeding grounds, then migration has an effect of mixing populations and lowering their genetic differences. Among the eastern populations of the USA and Canada, genetic differences are, in fact, rather small.

A well-known species with a similar distribution to that of the Red-winged Blackbird is the Brown-headed Cowbird. Northern and interior populations of the latter migrate southwards after the breeding season, some reaching as far south as southern Mexico. Individuals ringed in the north-east USA have been recovered up to 850 km to the south. This species has occurred as an accidental on many Caribbean islands, in Belize and, exceptionally, in several countries in western Europe, including Scotland, England, Wales and Norway. Like several other icterids, such as the Western Meadowlark, it also makes altitudinal movements in the Sierra Nevada and the Rocky Mountains of the western USA.

Northern populations of the Eastern and Western Meadowlarks are migratory, whereas their more southerly representatives are resident. Eastern Meadowlarks generally move only short distances, while some Western Meadowlarks may migrate longer distances, extending well south into central Mexico. The true status of the two species in Mexico, however, is somewhat uncertain, as the sight identification of wintering meadowlarks may not be reliable. Otherwise, the Western Meadowlark is a vagrant in Alaska, and has been recorded in Chukotka, in the Russian Far East. It also performs altitudinal movements in the highlands.

The scale of migration by icterids breeding within South America is modest, and involves only a few species in southern Chile and Argentina. Although there is only limited information from bird-ringing programmes, none of these species exhibits a seasonal withdrawal from most of its breeding range, suggesting that migration in these cases is partial. As a good example, the Yellow-winged Blackbird in Argentina is only a summer visitor from southern Mendoza south to Santa Cruz, and only a winter visitor in Paraguay and adjacent provinces of Argentina. In central Buenos Aires Province, Shiny Cowbirds disappear for a few





*The **Baltimore Oriole** is a solitary nester, with its nearest neighbour no closer than 45–60 m. The defended territory is a relatively small area around the nesting tree, and the foraging areas of neighbouring pairs commonly overlap. Yearling males and paired adult males may intrude into the territory in search of extra-pair copulations. The female flees from these attempts, giving loud calls, but may be driven to the ground and mounted. During her fertilizable period, her mate accompanies her constantly when she leaves the territory to forage or to gather nesting material, and chases her back if she strays too close to a neighbouring male. The nest, built mostly by the female, is woven from plant fibres such as grass and stems, although, in cities and gardens, artificial materials such as string and plastic may be used. It is lined with soft materials such as seed plumes or feathers. Adding a lining of this sort is often the only work done by troupials, which take over the nests of other birds. The **Orange-backed Troupial** frequently uses the nests of oropendolas or caciques, or, as here, of thornbirds* (Phacellodomus). *This Greater Thornbird* (Phacellodomus ruber) *nest was taken over by the Orange-backed Troupials but subsequently reoccupied by the thornbirds. Similarly, in the* llanos *of Venezuela, the Venezuelan Troupial* (Icterus icterus) *uses Rufous-fronted Thornbird* (P. rufifrons) *nests, which are multi-chambered, and the troupial may eventually co-exist with other birds, including the thornbirds, using the same structure. But Venezuelan Troupials sometimes destroy the eggs and small chicks of the occupiers, even of other troupial pairs.*

[Above: *Icterus galbula*, Wisconsin, USA. Photo: S. Nielsen/DRK.

Below: *Icterus croconotus strictifrons*, Mato Grosso, Brazil. Photo: Anita Studer]



*In two species of marsh-nesting blackbirds in South America, namely the **Chestnut-capped Blackbird** and the Yellow-hooded Blackbird* (Chrysomus icterocephalus), *the nests are built by the male. Each male builds a number of nests within his territory, using wet plant material such as grass and sedge that dries to a solid structure. If the female accepts the nest, she lines it with fine fibres. Although some males are monogamous, the mating system of these species is mainly sequential or harem polygyny, with 2–5 females in a harem. The male may remain with the female until incubation begins, but spends most of his time in singing and displaying.*

[*Chrysomus ruficapillus frontalis*,
Pedra Azul,
Espírito Santo, Brazil.
Photo: Edson Endrigo]

weeks in late February and March, at the end of the austral summer, but large flocks return by April and remain throughout the winter period. The pattern suggests the replacement of one population by another population, both of them migratory. A Shiny Cowbird ringed in winter in Córdoba Province was recovered 500 km to the south in spring, giving additional support to this idea.

In central Argentina, White-browed Blackbirds form wandering flocks that may shift northwards, but throughout the austral winter roosts of this species can be found in areas of bunch-grass in central Buenos Aires Province. Long-tailed Meadowlarks, which breed in the southern half of South America, occur in the austral winter as far south as the Falkland Islands and Tierra del Fuego, indicating that movements by this species are mostly local. The same pattern probably applies to the Pampas Meadowlark.

Partial migration in response to regular dry seasons is typical of the Scarlet-headed Blackbird, a very specialized marsh-dwelling icterid that finds its food mostly by gaping into the stems of green marsh plants (see Food and Feeding). Regular movements by this species are evident in the Chaco region. During the dry season, the austral winter, only a few remain in the best spots of the dusty and desiccated wetlands of the western Chaco. It is very likely that this and other marsh icterids make irregular movements in response to unusual and severe droughts. During a severe La Niña episode in the autumn of 1997, and again in the dry spring of 2008, just a few Scarlet-headed Blackbirds remained in one of the species' strongholds, the Paraná River delta, in Argentina. During that period, most of the vegetation in the delta remained parched and dry. Conversely, during wet El Niño episodes, icterids breeding in marshes or wet meadows may occur outside their regular ranges.

Nomadism as a general term for "irregular movements" has been applied to temperate-zone icterids, both in North America and in South America. A classic example of nomadism involves bird species that follow swarms of travelling locusts (Acrididae), breeding in the spots of highest insect abundance. There is some historical evidence connecting breeding colonies of Tricolored Blackbirds with locust swarms in the Central Valley of California. Nowadays locust swarms are controlled with pesticides, and this biological phenomenon has consequently disappeared.

Relationship with Man

Knowledge of icterids possessed by several native American ethnic groups is reflected in their systems of bird classification. Perhaps the most elaborate and best-known system is the one still used by many tribes of the widespread Tupí–Guaraní linguistic stock in South America. Tupí-speakers in the lower Amazon Valley include all their familiar icterids, from meadowlarks to oropendolas, in one group, the *Yapúpewar*. The widespread Crested Oropendola, known as the *Yapú* or *Japú*, is regarded as the characteristic bird, or the "chief", of this group. Tupí classification differs markedly, however, from the scientific one in including the Neotropical jays among the icterids. The Guaraní of Paraguay and nearby countries seemingly had a similar classification of icterids, one that influenced the natural-history accounts written by the Jesuit missionaries who lived among them. Father Sánchez Labrador, for instance, mixes up jays, or *acaé*, with oropendolas, or *yapú*, in the bird accounts in his 1767 book *Paraguay Natural*. Even the Spanish colonial naturalist Azara, in his important 1802–1805 book on birds, regarded icterids and jays as close relatives.

The generic name *Cacicus*, coined by B. G. de Lacépède in 1799, derives from the widespread Arawak linguistic family, and has the meaning of "chief". Among Tupí-speaking folk around Manaus, in Brazil, the Yellow-rumped Cacique is sometimes known as the *tuchauá*, the word for "chief". Tupí–Guaraní languages have provided many common names of icterids used in Brazilian Portuguese, such as *Japú*, *Japim*, *Chopim* and *Graúna*, and in the Spanish spoken in Paraguay, parts of Bolivia and north-eastern Argentina, such as *Yapú*, *Chopí* and *Guyrá-hu*. The term *guyrá-hu* means simply "blackbird". In Paraguay, there is a complete Guaraní nomenclature for all the local icterids. Although several Tupí–Guaraní bird names have been borrowed by English speakers, examples being *jacana*, *tucan*, *arasari* and *cotinga*, this has not, unfortunately, been the case with icterids.

Icterid names in other Amerindian languages include *zanate* (in Nahuatl), *loica* (in Mapuche), *paucar* (in Quechua) and *uchi* (in Aymara), applied to grackles, meadowlarks and oropendolas. The term *loica* is used in Chilean and Argentinian Spanish for the meadowlarks, and has entered the scientific nomenclature. The name *trupial*, sometimes spelt as *turpial*, is of unknown



*The trees chosen for **Montezuma Oropendola** colonies are often isolated and usually not part of unbroken forest. They sometimes contain hornet (Vespidae) nests, which may provide defence against predators and cowbirds* (Molothrus). *The nests are suspended from the ends of branches, 13–33 m above the ground. Colonies had an average of 57·5 nests in Mexico (Quintana Roo) and 31 in Costa Rica, with a recorded maximum of 172 nests. The top-ranking male remains in the colony for 52–68% of the time, and lower-ranking males visit during his absences. Of 21 chicks, a third were found to have been sired by the alpha male, 19% by beta males, and the rest by lower-ranking males and others displaying away from the colony.*

[*Psarocolius montezuma*, San Pedro, Costa Rica. Photo: Eduardo J. Libby]

etymology, but an onomatopoeic origin, after the song of the Venezuelan Troupial, has been suggested.

Icterids have been exploited by humans for their plumage. The elongated tail of male grackles, including the extinct Slender-billed Grackle, provided the Aztecs with glossy black feathers. Orioles and their feathers have been utilized as ornaments by some native American groups, and dried specimens of Orange-backed Troupials were used as ear ornaments by the Ayoreo in the northern Chaco. The showy yellow tail feathers of oropendolas were widely used in necklaces and head-dresses by tribes living in tropical and subtropical forests. Anthropologists and missionaries were not always well informed about birds and feathers, and many native cultures are now extinct. Nevertheless, reliable examples of the use of oropendola tail feathers for ornamentation are available for a minimum of 20 Amerindian nations, ranging from Colombia (Tukano) and Venezuela (Yanomami) south to Bolivia (Yuracaré), central Brazil (Bororo) and Paraguay (Mbya Guaraní). Most sources mention that the feathers were obtained from the widespread Crested Oropendola, but tribes in the Rio Xingu region also used those of the rarer Amazonian Oropendola.



*Whatever the mating system, and even among monogamous icterids with strong pair-bonds, incubation is exclusively by the female. For the majority of species, including the **Hooded Oriole**, the incubation period is 12–14 days, although it can be up to 20 days for large oropendolas. The Hooded Oriole's clutch is of 3–5 eggs. Male Baltimore* (Icterus galbula) *and Orchard Orioles* (I. spurius) *feed the incubating female, and Baltimore Oriole males may feed her also while she is brooding nestlings.*

[*Icterus cucullatus*, Mexico. Photo: Georgita Ruiz]



The restricted-range ***Forbes's Blackbird****, which is listed as Endangered, is a co-operative breeder. During nest-building several birds may bring material, and a number of adults may feed the chicks. Helpers at the nest have been reported also during incubation. Some icterids which breed co-operatively delay breeding until the second year, and individuals marked as chicks have been seen to help at the nests of their parents. Co-operative breeding has been reported so far for 16 species in nine genera of South American quiscalines, and may occur in some cacique* (Cacicus) *species, too, but no North American quiscalines are known to breed co-operatively.*

[*Curaeus forbesi*, Alagoas, Brazil. Photo: Anita Studer]

Native Americans often plucked feathers from pet parrots, but the existence of domesticated oropendolas is not mentioned. Taking into account the numbers of tail feathers included in some head-dresses, many hundreds of oropendolas were hunted in order to produce ornaments.

Icterids were minor food items for native Americans. There are some archaeological and ethnological data suggesting that the Maya people of Cozumel Island, off the north-east end of the Yucatán Peninsula, ate *Quiscalus* grackles and even Giant Cowbirds. Rural folk in Venezuela still eat Crested and Russet-backed Oropendolas, and retain a belief that the bones of these birds are a good preventative or remedy for respiratory problems. In the southern states of the USA, Bobolinks, Red-winged Blackbirds, Common Grackles and other gregarious blackbirds were widely hunted for food during the nineteenth century. Creole gourmets especially appreciated the overwintering blackbirds that had fattened themselves in the rice fields. Bobolinks have also been hunted for food in Jamaica, where they occur on migration.



The ***Long-tailed Meadowlark*** *is probably monogamous, and both parents feed the chicks. The male (with red in the supercilium) is shown here. Among other species of meadowlark, including the sometimes polygynous Eastern* (Sturnella magna) *and Western Meadowlarks* (S. neglecta)*, the male's contribution is variable, and chick-feeding may be done mainly or exclusively by the female. Long-tailed Meadowlark clutches are of 3–4 eggs, and Eastern and Western Meadowlarks can lay up to seven eggs. The nestling period is 10–12 days, and the young meadowlarks are fed for a further two weeks after fledging.*

[*Sturnella loyca falklandica*, Saunders Island, Falkland Islands. Photo: Ketil Knudsen]

Either because of the colourful plumage or because of their song, many icterids are popular as cagebirds, particularly in Latin America and the Caribbean. Orioles combine pleasant voices and bright colours, and several are commonly encountered in the pet trade. As a consequence of trapping, the Yellow-tailed Oriole is now scarce in many areas of Costa Rica. On the other hand, the Venezuelan Troupial has been introduced on, or escaped to, many Caribbean islands, including Puerto Rico. South American icterids captured as cagebirds because of their plumage include the Scarlet-headed and Saffron-cowled Blackbirds, eminently maladapted for living in captivity; moreover, the latter species is globally threatened. The Chopi Blackbird is highly valued for its song, and some of its populations have been overexploited; bird-trappers often destroy its nests in order to obtain chicks. Even male Shiny Cowbirds have been captured for the pet trade in South America. It is possible that escaped Shiny Cowbirds colonized Chile and some Caribbean islands; if true, this is a most deleterious consequence of the pet trade.

Many Amerindian peoples had myths or folk tales related to icterids. The Selknam people of Tierra del Fuego, for instance, had stories about the two icterids found on their island. The Austral Blackbird has the role of a messenger in one story. In another tale, the Long-tailed Meadowlark had a vicious fight with the Rufous-collared Sparrow and its breast became stained with blood. Meadowlarks play a role in several folk tales of North American Indians, often interacting with the coyote (*Canis latrans*), widely regarded as a "trickster" or mischievous cultural hero. In a somewhat ecologically based legend from central California, Western Meadowlarks advise Coyote not to resurrect the first humans who died, arguing that otherwise there would not be enough resources for the newborn. Coyote accepts the advice, and in some versions he also applies the rule to the meadowlarks.

The Aztecs sacrificed grackles, including the extinct Slender-billed Grackle, to their fire god. The yellow *yuyum* birds—orioles of the genus *Icterus*—are mentioned in prophetic Maya texts as inhabitants of the sacred *yaxché* trees (*Ceiba pentandra*). According to some Amazonian tribes, the oropendolas stole the fire for humans, and as a result the black beak of these birds had a red tip; only species in the subgenus *Gymnostinops* (see Systematics) had this trait. The Tupí name *yapú* or *japú*, applied to *Psarocolius* oropendolas, has the appropriate alternative meaning of "loquacious" or "talkative", and in Guaraní it also means "a liar". The diminutive form *japim* is widely used in Brazil for the Yellow-rumped Cacique, an outstanding mimic. The Victorian traveller and naturalist H. W. Bates mentioned that, in north-eastern Brazil, a popular newspaper in Pará was named *O Japim*, probably because of its tendency to print gossip. In Amazonian folk medicine, eggs of Yellow-rumped Caciques, eaten at midnight, are said to make children talkative.

This cacique is the subject of many folk stories in Amazonia. One tale tells how the arrogant cacique was punished by the gods, forgot his own song, and now copies other animals. In another tale, Yellow-rumped Caciques mock any other bird except red-billed nunbirds, either the Black-fronted (*Monasa nigrifrons*) or the White-fronted Nunbird (*Monasa morphoeus*). The nunbird's red bill, apparently stained with blood, scares the mocking caciques. In a second version, the caciques had once mimicked the nunbirds, until the offended birds used their bill to kill the cacique's parents and grandparents. Another story relates that the caciques, because of their mocking habits, were detested by all other birds, which constantly attacked their nesting colonies. The clever caciques, however, made a pact with the wasps, and the stinging insects now protect their nests. The same biological fact, the nesting association with aggressive wasps, makes the Yellow-rumped Caciques the mythical patrons of the passage rites to manhood endured by the young Wayaná, a Carib tribe from Brazil; during the rites, the candidates are exposed to the "bites" of stinging wasps and ants.

The scientific names of two icterids commemorate Aztec emperors. The Montezuma Oropendola was named *Psarocolius montezuma* after the weak and ill-fated Moctezuma II (often spelt Montezuma), who reigned during 1502–1520. This ruler kept large aviaries at his royal residences, and he may have known this oropendola, as its distribution extended to regions controlled by the Aztec empire in Veracruz. The specific name of the Black Oropendola, *Psarocolius guatimozinus*, honours the brave last emperor Cuauhtémoc, executed by the Spanish conqueror Hernán Cortés in 1525. This icterid, however, occurs in areas far south of those under former Aztec control. The great French naturalist d'Orbigny dedicated the scientific name of the Amazonian Oropendola to the Yuracaré, the proud Indian people who lived in the foothill forests of Cochabamba, in Bolivia.

Spanish or Portuguese names applied to icterids often have a "military" connection, as illustrated by *dragón*, meaning "dra-



*In studies of **Bullock's Oriole** in San Angelo, in Texas, the eggs hatched asynchronously over 2–4 days. The hatchlings grew at the rate of 3 g per day. The chicks of this oriole are fed by both parents, and the nestling period is 14 days. In Washington and California, fledglings may join crèches of up to 100 individuals, attended by several adults. After breeding, Bullock's Orioles move south-west to moult, before completing their journey to Mexico.*

[*Icterus bullockii bullockii*, Milpitas, California, USA. Photo: Alex Navarro]



A brood of three ***Orange-backed Troupial*** *chicks was reported from Argentina, but there is no other information on parental care or the nestling period of this species. For the Venezuelan Troupial* (Icterus icterus), *formerly considered conspecific with the Orange-backed, the published nestling period is 21–23 days, substantially longer than for any other* Icterus *species for which information is available, and almost twice as long as for temperate-breeding orioles. Both Venezuelan Troupial parents feed the young and defend the nest. Orange-backed Troupials usurp the nests of other species; this is the nest of a cacique or oropendola.*

[*Icterus croconotus strictifrons*, Mato Grosso, Brazil. Photo: Anita Studer]

goon", given to species of *Pseudoleistes* and *Xanthopsar* in Argentina and Uruguay, and *policia inglesa*, "English policeman", applied to *Sturnella* species in Brazil. The species name *militaris*, used for the Red-breasted Blackbird, is part of this same tendency. The Mexican name of the Red-winged Blackbird, *Tordo Sargento*, or "Sergeant Blackbird", derives from the species' coloured epaulets. Similarly, the Argentinian name *federal*, applied to the Scarlet-headed Blackbird, is related to this icterid's vivid red colour, used by the federal militias during the civil wars of the early nineteenth century. The Chestnut-capped Blackbird is known in southern Brazil as *garibaldi*, after the Italian independence hero Giuseppe Garibaldi, who was previously a guerrilla leader against the Brazilian Empire in the 1830s. Many vernacular Spanish American names are of direct Iberian origin and were previously used in Spain for entirely different birds; examples are *tordo*, *mirlo*, *oropéndola* and *arrendajo*, which referred to, respectively, thrushes, blackbirds, orioles and jays.



Both ***Brewer's Blackbird*** *parents feed the chicks, though a minority of polygynous males may divide their time between broods. The shiny black male is shown here. Similarly, the male may feed the female while she is incubating, although the polygynous male will desert the primary female once incubation has begun. In California, the number of polygynous males varies from year to year, depending on sex ratios within a colony. Males have a maximum of three mates, which may be scattered within the colony. Territorial defence is limited to a small area around each nest-site. Food for the chicks is obtained up to 800 m from the colony.*

[*Euphagus cyanocephalus*, British Columbia, Canada. Photo: S. Roberts/ Ardea.com]



*Aggressive nest-guarding by the **Scarlet-headed Blackbird** seems to keep the incidence of cowbird parasitism lower than in other marsh-nesting icterids. The average brood is three, although the last to hatch often fails to survive. The nest is attached to 4–7 stems of reeds or other tall aquatic vegetation, around 1 m above the water. Both sexes feed the young. Although the very distinctive plumage is common to both sexes, the female may occasionally breed in juvenile plumage, which lacks red altogether and is yellowish on the throat and breast.*

[*Amblyramphus holosericeus*, Mato Grosso, Brazil. Photo: Anita Studer]

Vernacular Caribbean English names applied to icterids also include "military" themes, such as "Wild Pine Sergeant" in Jamaica for the Jamaican Blackbird and "Soldier Bird" in Trinidad for the Red-breasted Blackbird. Some humorous Jamaican names for icterids include "banana bird" or "auntie katie" for the local oriole. North American English names are not of Amerindian origin, and are simply descriptive, such as "cowbird"; of European origin, "meadowlark" and "oriole"; or both, "blackbird"; with the occasional onomatopoeic name, for instance "Bobolink". Much the same applies to French Canadian names. The most characteristic French name for icterids is *carrouge*, applied mostly to orioles.

Nesting associations with humans are well developed in a few Neotropical icterids. In Paraguay and north-eastern Argentina Chopi Blackbirds often nest in buildings, a habit reported by Azara over two centuries ago. One of the most unusual breeding locations for a medium-sized group of Chopi Blackbirds was the international airport at Iguazú Falls, in Argentina, where the birds even nested in the noisy terminal building. In the same region, colonies of Red-rumped Caciques are usually sited around human dwellings and similar places, including hotels, restaurants, parking lots and police headquarters. If the buildings are abandoned, the caciques desert the colonies. Humans and domestic dogs probably deter many nest predators, from snakes to monkeys, and in Argentina some people in Misiones even purposefully help the nesting caciques by clapping the hands or yelling to scare off visiting toucans (Ramphastidae). The Yellow-rumped Cacique sometimes nests near human habitations in Venezuela, Trinidad and Bolivia. According to the naturalist W. H. Beebe, Venezuelan Indians never disturbed the nesting colonies located in their villages.

A rather different picture emerges in present-day North America, where blackbirds are regarded as unwelcome neighbours. Icterids such as *Agelaius* blackbirds, cowbirds and grackles may form night roosts of millions of birds, often in the company of Common Starlings (*Sturnus vulgaris*). A US government survey in the winter of 1974–1975 revealed 723 major roosts containing 438 million icterids, along with 99 million starlings. Red-winged Blackbirds, Common Grackles and Brown-headed Cowbirds, in that order, were the commonest icterids. Such huge concentrations can represent a major environmental problem, particularly in urban and suburban areas. Blackbird roosts are a problem also in agricultural areas. Attempts to control the numbers have included the spraying of roosts with chemicals toxic to birds or with plant defoliants, and even the use of explosives. Unfortunately, relatively rare and harmless icterids, such as wintering Rusty Blackbirds, which may share roosts with the troublesome species, also fall victim to such control measures.

Urban roosts of Great-tailed Grackles are an increasing nuisance in Central America. In Costa Rica, for example, the authorities in some towns in Guanacaste Province have cut down



*Male orioles and other icterids may become more assiduous providers of food for their young as they grow older. The male **Baltimore Oriole** take two years to attain his adult plumage. First-year males, with plumage intermediate between second-year males and females, do sometimes breed, but have smaller clutches and lower fledging rates than older males. A study of Audubon's Oriole* (Icterus graduacauda) *found no difference in the number of feeding trips, 2–3 per hour, made by the male and female parents. A female without a mate made double the number of feeding visits (five per hour) to compensate for the lack of assistance.*

[*Icterus galbula*, Ithaca, New York, USA. Photo: Marie Read]



*The **Brown-headed Cowbird** is an extreme generalist, known to parasitize over 200 species, mostly passerines in the size range 10–150 g. Important hosts include vireos (Vireonidae), here a Red-eyed Vireo* (Vireo olivaceus)*, tyrant-flycatchers (Tyrannidae), New World warblers (Parulidae), American sparrows (Emberizidae), and other icterids. Female Brown-headed Cowbirds reportedly produce up to 40 eggs per season. They regularly puncture host eggs or remove them from the nest. Cowbird eggs have shorter incubation times than those of hosts, so that they hatch first and the chicks outcompete surviving host nestlings.*

[*Molothrus ater ater*, Indiana, USA. Photo: Ron Austing/VIREO]

trees in order to expel the grackles. In central Argentina, wintering Shiny Cowbirds sometimes form roosts of several thousand individuals in rural towns, where the sites chosen may be street trees or even plazas and gardens. So far, this habit has caused only minor problems.

Frugivorous icterids, such as oropendolas, will at times feed on cultivated fruits, including oranges, bananas, cacao pods and similar produce. On these grounds, the Crested Oropendola has sometimes been classed as an agricultural pest, for example in Trinidad, and the same applies to certain other species. With their limited numbers, however, oropendolas are unlikely to be important crop pests except, perhaps, on a very local scale.

On the other hand, granivorous icterids that form huge flocks can become serious pests of cereal and sunflower (*Helianthus*) crops. Red-winged Blackbirds will attack ripening maize (*Zea mays*), using a gaping bill action (see Food and Feeding) to obtain the seeds. The damage can be locally important in several areas of North America. Nevertheless, the overall damage in the state of Ohio is just about 1% of the total maize harvest. Red-winged Blackbirds prefer to visit agricultural fields within 8 km of their roosts, and it is therefore the farms in such locations that suffer most of the crop losses. Roost size and roost location are the critical factors. Damage can be minimized by planting near the roosts alternative crops, such as soybeans or potatoes, which are not used by the blackbirds. Recently, varieties of maize and sunflower that are morphologically resistant to blackbird damage have been developed.

A particularly troublesome icterid in South America is the Chestnut-capped Blackbird, regarded as a pest in rice fields throughout the Río de la Plata Basin in Brazil, Paraguay, Uruguay and Argentina. Some sources claim that the annual damage that this species inflicts on rice in Rio Grande do Sul, in southeast Brazil, amounts to about US$100,000,000, but this may be an exaggeration. Analysis of the contents of hundreds of stomachs of the blackbird shows that rice accounts for 12–62% of the items consumed, the proportion varying with season. It appears that the main damage occurs during sowing. Sometimes the blackbirds have been poisoned with highly toxic baits, leading to huge mortality of other birds, too. Despite decades of persecution, Chestnut-capped Blackbird populations have not been reduced, and perhaps a more environmentally friendly method of control should be devised. In addition, studies in Argentina suggest that the damage done to rice is exaggerated, and partly compensated by the species' consumption of insects harmful to the crop. Like the blackbird, the Bobolink is commonly regarded as a pest in rice fields in Bolivia and Argentina. Other South American icterids sometimes considered to be agricultural pests, mostly attacking maize, include the Shiny Cowbird and the Chopi and Bolivian Blackbirds, but none of these has been much studied.

Since the 1950s, the members of this family have been of capital importance in the development of biological disciplines studying the social behaviour and organization of animals. This is particularly true of North American species such as the Red-winged, Yellow-headed and Tricolored Blackbirds. Their conspicuousness, abundance and colonial nesting habits have made these species the favourites of students of ecology and animal behaviour. Early studies of comparative social organization in the 1960s used icterids as models. Field research on marsh blackbirds by Orians and his students produced the first hypothesis on the evolution of polygamy in animals. Data showing a discrepancy between the visible pair-bond and actual promiscuous copulation behaviour were first obtained for female Red-winged Blackbirds. This icterid is certainly one of the best-studied bird species in the New World. Neotropical species have been less researched, but some types of social organization, such as cooperative breeding, are known mostly in respect of South American taxa. Brood parasites such as the cowbirds have for long fascinated many biologists and naturalists. Every year, numerous studies are published on various facets of the parasites' life histories, ranging from egg mimicry to the problems of learning and imprinting.

Literary works relating to icterids are not many. The poem entitled "Robert of Lincoln", by the nineteenth-century author William Cullen Bryant, describes the life of the Bobolink with affection and irony. Grackles were the subject of a humorous poem by another renowned North American, Ogden Nash:

> The grackle's voice is less than mellow,
> His heart is black, his eye is yellow,
> He bullies more attractive birds
> With hoodlum deeds and vulgar words,
> And should a human interfere,



*This **Golden-winged Cacique** is removing and carrying away a faecal sac from its nest. Conspicuous objects such as faeces and eggshells could attract predators or brood parasites if dropped directly below the nest, and tend therefore to be disposed of at a distance. The faeces of very young chicks may be swallowed: this has been observed for Audubon's Orioles* (Icterus graduacauda) *with two-day-old nestlings. Golden-winged Caciques are frequently parasitized by the Shiny Cowbird* (Molothrus bonariensis). *This cacique is an "accepter" species, which raises the cowbird chicks instead of, or as well as, its own. Some icterids are "rejecters": they recognize the eggs as alien and carry them away from the nest. When cowbird eggs were experimentally placed in 16 Baltimore Oriole* (I. galbula) *nests, all were rejected, 14 of them within one hour. Females ejected the cowbird egg at eleven nests, males at two nests, and at one nest both sexes participated in egg removal. At eight nests the eggs were spiked with the open beak and carried away, and at six nests the eggs were broken and removed piece by piece. Except for one egg that was dropped immediately beneath the nest, the orioles carried the eggs 1·5–35 m away. It has been suggested that egg ejection resembles nest-sanitation behaviour, such as the removal of faecal sacs, and may have evolved from it.*

[*Cacicus chrysopterus*, Río Pilcomayo National Park, Argentina. Photos: José Calo]



*The males of polygynous oropendolas and caciques, such as this **Red-rumped Cacique**, usually play little or no part in provisioning the young, but actively defend the nest or colony from predators such as toucans (Ramphastidae) and monkeys. Caciques, oropendolas and orioles sometimes nest near aggressive insects, such as wasps (Vespidae) or ants (Formicidae), that deter climbing predators, or share the nest tree with jays (Corvidae) or tyrant-flycatchers (Tyrannidae), which are aggressive towards avian predators. Red-rumped Caciques may nest near humans, and in towns, as an anti-predator strategy.*

[*Cacicus haemorrhous affinis*,
Iguazú National Park,
Misiones, Argentina.
Photo: José Calo]

Attacks that human in the rear.
I cannot help but deem the grackle
An ornithological debacle.

In the Spanish language, the best examples are perhaps two poems by the Argentinian writer Leopoldo Lugones, a member of the nation's ornithological society and obviously familiar with birds. In his 1917 book *Libro de Paisajes*, "Book of Landscapes", he dedicates a poem to the Solitary Cacique, conjuring up, in a few words, the mood of the bird, its habitat in the Paraná Delta, and its remarkable nest.

Some orioles have been awarded the title of "national bird", examples being the Venezuelan Troupial in Venezuela and the Montserrat Oriole in the island nation of that name. Similarly, the Baltimore Oriole has been named the state bird in the US state of Maryland. Orioles are colourful, have pleasant voices and seldom interfere with human economic interests. These are surely among the primary reasons why orioles have such a positive public image and are greatly appreciated by birdwatchers and others alike.

Status and Conservation

Only one icterid species has become extinct in historical times. This is the Slender-billed Grackle, a medium-sized slender grackle with visible sexual plumage dimorphism. Described in 1827, by W. J. Swainson, this species had a restricted distribution in the marshes of the Valley of Mexico and the Toluca Valley, in the central Mexican highlands; ethnological data gathered by the Spanish missionary Sahagún indicate that the Aztecs were certainly familiar with it (see Relationship with Man). The wetlands were steadily drained during the nineteenth century, and the grackle was last reported in 1910. Almost nothing is known of the ecology and natural history of this icterid; it possibly nested colonially in reedbeds, but it was also reported from towns. Mitochondrial DNA extracted from museum specimens shows that it was not related to the Nicaraguan Grackle, as previously suggested, but to the widespread and abundant Great-tailed Grackle (see Systematics).

Of the 111 extant species in the family, 14, almost 13% of the total, are currently listed as globally threatened. Perhaps not surprisingly, five of the threatened icterids are restricted to islands of the West Indies, where they represent 26% of the resident Caribbean icterids. A further Caribbean species is currently considered Near-threatened. This is the St Lucia Oriole (*Icterus laudabilis*), confined to the island of that name. The remaining nine threatened icterids include seven South American taxa, together with the North American Rusty and Tricolored Blackbirds. Five of the South American species have isolated and small ranges, ecologically approaching an insular situation.

Two of the 14 threatened species are listed as Critically Endangered. The Montserrat Oriole, found only on a single small



*Both the solitary-nesting **Yellow-rumped Marshbird** and the colonial Brown-and-yellow Marshbird* (Pseudoleistes virescens) *are co-operative breeders. Up to six helpers assist both parents with feeding the nestlings and defending the nests against raptors. Helpers may be associated with the nest during incubation, but the number of helpers increases after hatching. Brown-and-yellow Marshbirds almost never leave the nest unattended during the brood-rearing stage. Despite this, both marshbirds are heavily parasitized by cowbirds* (Molothrus) *and the nesting success of the Brown-and-yellow Marshbird can be low.*

[*Pseudoleistes guirahuro*,
Das Emas National Park,
Goiás, Brazil.
Photo: Brian E. Small]

island in the northern Lesser Antilles, has declined seriously owing to an unhappy combination of human pressure, natural catastrophes and the small size of its island range. Formerly it was found in all of the main montane forests, but these were reduced by increasing cultivation to a few suitable patches. The Soufrière Hills volcano, after a long period of dormancy, erupted in 1995, damaging or destroying the remaining forest patches; the volcano has remained active ever since then. The number of surviving orioles was estimated to be 5200 individuals in 2004, while a more recent assessment was of a total population of 460–590 pairs. These are more or less confined to the Centre Hills. Research studies, using nest cameras, revealed high rates of nest predation by introduced rats (*Rattus*) and native Pearly-eyed Thrashers (*Margarops fuscatus*), both of which are present at often high densities. In 2001 and 2003, a reduction in the oriole's laying frequency and clutch size was thought to have been caused by drought, and this could become a more serious problem since the species is now confined to lower, drier parts of the island. Similarly, excessively heavy rainfall can have an adverse impact. A significant additional problem is presented by feral livestock, which eat native plants and hinder forest regeneration; they destroy the native *Heliconia caribea*, the oriole's preferred nesting plant. Particularly destructive is the feral pig (*Sus*) population, which is spreading rapidly and could, if left to its own devices, seriously damage the forest habitat. A programme of captive-breeding of Montserrat Orioles was started in 1999 and appears to have achieved some success; to date, this has been regarded as a precautionary measure, in case the species does become extinct in the wild. Several other conservation measures have been taken. The Centre Hills have been designated a protected area, within the marked boundaries of which no development is permitted. A Species Action Plan was published in 2005, and experimental rat control in the Centre Hills began in the following year. There are also plans for a pig-eradication programme on Montserrat.

Following the recent taxonomic split of the "Greater Antillean Oriole" into four distinct species (see Systematics), the status of these taxa had to be individually assessed. As a result, the Bahama Oriole (*Icterus northropi*) has now been listed as Critically Endangered. This icterid was formerly found on Abaco and Andros, in the western part of the Bahamas, but it disappeared from Abaco during the early 1990s, and the Andros population appears to be declining. The reasons for its extirpation from Abaco are not known. Recent surveys covering the whole of Andros indicate that the total population may be as few as 127–254 individuals. Moreover, among the birds recorded during a survey in 1997 was only a single individual in juvenile plumage, indicating an alarmingly low reproductive output; happily, more juveniles have been seen during later surveys. The species inhabits mature coppice woodland, nesting in thatch palms (*Thrinax*) and in non-native coconut palms. Unfortunately, the coconut palm on Andros has been attacked by lethal yellowing, a phytoplasma pathogen that attacks many species of palm, killing the palm within six months. The phytoplasma, thought to be spread by the planthopper *Haplaxius crudus*, first causes the fronds to turn yellow, before the entire crown falls to the ground. The disease has evidently eradicated the coconut palm in parts of North Andros; for example, the oriole is no longer to be found at Staniard Creek, where it was previously common. Lethal yellowing has not yet been detected on Mangrove Cay or South Andros, both of which held very healthy palm populations, and higher oriole densities than North Andros, in 2009. An additional new threat to the Bahama Oriole is brood parasitism by the Shiny Cowbird, which has recently arrived on Andros. In summary, the Bahama Oriole is one of the rarest avian species in the Caribbean region.

Of the remaining twelve globally threatened icterids, seven are listed as Endangered and five are Vulnerable. Among the seven Endangered members of the family, only one, the Tricolored Blackbird, is found in North America. This species occurs mostly in the Central Valley of California. It formerly nested in colonies containing hundreds of thousands of birds, but in the last hundred or so years human activities have dramatically reduced both its habitats and its numbers. It is classed as being considered of "Highest Concern" in the USA (Red WatchList priority species for conservation).

Somewhat mysteriously, the Rusty Blackbird, the northernmost icterid and one having a huge distribution in boreal North America, has suffered a serious long-term population decline that appears to have accelerated since the end of the last century. It qualifies as Vulnerable, although more accurate survey data may indicate that a re-evaluation of its status is warranted. It is classi-



Studies have found that nearly all hosts, despite the often great disparity in size, are able to meet the demands of ***Brown-headed Cowbird*** *chicks. Growth rates of this cowbird's nestlings have been shown to be nearly identical in nests of hosts weighing 9·5 g and 52·6 g, although Brown-headed Cowbirds in nests of House Finches* (Carpodacus mexicanus), *which feed their young with regurgitated seeds, fail to survive. Conversely, when Shiny Cowbird* (Molothrus bonariensis) *chicks were raised by host species varying in weight from 12·8 g to 74 g, their mass at fledging increased with that of the host.*

[*Molothrus ater artemisiae*, Pica County, Arizona, USA. Photo: J. Hoffman/VIREO]

fied as "Declining" in the USA (Yellow WatchList priority species for conservation). This species breeds right across the northern forest zone, and then migrates to non-breeding quarters throughout the eastern USA. Since the 1970s, surveys and counts have revealed annual rates of decline ranging from about 5% to 12%. From historical accounts, it appears that Rusty Blackbird numbers have been falling steadily for more than a century. There are several possible reasons for this decline. Perhaps the most likely is the loss and degradation of wooded wetlands, the habitat on which this species is dependent throughout the year; this has been a particular problem in the non-breeding range. In recent decades, habitat disturbance and environmental contamination, as well as global climate warming, may have had adverse effects on breeding numbers and success. In 2005, a special group, the International Rusty Blackbird Working Group, was set up with the aim of developing research that would enable scientists to understand the true causes of the decline. This research includes, among other aspects, investigation of the species' habitat use on the breeding grounds and in the winter quarters, its breeding success and its moult patterns. Some of the early findings were that methylmercury levels in tissues were higher in the breeding area than in the wintering range, and that, in winter, individuals are vulnerable to parasite and microbial infections, this possibly a result of stress induced by degradation of the wintering habitat. In addition, it seems that the blackbird's habit of nesting in small stunted conifers, mainly spruce (*Picea*), can produce mixed fortunes. When it used such nest-sites in undisturbed wetlands in Alaska and New England, it achieved relatively high success; in contrast, when Rusty Blackbirds in New England nested in young spruces or balsam firs (*Abies balsamea*) that had regenerated after recent logging of wetlands or adjacent uplands, they suffered far greater nest predation, leading to a reduction in nest survival of almost 70%. The researchers suggested that unlogged buffer zones around wetlands should be considered as a conservation measure for the protection of nesting Rusty Blackbirds. The various studies are continuing.

In addition to the Montserrat and Bahama Orioles, three other Caribbean species are threatened. The Jamaican Blackbird and the Yellow-shouldered Blackbird are both considered Endangered and the Martinique Oriole (*Icterus bonana*) is Vulnerable. Jamaican Blackbirds occur mostly in wet montane forest, a habitat threatened by several human activities, including mining, logging and the commercial planting of exotic trees, as well as fires. Removal of mature native trees may have had a particularly serious effect on this species, as these trees support the large bromeliads in which the blackbird forages for insects. A significant population of Jamaican Blackbirds is found in the Blue and John Crow Mountains National Park, which covers an area of more than 800 km² and is part of a system of protected areas with at least 40 forest reserves, in some of which this species occurs. The management of such reserves and the enforcement of regulations tend to be weak, however, and habitat destruction continues within them, so their long-term security is by no means assured. The species' total population is thought to be within the range 2500–10,000 individuals.

The Yellow-shouldered Blackbird has declined in both range and numbers. The nominate race once occurred throughout mainland Puerto Rico, and a second subspecies was widespread on the offshore islands of Mona and Monito. On Puerto Rico, the population was estimated at 2400 individuals in 1975, but, following a drastic contraction of its range, it is now confined mostly to the south-west coastal area; a small remnant population persisted in eastern coastal areas, but this appears to have disappeared, with no breeding records since 1986. In south-west Puerto Rico, the population declined by about 80% between 1975 and 1981, and in 1982 numbered no more than 300 individuals, but roost counts made prior to the breeding season during 1985–1995 revealed an average annual increase of 14%. The global population in early 1998 was estimated at 1250 individuals. This blackbird seems always to have been most numerous in places near the coast, and nowadays many of the surviving population breed on offshore cays. One of the main reasons for this species' decline was brood parasitism by Shiny Cowbirds, which invaded Puerto Rico around the mid-1950s or before, and this has been cited as the chief cause of the shift to offshore cays. Habitat disturbance enabled the cowbirds to increase and spread rapidly. Additional factors include habitat loss through clearance for agriculture, as well as nest predation by Pearly-eyed Thrashers and increased mortality caused by introduced carnivores. A further threat comes from Caribbean Martins (*Progne dominicensis*) invading the blackbird's nesting areas. Among conservation actions taken since 1982 are the installing of artificial nests, the monitoring of breeding results, and control of the numbers of cowbirds, rats and nest mites (Acarina). Cowbird control, as well as habitat management,



The nominate race of the ***Jamaican Oriole*** *(shown here) is still common in Jamaica, and the race* lawrencii *is said to be abundant on the island of San Andrés, off the coast of Nicaragua. But the third race of this restricted-range species,* bairdi, *restricted to Grand Cayman, has not been seen since 1967 and is believed to be extinct. The reasons for its demise are unknown. In Jamaica, the species inhabits most kinds of woodland, from coasts to the mountains, and on Grand Cayman it was found even in town gardens. The race* lawrencii *is brighter in colour than the nominate, and* bairdi *was both smaller and brighter.*

[*Icterus leucopteryx leucopteryx*, Port Antonio, Jamaica. Photo: Greg & Yvonne Dean/ WorldWildlifeImages.com]



Scarce but still widespread in all types of forest, scrub and plantation edges on its home island, the ***St Lucia Oriole*** *has a global range of 620 km². It has been declining since the 1930s, perhaps earlier, owing to a combination of pesticides, habitat loss, parasitism by Shiny Cowbirds* (Molothrus bonariensis) *and increasing numbers of Spectacled Thrushes* (Turdus nudigenis), *which are aggressive towards other thrush-like birds. Though small, at perhaps not many more than 1000 mature individuals, the St Lucia Oriole population appears stable and not at immediate risk. It is considered Near-threatened.*

[*Icterus laudabilis*, St Lucia. Photo: Hank Chiu-wen Seng/AGAMI/ Spectrum photofile]

begun in 1980, led to an improvement in nesting success, and in south-west Puerto Rico, where the Boquerón Commonwealth Forest is a stronghold for the blackbird, its numbers have continued to recover, albeit slowly. So far as is known, cowbird eggs have not yet been found on Mona Island, where the Yellow-shouldered Blackbird population is thought to number about 700 individuals and appears to have remained stable.

Like other Caribbean members of the family, the Martinique Oriole has suffered notably from parasitism by the Shiny Cowbird. Its global range is tiny, being restricted to the island of Martinique, but it is still reasonably numerous, with a population recently estimated at more than 10,000 individuals. It was originally found in many types of forest below 700 m, ranging from semi-arid woodland to forest edge, plantations and rainforest, but there is some evidence that it favours dry forests and mangroves. Since the 1970s this icterid has become less common, its slow decline believed to be due to the invasion of its island by the cowbird. Deforestation on Martinique has allowed the Shiny Cowbird to spread, and it now parasitizes 75% of the oriole's nests each year. On the other hand, a recent decline in the cowbird's numbers has enabled the oriole to recover some of its population losses, albeit on a very small scale. The true impact of the cowbird on the Martinique Oriole, however, is not really known, and the situation should be monitored. In the meantime, further deforestation on the island would almost certainly lead to a range expansion by the cowbird and should be prevented.

South America harbours the remaining seven globally threatened species. One of these is the enigmatic Selva Cacique, a rare and local icterid that was, until the last few years, known from only three localities within a tiny area of Peru. Recently, however, it has been located in at least one additional protected area. Its known range is fragmented, and it may occur also in Acre, in adjacent west Brazil. Its preferred habitat appears to be riparian vegetation and riverine forest. All records of this species have been made in sparsely populated areas that appear not to be under imminent threat of habitat loss. Its presence in Manu National Park and in the Santuario Nacional Megantoni has now been confirmed, and the species may occur also in Cordillera Azul National Park. The Selva Cacique is currently listed as Vulnerable, but it is possible that, if further populations are discovered in neighbouring areas, its status could be downgraded to Near-threatened.

Three globally threatened species are confined to Colombia. These are the Baudo Oropendola, restricted to the coastal lowlands and foothills of Chocó, in north-west Colombia, and the Colombian Mountain Grackle (*Macroagelaius subalaris*) and Red-bellied Grackle, both found in the Andes of that country. It is possible that the Baudo Oropendola also occurs in nearby areas of Panama. All three are listed as Endangered. The Baudo Oropendola, until very recently known from only five localities and possibly a naturally scarce species, seems to prefer lowland forest growing in sandy deposits and with a relatively open

The ***Selva Cacique*** *was for long known only from the type locality in Loreto, in Peru. Then, in the late 1990s, it was found at two further sites, on the Río Shihuaniro and the upper Río Camisea, in Cuzco. It has been seen in Manu National Park and Biosphere Reserve and in Megantoni National Sanctuary, with an unconfirmed report from Cordillera Azul National Park. It is thought to occur at low densities, and is apparently very local. Its riverine-forest habitats are at risk from agriculture and settlement, but it has been heard calling from mosaics of forest and cultivated land around a village. It is currently considered Vulnerable.*

[*Cacicus koepckeae*, Río Camisea, La Convención, Cuzco, Peru. Photo: Pablo Grilli]





*In the 1800s, the **Saffron-cowled Blackbird** was found in southern Brazil, Paraguay, and over much of north and central Argentina and most of Uruguay. Its range has contracted sharply, leaving a few widely separated populations totalling perhaps no more than 5000 individuals. The greatest threats are from the damming of marshy valleys for irrigation, and high rates of nest loss owing to trampling by cattle; colonies have been destroyed by fires used in grazing management, and in south Paraguay almost 70% of suitable breeding habitat is covered by rice fields. Saffron-cowled Blackbirds are captured illegally for the cagebird trade, which can destroy entire colonies.*

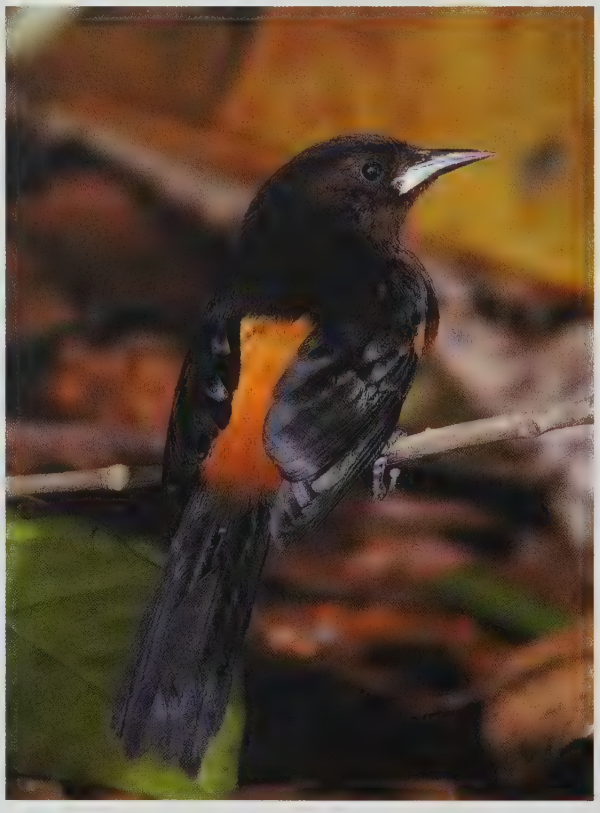
[*Xanthopsar flavus*, São Francisco de Paula, Rio Grande do Sul, Brazil. Photo: Edson Endrigo]

canopy. A breeding colony had been recorded at the headwaters of the River Acandí in 1991, and at a site north of Ensenada de Utría National Park, near the Pacific coast, two individuals were seen in 1997 and six were observed two years later. In 2010, however, during an expedition in the western Andes in Chocó, two colonies of this oropendola were discovered not far from Medellín. These colonies, totalling 70–80 individuals, are about 120 km from Ensenada de Utría National Park, close to the only other site where a very small number of the species were thought to survive. The two newly discovered colonies are not within a protected zone and, most worryingly, deforestation in the area is accelerating. Conservation measures are required as a matter of urgency, and further surveys are being conducted at the site in order to determine the precise actions that are needed. Habitat alteration and destruction, which are increasing in western Colombia, are the most serious threats to this very rare species.

The Colombian Mountain Grackle is found only on the west slope of the east Andes from Norte de Santander south to Cundinamarca. Its preferred habitat appears to be Andean oak (*Quercus humboldtii*) forest, and is therefore greatly fragmented. In recent surveys, this icterid was recorded at 22 localities ranging from Suratá, in Santander, south to La Aguadita, in Cundinamarca, but follow-up surveys revealed that many of these sites were suffering rapid deforestation. In surveys between 2003 and 2006 in the Serranía de los Yariguíes, a spur extending from the main east Andean range in Santander, it was found at three sites, at one of which it was abundant. The species' current total population has been estimated to be in the range 1000–2500 individuals. Formerly, it occurred over a more extensive region, and probably extended also to the east slope. Much of its mountain-forest habitat, however, has been logged or cleared for agriculture. Nevertheless, the Yariguíes massif, a steep, forested mountain range about 100 km in length, still holds a considerable amount of forest at elevations suitable for this icterid. In January 2011, an important new population was discovered in the Yariguíes range at Reserva Páramo La Floresta, a privately owned reserve administered by the municipality of Zapatoca. This site, at an elevation of about 2600 m, includes second growth, sub-*páramo*, fragments of oak forest and, importantly, a *humedal*, or marshy wetland. In the forest and forest edge surrounding this marshland, the Colombian Mountain Grackle was the most conspicuous bird species, and possibly even the most numerous one. Very similar-looking habitats exist in many parts of the Yariguíes range, but, as they are on isolated plateaux of steep forested mountains, they are very difficult to reach. It seems likely that these, too, support significant populations of the species. Elsewhere, this species' population is small and severely fragmented, and it is debatable whether or not it can survive. Conservation efforts and ecological studies at Guanentá–Alto Río Fonce Fauna and Flora Sanctuary, in Santander, and at Soatá and Tipacoque, in Boyacá, appear to have had some success and are continuing.

Third and last of the threatened Colombian icterids is the striking and distinctive Red-bellied Grackle, found in the Andean mountain forests at altitudes of 800–2750 m. It formerly occurred mostly in the western and central Andean ranges, from Antioquia south to Putumayo, but with a disjunct population in the eastern Andes in Huila and Caquetá. Probably as a result of extensive forest clearance, the species disappeared from much of its earlier range, including the western Andes, and from several historical localities elsewhere. Since about 1980, it has been observed in small numbers very locally, but it is said to be quite common in the mountains around Medellín and La Linda, Las Nubes and La Noque, in Antioquia. Captives from Santafé Zoo were released into the mountains around Medellín during 1997–1998. The species' range, however, remains highly fragmented. Nevertheless, this grackle has been reported living at forest edges and in old second growth, and even nesting in an isolated tree in a pasture, suggesting some tolerance of forest clearance and disturbance, and it has been found recently at several new localities, such as Amalfi, in Antioquia. The present known range of the Red-bellied Grackle includes some protected areas, such as Ucumarí Regional Park and Cueva de los Guácharos National Park. Despite these encouraging signs, detailed surveys and a population estimate are much needed. Its remaining habitat is becoming increasingly degraded and fragmented, suggesting that the species is probably undergoing a gradual decline. It is sometimes persecuted as a pest of commercial maize crops, and is sometimes trapped for the cagebird trade.

Forbes's Blackbird is another species with a very small overall population, estimated in the range of 1000–2499 individuals. It is confined to east Brazil, and was probably a rare and localized bird when first discovered, in 1880, in the state of Pernambuco. For a century there were no further records of this



*The **Martinique Oriole** remains common on Martinique, with a population of more than 10,000 birds and a density of 2·4 birds/ha in the centre of the island. Orioles are found in plantations and town gardens, as well as in native forest and mangroves. The species is listed as Vulnerable because of its very small range (1100 km²) and because brood parasitism by the recently established Shiny Cowbird* (Molothrus bonariensis) *has led to a decrease in its numbers. But the cowbirds have declined recently, allowing a slight recovery in the oriole's population.*

[*Icterus bonana*, Arboretum north of Fort de France, Martinique. Photo: Doug Wechsler/ VIREO]



*The **Pampas Meadowlark** was formerly common and widespread in east-central Argentina and Uruguay, but since 1900 its range has decreased by 90%. Nowadays it is found mostly around Sierra de la Ventana, in south-west Buenos Aires, where the rocky soils do not favour ploughing. This population may approach 28,000 individuals, and there is an isolated population of up to 90 pairs in Uruguay. Some birds breed in planted pasture and croplands with a similar structure to that of the natural habitat, but most are confined to natural grasslands. Between 1992 and 1999, 30% of these grasslands were converted to farming. The Pampas Meadowlark is currently considered Vulnerable.*

[*Sturnella defilippii*, Bahía Blanca, Argentina. Photo: Sergio Seipke]

species, largely because it was confused with the far more common and sympatric Chopi Blackbird. It was even suggested that specimens of this icterid were unusual intergeneric hybrids between *Chrysomus* and *Gnorimopsar*. A careful check of collected specimens by L. L. Short and K. C. Parkes in 1979 clarified the distribution and systematic position of Forbes's Blackbird, but virtually nothing was known of its natural history. In the early 1980s, however, the species was rediscovered at Pedra Talhada, in Alagoas, and in 1988 A. Studer and J. Vielliard reported two small and disjunct populations, the one at Pedra Talhada, and another at Rio Doce, in Minas Gerais. The Alagoas population was estimated at 150 individuals, living around a relict forest patch. Soon thereafter, the species was found at other sites in Alagoas, with records from Usina Serra Grande, from near Matriz de Camaragibe, and from a forest area near Murici known as Pedra Branca, as well as from sugar-cane plantations and pastures bordering forest at Engenho Coimbra. Just to the north, in Pernambuco, the species has now been recorded at Usina Trapiche and at Mata do Estado, with flocks of up to 709 individuals observed, and at São Vicente Ferrer and Engenho Água Azul, in Timbaúba, and the species is said to occur at an additional nine localities in Pernambuco. This icterid appears again more than 1400 km to the south, in Minas Gerais, where up to 40 have been reported from the confluence of the Piracicaba and Doce rivers, and the species has been observed also near Pirapora and on the edge of the Cavernas do Peruaçu National Park.

This species clearly has an extremely fragmented range, and its total population is surely small and is thought to be declining. It is listed as Endangered. It is threatened by habitat loss, a problem compounded by the fact that it is captured for the pet and cagebird trade. Probably a more serious threat, however, at least in some localities, is parasitism by the Shiny Cowbird. At Pedra Talhada, 64% of Forbes's Blackbird nests were parasitized by this cowbird during 1981–1986, and in 1987 brood parasitism of the icterid reached 100%. The recruitment rate for the blackbird was found to be very low.

The last two globally threatened members of the family are the Saffron-cowled Blackbird and the Pampas Meadowlark. Both are inhabitants of grassland in southern South America and both are Vulnerable, having suffered substantial range reductions owing to habitat loss. In 1879, when the Argentinian army conquered the last of the Indian territories, the expedition scientists A. Doering and P. G. Lorentz found the Pampas Meadowlark to be the most abundant and characteristic icterid of the Buenos Aires *pampas* between latitudes 37° and 38°30' S. In this stronghold it inhabited the almost pure grasslands of the undulating plains. Outside Buenos Aires, this icterid was reported to breed in the provinces of Santa Fe and Entre Ríos, and perhaps even in Uruguay, as late as the 1950s. Since then, the distribution of the Pampas Meadowlark has steadily declined, and today most of

*Until very recently, the **Baudo Oropendola** was known from only five localities in north-western Colombia, including the headwaters of the River Acandí, where a breeding colony was recorded in 1991. This species may be naturally scarce. The kind of open-canopy forest that it seems to prefer, growing on sandy deposits along rivers and on coastal plains, is often the first to be lost to conversion and settlement. In 2010, two new colonies, totalling 70–80 individuals, were found about 120 km from Ensenada de Utría National Park, in an area where deforestation is accelerating. The Baudo Oropendola is considered Endangered.*

[*Psarocolius cassini*, W Antioquía, Colombia. Photo: Fundación ProAves/ Alonso Quevedo]





More than 95% of the population of the globally Endangered ***Tricolored Blackbird*** *breeds in the US state of California. In 2010, the total population was put at 395,000 individuals, barely half the number estimated for the seven Sacramento Valley counties alone in the 1930s. Considerable variation in estimates since the 1990s, however, suggests that this is a difficult species to survey. Up to 17% of the population breed in silage fields, a disastrous choice since these are harvested while the young are still in the nest. As breeding success is much higher in non-native upland vegetation than in native wetlands, conservation measures must address agricultural and upland habitats, too.*

[*Agelaius tricolor*, S California, USA. Photo: Dave Maslowski/ Maslowski Productions]

its population is concentrated in a small area at the southern edge of its former range, at the Sierras de la Ventana, north-west of the city of Bahía Blanca. Smaller populations have been reported from other sites, including the San Luis province of Argentina and parts of Uruguay, but their breeding status is unknown. There are also four winter records from south-east Brazil. A recent survey by P. Tubaro, F. Gabelli and co-workers showed that the remaining meadowlark population in Ventana far exceeds the previous estimate of 7500 individuals. Further populations were found in the sierras, with estimated total numbers of more than 20,000 individuals. Nevertheless, the species is still suggested as being Vulnerable, as it has a comparatively small and declining population within a small range. Conversion of natural grasslands for agriculture is causing rapid declines in the area of suitable habitat, with inevitable impacts on population size. The replacement of natural grasslands with crops and planted pastures, the main reason for the decline, may even affect its last stronghold; Pampas Meadowlarks nest mostly, or exclusively, on native grasslands. In addition, this meadowlark is not found within any national or provincial parks or reserves. The species' current breeding range is estimated at 16,600 km², a reduction of about 90% since 1900

Within the same general area of South America, the decline of the Saffron-cowled Blackbird is reasonably well documented. This icterid usually lives in or near wet grasslands, but it tolerates grazing and forages in agricultural fields. According to Hudson, it was found even in the rural suburbs of Buenos Aires city up to the 1880s. At that time the species was much more widely distributed, ranging from Paraguay and south Brazil southwards over much of the northern half of Argentina and most of Uruguay. The more drastic range retraction has occurred within Argentina. Here, this icterid became extinct in the late nineteenth century over most of Buenos Aires Province, where the last nesting attempt was observed in 1932; nowadays, it is found mostly in small areas of Entre Ríos and Corriéntes. Outside Argentina, it has small populations in eastern Paraguay, south-east Brazil, mostly in the state of Rio Grande do Sul, and south and east Uruguay, especially the Bañados del Este Biosphere Reserve. The global population is estimated at 2500–9999 mature individuals, but may not exceed 5000 individuals. Saffron-cowled Blackbirds are highly gregarious, and the large flocks reported in the past should be interpreted with care; it is possible that this was never an abundant species. In Entre Ríos, in Argentina, the total population estimate for 1997 was 250–500 individuals, and yet flocks containing more than 100 birds were seen in the winter. In 1879, the scientific expedition of Doering and Lorentz to the *pampas* of southern Buenos Aires reported only two groups of this blackbird, one of about 20 individuals and the other even smaller, during a 250-km transect across the pristine grasslands.

Due to their colourful plumage, Saffron-cowled Blackbirds are captured for the illegal cagebird trade during the breeding season, and this may disrupt or destroy entire nesting colonies. Another important threat to the species is the large-scale replacement of grasslands by pine and eucalypt (*Eucalyptus*) plantations, a practice that simply destroys its habitat. Drainage of wetlands probably had a major role in the extinction of populations in Buenos Aires Province. The species is also parasitized by Shiny Cowbirds, but this threat was already reported in 1881. The decline of the Saffron-cowled Blackbird is probably due to several factors, possibly exacerbated by the species' relative rarity. It is found in some protected areas in Uruguay, Paraguay and Brazil.

It is worth noting that a decline in grassland species has been recorded in most parts of the world, but it is in South America that the problem is of greatest concern. One factor that is often cited is that of burning. A recent experimental study by M. V. Petry and L. Krüger in Rio Grande do Sul focused on the way in which fire influenced the use of foraging habitat and breeding habitat by Saffron-cowled Blackbirds, which forage in grasses and nest in marshes. It was found that the blackbirds utilized the burnt areas more frequently and generally avoided areas of tall grass with other vegetation. In this region of south-east Brazil, fire has been used for centuries as a tool in the management of cattle, and in the study area short grasses are the result of such practices. The Saffron-cowled Blackbird depends on the existence of marshes surrounded by short grasses, using the latter for foraging. Because the period when burning is carried out coincides with the species' breeding season, the local landowners' unawareness of ecological factors and their inability to control fires pose a real threat to these populations.

In north-east Argentina, the Aguapey river basin in the *pampas* grasslands is the last refuge for a whole array of globally



*The Endangered **Yellow-shouldered Blackbird** was once widespread in Puerto Rico, but is now restricted mostly to south-western coastal areas. Brood parasitism by the Shiny Cowbird* (Molothrus bonariensis) *greatly reduced its numbers and resulted in most pairs breeding on offshore cays. In 1984 an artificial-nest programme was initiated, combined with the removal of cowbirds. From 1996 to 1999, only 22 of 804 nests in artificial structures and one of 203 nests in natural substrates were parasitized. Pre-breeding roost counts from 1985 to 1995 showed annual increases of 14%, and the population in 1998 was estimated at 1250, up from a low of 300.*

[*Agelaius xanthomus xanthomus*, Cabo Rojo, Puerto Rico. Photo: Eladio M. Fernández]

threatened bird species. A. S. Di Giacomo and colleagues, in an interesting and useful study, evaluated the influence of landscape characteristics on the occurrence of six threatened and Near-threatened passerines. Saffron-cowled Blackbirds were associated with rolling country in which, predictably, wet lowland grasslands and marshes were linked with dry upland grasslands; so, also, were Black-and-white Monjitas (*Xolmis dominicanus*). The grasslands of the Aguapey basin are exploited mainly for livestock grazing and afforestation. Since 1995, about half of the original grassland habitat has been planted with non-native trees. The authors believe that, if this trend continues, the Saffron-cowled Blackbird will probably become extinct in the Aguapey river basin, which currently holds the largest population of this icterid in Argentina. Various conservation measures have been proposed, including, among others, the establishing of appropriate reserves and protected zones, the creation of a land-use plan for the basin, the avoiding of planting trees in large blocks, and the removal of government incentives for large afforestation projects.



*Now rare and extremely local, the **Colombian Mountain Grackle** occurs mainly along the western slope of the east Andes of Colombia. At least 80% of its epiphyte-rich humid montane oak forests have been logged or converted to pasture, and many of the sites at which it was recently recorded are being rapidly deforested. Suitable habitats exist in the inaccessible upper elevations of the Yariguíes mountains, where the core population is probably at least 800 individuals. Elsewhere in its range, the population is small and severely fragmented.*

[*Macroagelaius subalaris*, Reserva Nacional de las Aves Reinita Cielo Azul, Santander, Colombia. Photo: Nick Athanas]

Only one member of Icteridae is listed as Near-threatened. The St Lucia Oriole, restricted to one small Caribbean island, has an extremely small global range and a very small population, thought to be nearer the lower end of the range 1000–2500 mature individuals. Although scarce, it is reasonably widespread on the island in dry scrub, coastal vegetation, plantation forests and edges, and both primary and secondary forests. Since the 1930s, this oriole has decreased in number and become more local, the probable cause being a combination of habitat loss, pesticide-spraying, brood parasitism by Shiny Cowbirds and harassment by Spectacled Thrushes (*Turdus nudigenis*). Rates of cowbird parasitism may be very high locally, up to 75% of broods consisting partially or exclusively of Shiny Cowbirds, but it is not known what effect, if any, this may be having on the oriole's present populations. There is no evidence that the St Lucia Oriole is declining or is under any threat, and its population is thought to be stable. Its population trends, however, are poorly known and should be monitored.

Apart from the "official" international listing of species of conservation concern, other measures of status are sometimes revealing. One such case involves Audubon's Oriole (*Icterus graduacauda*). This species' distribution is mostly in north-east and south Mexico, but the subspecies *auduboni* extends northwards into south Texas, in the extreme south USA. Local populations of this taxon along the Rio Grande in Texas and Tamaulipas, in adjacent north-east Mexico, have declined as a result of clearance of woodlands for irrigated agriculture; brood parasitism by Bronzed Cowbirds may represent an additional problem. It has now disappeared from most of the Lower Rio Grande Valley, including protected areas, and in *The American Bird Conservancy Guide to Bird Conservation*, published in 2010, this icterid is classed as "Rare" in the USA (Yellow WatchList priority species for conservation).

Some distinctive races of icterids have also suffered drastic declines. In the Cayman Islands, the subspecies *bairdi* of the Jamaican Oriole became extinct in the 1960s, for reasons that remain largely unknown; it even inhabited gardens in towns. It was smaller and brighter in colour than the nominate race of Jamaica.

It may seem odd that a parasitic cowbird could be regarded as being threatened, but the Bronze-brown Cowbird may come in that category. It has a very restricted distribution in the Caribbean lowlands of the north Colombian departments of Atlántico, Bolívar and Magdalena, where it is extremely local, and the total population must be small. The reasons for this cowbird's restricted range are not clear, as its dry woodland habitat extends well into Venezuela. It is present in the Isla de Salamanca National Park, in Magdalena. The natural history of this cowbird is almost entirely unknown. Most non-Colombian authorities treat it as a well-differentiated subspecies of the far more widespread Bronzed Cowbird.

It is clear that cowbirds have on the whole proved to be very successful species. Indeed, it is believed that the Brown-headed Cowbird has, during recorded history, achieved a greater natural expansion of range than any other native North American bird species. The cowbird's recent range extensions have coincided with declines in several other native species, and these have often been blamed on cowbird parasitism. As a consequence, control programmes have been set up and thousands of cowbirds are killed every year in an attempt to save a number of threatened passerine species. It has been suggested that, although some of this control may be appropriate, much of it may be a waste of time and money. Evidence that Brown-headed Cowbirds have an adverse impact on common North American species is at best minimal, but cowbirds



Molecular-genetic data indicate that the highly distinctive ***Red-bellied Grackle*** *evolved in isolation for four million years. Known from all three Andean ranges in Colombia, it now has a small and fragmented population and is Endangered. Habitat clearance is one cause of its decline, but increases in forest cover in some areas have failed to result in population growth, suggesting that other factors are involved. Sometimes persecuted as a pest in maize* (Zea mays) *crops, it is also trapped for the cage bird trade. Recent new locations for the species include Amalfi, in Antioquia. It is reported as quite common in mountains around Medellín, and common at four reserves in Antioquia. Its current known range includes several other protected areas.*

[*Hypopyrrhus pyrohypogaster*, Amalfi, Colombia. Photo: Pete Morris]

In 2010, the four island subspecies of what was then called the "Greater Antillean Oriole" were elevated to species rank. Historically, the ***Bahama Oriole*** *was found on the Bahamian islands of Abaco and Andros. For unknown reasons, the Abaco population disappeared in the early 1990s, and recent surveys found just 127 orioles on Andros. With an estimated global population of fewer than 250, the new species immediately qualified as Critically Endangered. Lethal yellowing disease has wiped out the coconut palm* (Cocos), *in which the orioles nest, in much of north Andros, and nests are parasitized by the newly arrived Shiny Cowbird* (Molothrus bonariensis).

[*Icterus northropi*, Stafford Creek, Andros, Bahamas. Photo: Stephen Myers]

do undoubtedly pose a potentially serious threat to two species and two subspecies that suffered greatly from habitat loss during the twentiethy century. The taxa in question are Kirtland's Warbler, the Black-capped Vireo (*Vireo atricapilla*), race *pusillus* of Bell's Vireo (*Vireo bellii*), known as the Least Bell's Vireo, and the south-western race *extimus* of the Willow Flycatcher (*Empidonax traillii*). Cowbird control is a major component of the recovery programme for these endangered passerines, and was decidedly effective when it was first introduced. However, S. I. Rothstein has suggested that, in each case, the controlling of cowbird numbers has gone too far and that it now creates potentially harmful consequences, in addition to the obvious ethical problems that arise from the killing of thousands of Brown-headed Cowbirds, a native songbird, every year. Rothstein adds that, in the case of *extimus* Willow Flycatchers, it is difficult to detect any population benefits that have been gained since control began in California, Arizona and New Mexico; in most instances, the results of cowbird control were large increases in the production of young, but no clear growth in the numbers of breeding individuals.

Shiny Cowbirds, too, have expanded into new areas in South America and have also extended northwards into the Caribbean region. More recently, this species has reached the south-west USA, and it is expected to continue to expand its range as it encounters more and more suitable habitats. It is well adapted to artificial environments and is found in almost all open habitats, avoiding unbroken forest and dense woodland. The opening-up of previously closed forest habitats has benefited this and other cowbird species, enabling them to spread into areas where they were formerly absent. In Brazil, the Screaming Cowbird has spread northwards as far as the Tocantins–Maranhão–Bahia border, following its principal host species in Brazil, the Chopi Blackbird.

Woodland clearance and the creation of artificial habitats can sometimes benefit other species, as well as cowbirds. One example of this can be seen in South America, where the Peruvian Meadowlark (*Sturnella bellicosa*) has recently succeeded in expanding its area of distribution as a result of the conversion of woodlands into pastures.

The ***Montserrat Oriole*** *once occurred in all the main montane forests on Montserrat, but has declined greatly through a combination of human pressures and natural catastrophes. Volcanic eruptions and ashfalls in the mid-1990s destroyed most of the remaining forest, and the oriole is now restricted to two patches of 14 km² and 1–2 km². The volcano remains active, but the current main threat is nest predation by Pearly-eyed Thrashers* (Margarops fuscatus) *and introduced rats* (Rattus). *A protected area has been established in the Centre Hills, where the main population survives, and eradication of rats has begun. Recent evidence suggests some population recovery, but its future in the wild is uncertain and it is listed as Critically Endangered. There are captive-breeding groups at Jersey Zoo and elsewhere.*

[*Icterus oberi*, Centre Hills, Montserrat. Photo: Tavez Aymer]





General Bibliography

Allen & Omland (2003), Arendt *et al.* (2004), Azara (1802–1805), Barker *et al.* (2008a, 2008b), Barrera Vásquez & Rendón (1948), Beecher (1950, 1951b), Beletsky (1996), Bendell *et al.* (1981), Bent (1958), Bjorklund (1991), Blake (1968), Bock (1994), Bray *et al.* (1975), Briskie & Sealy (1990), Brodkorb (1957, 1978), Bruggers & Zaccagnini (1994), Butcher & Rowher (1988), Cadena *et al.* (2004), Campbell & Lack (1985), Choepf (1976), Corbin *et al.* (1979), Craves (1994), Cruden & Toledo (1977), Cuello (1988), DaCosta *et al.* (2008), Davies (2000), Dearborn & Lichtenstein (2002), Dickinson (2003), Dolbeer (1978), Dunning (1984), Dyer (1975), Eaton (2006), Eguiarte *et al.* (1987), Feekes (1981), Fink & Brower (1981), Fjeldså & Krabbe (1990), Flood (1989), Fraga (1991, 1998, 2008b), Freeman & Zink (1995), Friedmann (1929, 1965, 1971), Friedmann & Kiff (1985), Garrido *et al.* (2005), Gifford & Block (1930), Goguen & Mathews (1999), Greenlaw (1976), Grzybowski & Pease (1999), Gusinde (1982), Haemig (1978, 2010), Hamblin (1984), Hamilton & Orians (1966), Hardy *et al.* (1998), Hellmayr (1937), Herbert *et al.* (2004), Hill & Hagan (1991), Hobart *et al.* (1982), Hofmann *et al.* (2008a, 2008b), Howell & Webb (1995), Hudon & Muir (1996), Hudson (1920), Irwin (1990, 1994), Jacobsen *et al.* (2010), James (1993), Jaramillo & Burke (1999), Jensen (1988), Johnson & Lanyon (1999), Kondo & Omland (2007), Lanyon, S.M. (1992, 1994), Lanyon, S.M. & Omland (1999), López-Lanús (2008), Lowther (1975), Lowther *et al.* (2004), Marler (1969), Mermoz & Ornelas (2004), Meyer de Schauensee (1951), Ney-Nifle *et al.* (2005), Nomura (1996), Nottebohm (1975b), Omland & Kondo (2006), Omland & Lanyon (2000), Orians (1961, 1980, 1985a, 1985b), Orians & Christman (1968), Orians & Horn (1969), Orians, Eckermann & Schultz (1977), Orians, Orians & Orians (1977), Payne (1969), Peterson (1998), Petry & Krüger (2010), Pinto (1944a), Powell *et al.* (2008), Price & Lanyon (2002a, 2002b, 2004a, 2004b), Price *et al.* (2009), Rahn *et al.* (1988), Raven (1979), Remsen & Parker (1983), Rich *et al.* (2004), Robinson (1986a), Rohwer, Hobson & Rohwer (2009), Rothstein (1978b, 1990), Rothstein & Robinson (1998), Schaefer (1976), Schäfer (1957, 1984), Schoepf (1985), Schönwetter & Meise (1981, 1982), Schubart *et al.* (1965), Sclater (1883), Sealy & Neudorf (1995), Sealy & Underwood (2004), Searcy *et al.* (1999), Short (1968), Short & Parkes (1979), Sibley, C.G. (1996), Sibley, C.G. & Ahlquist (1990), Sibley, C.G. & Monroe (1990, 1993), Sick (1993), Silva & Strahl (1994), Skutch (1954, 1996), Stokes & Stokes (2000), Studer & Vielliard (1988), Weatherhead *et al.* (1982), Webster, J.D. (2003), Webster, M.S. (1992, 1999), Weir *et al.* (2009), Wetmore *et al.* (1984), Yuri & Mindell (2002).



PLATE 71

inches 4
cm 10

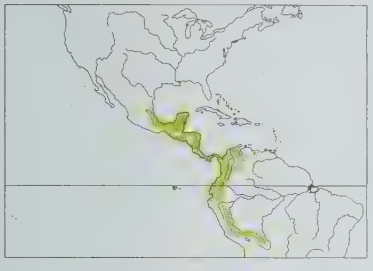
Genus *AMBLYCERCUS* Cabanis, 1851

1. Yellow-billed Cacique

Amblycercus holosericeus

French: Cassique à bec jaune **German**: Gelbschnabelkassike **Spanish**: Cacique Piquiclaro
Other common names: Chisel-billed Cacique/Blackbird; Prevost's/Chapman's Cacique (*australis*)

Taxonomy. *Sturnus holosericeus* W. Deppe, 1830, Alvarado, Veracruz, Mexico.
Affiliation uncertain. DNA and skeletal data, also nest structure, indicate that this species is not related to true caciques (*Cacicus*); even its inclusion within present family has been questioned. Genetic distance between nominate race and *australis* suggests that two separate species may be involved; races appear to differ little in nesting habits and voice; examination of *flavirostris* required. Three subspecies currently recognized.
Subspecies and Distribution.
A. h. holosericeus (W. Deppe, 1830) – SE Mexico (S Tamaulipas) and across C America S to NW Colombia (Cartagena).
A. h. flavirostris Chapman, 1915 – Pacific lowlands from W Colombia (Chocó) S to N Peru (Tumbes).
A. h. australis Chapman, 1919 – Santa Marta Mts (N Colombia), Sierra de Perijá and coastal mountains of C Venezuela (Distrito Federal), and Andes from SW Venezuela S to Peru and C Bolivia (Santa Cruz).



Descriptive notes. Male 21·5 cm and 68·6 g, female 20·5 cm and 53 g; male 50·3 g, female 47·3 g (*australis*). Male nominate race has plumage entirely black, with minimal gloss; iris pale yellow; bill long, chisel-shaped at tip, yellow, nostrils covered with characteristic flap; legs grey. Female is similar to male but smaller, with plumage slightly slaty, less pure black. Juvenile is duller black than adult, with dark iris. Races differ in size and bill colour: *flavirostris* is smaller than nominate and has brighter yellow bill; *australis* is even smaller, with longer tail, and with more slender yellow bill with grey base. Voice. Series of paired loud whistles, "sh-wheu", female sometimes may answer with dry harsh "chrrr" in a kind of duet; may vocalize from the nest. Also a nasal call.
Habitat. Dense thickets, including bamboo, often near streams; thick undergrowth in secondary forest, abandoned agricultural clearings in forest, also weed-covered fields. In highlands (particularly Andes) found mostly in dense *Chusquea* bamboo stands. Occurs form sea-level up to 1500 m, but reaching 3100 m in Panama and Costa Rica (nominate race); 1500–3500 m in Andes (*australis*).
Food and Feeding. Mostly insects, e.g. Orthoptera, bugs (Hemiptera), Hymenoptera and beetles (Coleoptera) in stomach contents; also other arthropods, possibly small vertebrates, rarely fruit (*Inga*). Forages mostly in dense vegetation, using "gaping" action (open-bill probing), and even hammering, to extract prey from leaves and stems, or from rotten wood. Once observed while following army ants (Formicidae) in Panama. Forages in pairs and in family groups; follows mixed-species foraging flocks.
Breeding. Season Apr–Jun in Costa Rica, Jun in Colombia and Dec in Ecuador. Apparently monogamous. Nest in Costa Rica a bulky cup of plant material, e.g. strips of banana leaves, dry vines and leaves, and grass, sometimes with black fungal rhizomorphs incorporated, external diameter 12–15 cm, internal depth 6–6·5 cm, placed over tree crotch or attached to stems and vines, 1–2·5 m above ground in dense vegetation; a nest in Ecuador was an open cup with external diameter 12–13 cm and external depth 9·5 cm, built from *Chusquea* bamboo leaves and lined with pale fibres, attached 2·6 m above ground to three bamboo stems with long, thin vine tendrils and dead herbaceous material in 1·5-ha patch of *Chusquea*. Clutch 2 eggs, pale blue with black spots and lines around large end, mean dimensions 26·9 × 18·3 mm (Costa Rica) and 27·1 × 19·3 mm (Ecuador); in Ecuador only one adult observed during early incubation, later other adult (presumed the male) fed incubating individual (presumed female); both parents feed chicks; no information on duration of incubation and nestling periods. Frequent host of *Molothrus aeneus*, at least locally; five parasitized nests in Costa Rica contained 3–5 cowbird eggs and 0–2 host eggs.
Movements. Apparently sedentary; possibly some altitudinal movements in highlands.
Status and Conservation. Not globally threatened. Fairly common to uncommon and local. Tolerant of partial deforestation; uses dense second growth for nesting. Present in many protected areas.
Bibliography. Freeman & Zink (1995), Gómez (1983), Greeney, Jaffe & Manzaba (2008), Hilty (2003), Howell & Webb (1995), Kiff (1973), Kratter (1993), Lanyon & Omland (1999), Ridgely & Greenfield (2001a, 2001b), Russell (1964), Schönwetter & Meise (1982), Skutch (1954, 1996), Stiles & Skutch (1989), Webster (2003), Wetmore *et al.* (1984).

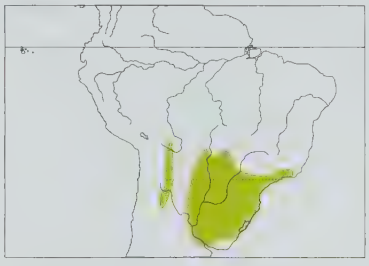
Genus *CACICUS* Lacépède, 1799

2. Golden-winged Cacique

Cacicus chrysopterus

French: Cassique à épaulettes **German**: Goldschulterkassike **Spanish**: Cacique Aliamarillo

Taxonomy. *Xanthornus Chrysopterus* Vigors, 1825, Brazil.
Formerly placed in genus *Archiplanus*, as *A. albirostris*; when included in present genus, however, that name becomes preoccupied. Has been regarded as closely related to *C. koepckeae*, with the two possibly forming a superspecies; also close to *C. sclateri*. Monotypic.
Distribution. E Bolivia (Santa Cruz) and S Brazil (from Mato Grosso do Sul and Rio de Janeiro) S to N Argentina (Tucumán, Catamarca, Santa Fe and Entre Rios) and NW Uruguay.



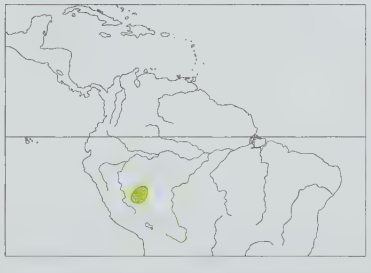
Descriptive notes. Male 20·7 cm, 34·6–47·2 g; female 19·3 cm, 30·2–34 g. Plumage is black overall, with bright yellow patch on lower rump and bright yellow patch on wing (median and inner greater upperwing-coverts); iris pearly white to yellow; bill pale bluish-grey; legs black. Sexes similar, female slightly smaller than male. Juvenile is duller than adult, and with dark eyes. Voice. Song variable, rather musical; usually starts with lower-pitched notes, followed by sudden crescendo, e.g. "dreow-deo-deo-psiklée-o". Male bows while singing. Paired birds may communicate with low-pitched whistles or warbles with odd harmonics. Appears at times to mimic other birds. Contact call an ascending, rasping nasal "aa-ah".
Habitat. Mountain forests (yungas) on humid Andean slopes, reaching almost timber-line in the alder (*Alnus*) or *Podocarpus* zone; also forest edge, humid and mesic *chaco* woodland, and transitional *chiquitano* forest. In E inhabits Atlantic Forest, from pristine-looking to degraded, and found also in second growth. In drier parts of range (C Chaco), partial to riparian or gallery forests. Up to 2800 m in humid mountain forests (S yungas) in Andes; mostly above 400 m in E Brazil.
Food and Feeding. Insects and other invertebrates, small vertebrates, also fruits and nectar. Stomach contents included small beetles (Coleoptera) and lepidopteran caterpillars. Wild fruits eaten include those of the trees *Alchornea glandulosa* and *Cabralea canjarana*, also of *Rhipsalis* epiphytic cacti, and arils of the vine *Chamissoa altissima*; feeds also on cultivated fruits, e.g. guavas (*Psidium*), oranges (*Citrus*), mulberries (*Morus*). Nectar obtained from flowers of epiphytic and terrestrial bromeliads (e.g. *Bromelia* and *Aechmea*), also from *Fuchsia*. Commonly probes and gapes into bark and epiphytes, and opens hollow twigs and insect galls; in Misiones (NE Argentina), seen to search webs built by tent caterpillars (*Malacosoma*). May hang upside-down while foraging. Mostly arboreal, frequently in mixed-species foraging flocks, commonly with *Icterus pyrrhopterus* and other icterids. Usually in pairs or family groups, but also reported also in flocks of 30 individuals, sometimes even more, in non-breeding season or during altitudinal movements.
Breeding. Season Oct–Dec in Argentina. Monogamous; solitary nester. Male commonly displays and sings around nest-site. Nest built by female, a long purse (45–60 cm long), open at top, almost always woven from thin blackish fibres, main material rhizomorphs of *Marasmius* fungus picked from bark of trees (particularly those of family Myrtaceae), sometimes mixed with horsehair, nest suspended from isolated branch tip, commonly over stream or small pond; sometimes built near older nests. Nest sometimes usurped by Piratic Flycatcher (*Legatus leucophaius*). Clutch 2–4 eggs, mostly 3, white with brownish spots, mean dimensions 24 × 16·6 mm; incubation by female alone, period 14–15 days; chicks fed by both parents, nestling period 18–19 days; family group persists for some months after young leave nest. Nests parasitized by *Molothrus bonariensis*.
Movements. Basically sedentary; some altitudinal movement in mountains of NW Argentina and (probably) Bolivia. Records from Buenos Aires (E Argentina) possibly involve vagrants, as nesting not reported from that province.
Status and Conservation. Not globally threatened. Rather abundant, particularly in mesic subtropical forests and woodland; rare or local in drier W Chaco of Bolivia, Paraguay and Argentina. Tolerant of light to medium disturbance of forest. Found in several protected areas, including Kaa-Iya del Gran Chaco and Amboró National Parks (Bolivia), Chaco, Mburucuyá, Río Pilcomayo, Finca El Rey and Calilegua National Parks (Argentina), San Rafael National Park (Paraguay) and Serra da Bocaina and Itatiaia National Parks (Brazil).
Bibliography. Belton (1985), Bodrati & Fraga (2010), Chatellenaz & Ferraro (2000), Contreras (1983), Di Giacomo (2005), Guerrero & Arambiza (2001), Hartert & Venturi (1909), Jaramillo & Burke (1999), Narosky (1973), Pizo (1996), Ramírez-Llorens *et al.* (2003), Ridgely & Tudor (1989), Wetmore (1926), Wright & Ferraro (1985).

3. Selva Cacique

Cacicus koepckeae

French: Cassique de Koepcke **German**: Koepckekassike **Spanish**: Cacique de Koepcke

Taxonomy. *Cacicus koepckeae* Lowery and O'Neill, 1965, Balta, c. 300 m, south-east Ucayali, Peru.
Could been included in genus *Archiplanus*, if recognized. Morphological and biogeographical evidence indicate close relationship to *C. sclateri*; has been suggested that the two might be conspecific, but songs differ (though some calls similar). Has been regarded as close relative of *C. chrysopterus*, with the two perhaps forming a superspecies. Monotypic.
Distribution. W Amazonia in E Peru (Ucayali, Cuzco and Madre de Dios) and nearby W Brazil (Acre).



Descriptive notes. c. 23 cm. A slender, long-tailed dark cacique. Plumage is entirely black, except for bright yellow rump and uppertail-coverts; iris pale blue; bill pale bluish-grey; legs black. Sexes similar. Juvenile undescribed. Distinguished from superficially similar congeners by combination of yellow rump and blue bill and eye colours. Voice. Song during display at nest c. 2·4 seconds, consists of 2–4 similar introductory notes followed by two whistles or by a whistle and a buzzing note. A frequent call consists of alternate high-pitched and low-pitched staccato notes, "legs-cheow".
Habitat. Found mostly in dense riparian vegetation along small rivers or creeks flowing through forested foothills, often in *quebradas* (ravines); riparian vegetation includes dense growth of the "paca" bamboo *Guadua*, and also the giant cane-like grass *Gynerium saggitatum*, as well as medium-sized trees such as *Cecropia*, balsa (*Ochroma*

On following pages: 4. Ecuadorian Cacique (*Cacicus sclateri*); 5. Northern Mountain Cacique (*Cacicus leucoramphus*); 6. Southern Mountain Cacique (*Cacicus chrysonotus*); 7. Subtropical Cacique (*Cacicus uropygialis*); 8. Scarlet-rumped Cacique (*Cacicus microrhynchus*); 9. Red-rumped Cacique (*Cacicus haemorrhous*); 10. Yellow-rumped Cacique (*Cacicus cela*); 11. Band-tailed Oropendola (*Ocyalus latirostris*); 12. Casqued Oropendola (*Clypicterus oseryi*); 13. Solitary Cacique (*Procacicus solitarius*); 14. Yellow-winged Cacique (*Cassiculus melanicterus*).

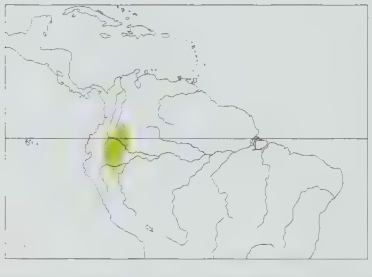
pyramidale), and leguminous trees e.g. *Erythrina poeppigiana*, *Zygia* and *Inga*. Has also been reported along larger rivers and *cochas* (oxbow lakes). At 300–700 m.
Food and Feeding. Diet little known. Feeds on nectar of *Erythrina* and *Inga* flowers. Forages mostly 1–5 m above ground; seen also seen in canopy, searching *Erythrina* seed pods. Usually in small groups of up to six individuals, possibly families; roosts with other icterids, particularly oropendolas.
Breeding. Nests found during Jul (dry season). Breeds as isolated pairs. Possibly co-operative breeder, as small groups of 3–5 individuals seen to visit nests; at one nest, a third cacique visited and did some nest-guarding, and the trio chased and attacked other icterids, notably *C. cela* and *Psarocolius decumanus*. One member of pair (presumably female) brought all nesting material, escorted by its mate, which sang and displayed on branch supporting nest; nest a slender pensile bag c. 60 cm long, main material blackish hyphae of *Marasmius* fungus, probably with other fibres incorporated, one was suspended from branch of *Zygia* tree 6 m above stream (the Arroyo Sepriato, in Cuzco), another was hanging from thorny *Mimosa* creeper growing over a small tree 10 m over water of same stream, both nests would have been flooded in rainy season. No other information.
Movements. Apparently sedentary.
Status and Conservation. VULNERABLE. Restricted-range species: present in South-east Peruvian Lowlands EBA. Rare and local; possibly overlooked. Known range in Peru fragmented; thought to occur also in adjacent W Brazil (Acre). Was formerly known from only three localities within tiny area of E Peru; has recently been located in at least one additional protected area. This species' preferred habitat appears to be riparian vegetation and riverine forest, and recent spatial models suggest that its distribution could be more extensive than currently known, and perhaps extend beyond 20,000 km². All records have been in areas of sparse human population, apparently not at imminent risk of habitat loss. Occurs in Manu National Park; presence in Santuario Nacional Megantoni recently confirmed, and may occur also in Cordillera Azul National Park. If fieldwork leads to discovery of further populations of this icterid in neighbouring areas, it could perhaps be downgraded to Near-threatened.
Bibliography. Anon. (2010d), Butchart & Stattersfield (2004), Buzzetti (2009), Cardiff & Remsen (1994), Gerhart (2004), Grilli *et al.* (2009), Jaramillo & Burke (1999), Lowery & O'Neill (1965), Ridgely & Tudor (1989), Schulenberg *et al.* (2010), Stattersfield & Capper (2000), Tobias (2003), Young *et al.* (2009).

4. Ecuadorian Cacique

Cacicus sclateri

French: Cassique d'Équateur **German**: Trauerkassike **Spanish**: Cacique Ecuatoriano
Other common names: Ecuadorian Black Cacique

Taxonomy. *Agelaeus sclateri* A. J. C. Dubois, 1887, Ecuador.
Has in the past sometimes been placed in genus *Archiplanus*. Morphological and biogeographical evidence indicate close relationship to *C. koepckeae*; has been suggested that the two might be conspecific, but songs differ (though some calls similar). Monotypic.
Distribution. W Amazonia from S Colombia (Serranía de la Macarena) S to E Ecuador and N Peru (Loreto).



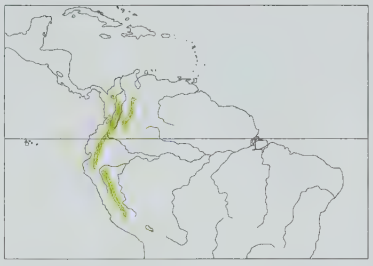
Descriptive notes. Male 23 cm, mean 57 g; female 19·5 cm, 49 g. A slender, long-tailed cacique. Plumage is entirely black, occasionally with a few yellow feathers in rump; iris pale blue; bill usually bluish-grey, sometimes dark horn-coloured; legs black. Differs from similar *Procacicus solitarius* mainly in smaller size and blue (not dark) eyes. Sexes similar. Juvenile (known from a single specimen) duller black. VOICE. Song typically transcribed as "wa-hu-kléé-ó" and variants, somewhat resembling that of *Procacicus solitarius*. Calls include "kip-cheew" and loud "chak-chak", similar to those of *C. koepckeae*.
Habitat. Lowland forests and forest edge near water; reported from oxbow lakes. Lowlands and foothills mostly below 400 m, rarely up to 750 m.
Food and Feeding. Insects, including ants (Formicidae), caterpillars, and beetles (Coleoptera); also fruit and possibly nectar. Forages in canopy, sometimes descending to lower levels. Singly and in pairs. Sometimes joins mixed-species flocks.
Breeding. Breeds in Jan in Colombia. Solitary nester, presumably monogamous. Possibly a co-operative breeder; three individuals reported as visiting one nest. Nest a purse up to 100 cm long, open at top, woven from dark rhizomorphs of *Marasmius* fungus, suspended from branch tip; two consecutive nests were in tree growing within an oxbow lake. Clutch 2 eggs, white. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Upper Amazon–Napo Lowlands EBA. Fairly common to locally not uncommon; sometimes rated as rare and local, but easily overlooked. Found in Tinigua National Park (Colombia) and in Pacaya-Samiria National Reserve (Peru).
Bibliography. Botero (2001), Cadena *et al.* (2000), Hardy *et al.* (1998), Jaramillo & Burke (1999), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schulenberg *et al.* (2010).

5. Northern Mountain Cacique

Cacicus leucoramphus

French: Cassique à bec blanc **German**: Nordandenkassike **Spanish**: Cacique Montano Norteño
Other common names: Golden-shouldered Cacique; Mountain Cacique (when treated as conspecific with *C. chrysonotus*)

Taxonomy. *Xanthornus leucoramphus* Bonaparte, 1845, "Bogotá".
Formerly placed in genus *Archiplanus*. Often considered conspecific with *C. chrysonotus*. Two subspecies recognized.
Subspecies and Distribution.
C. l. leucoramphus (Bonaparte, 1845) – Andes of W Venezuela (Táchira) and Colombia (all three cordilleras) S to SE Ecuador (Loja).
C. l. peruvianus J. T. Zimmer, 1924 – E slope of Andes of Peru (Amazonas S to Junín).
Descriptive notes. Male 28 cm and 98 g; female 25 cm and 64·5 g (nominate). Male nominate race is mostly glossy black, with bright yellow wing patch (median and inner greater upperwing-coverts), lower back and rump; concealed pale semi-collar formed by white bases of black feathers (perhaps exposed during display); iris blue; bill greenish-ivory, base bluish-grey; legs grey to black. Female is like male, but duller black overall. Immature has dark brown iris and darker bill than adult. Race *peruvianus* is heavier-billed and has less well-developed collar than nominate. VOICE. Noisy. Commonest calls are repetitions of loud notes with several harmonics, resembling calls of jays (Corvidae) or even hawks (Accipitridae); also a descending "fee-ooow" whistle, 2700–2050 Hz, and groups of 2–3 similar notes sounding like "frío-frío-frío". Duets reported. Song of a male near nest described as pig-like squeals followed by high-pitched notes and accelerating into a rattle.



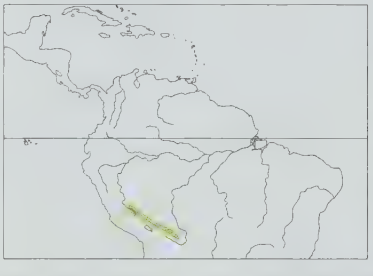
Habitat. Subtropical to temperate, humid montane forests. Reported to prefer forest with species of *Weinmannia* and *Clusia*. At 2000–3600 m (nominate race); 2000–3300 m in S of range (*peruvianus*).
Food and Feeding. Appears to feed mostly on insects and other arthropods; stomach contents include unidentified fruits. Forages in canopy and forest edge, actively probing into bamboo, epiphytes and bark. Found singly, in pairs, and in small flocks of 5–10 individuals; often in mixed-species foraging flocks with *Cyanolica* jays or *Buthraupis* mountain tanagers, also with *Hypopyrrhus pyrohypogaster*.
Breeding. Season Feb–Jul in Colombia. Apparently breeds solitarily or in small colonies: in Cundinamarca, Colombia, reported as solitary nester, with suggestion of co-operative breeding; in Ecuador, cluster of six active nests found near Baeza, but of three nests rather close together in Volcán Tungurahua only one was active. Nest an elongated bag c. 50 cm long, entrance at top, built from coarse plant materials, suspended from branch at medium height above a slope. No further information.
Movements. No information. Possibly some altitudinal movement.
Status and Conservation. Not assessed. Scarce or local in Venezuela and Colombia; uncommon to fairly common in Ecuador; fairly common in Peru. Has relatively large geographical range. Not reported as a host of *Molothrus oryzivorus*, probably because it occupies higher elevations.
Bibliography. Cuadros (1988), Hilty (2003), Hilty & Brown (1986), Jaramillo & Burke (1999), McCarthy (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schulenberg *et al.* (2010), Skutch (1996).

6. Southern Mountain Cacique

Cacicus chrysonotus

French: Cassique montagnard **German**: Mittelandenkassike **Spanish**: Cacique Montano Sureño
Other common names: Bolivian Cacique; Mountain Cacique (when treated as conspecific with *C. leucoramphus*)

Taxonomy. [*Cassicus*] *Chrysonotus* d'Orbigny and Lafresnaye, 1838, Yungas, La Paz, Bolivia.
Formerly placed in genus *Archiplanus*. Often considered conspecific with *C. leucoramphus*. Monotypic.
Distribution. Andes of Peru (from Junín) S to C Bolivia (Santa Cruz).



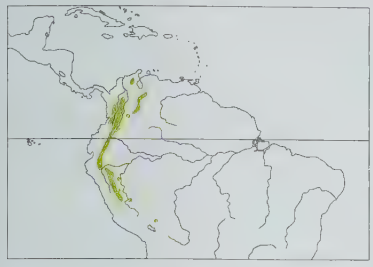
Descriptive notes. c. 28–30 cm; male 92·5 g, female 66·5 g. Male is mostly glossy black, with lower back and rump yellow; some have some yellow feathers in upperwing-coverts; iris blue to bluish-white; bill ivory-coloured, base bluish-grey; legs black. Differs from *C. leucoramphus* mainly in lack of concealed white collar, usually no yellow in wing-coverts, and has longer bill. Female is similar to male, but duller black overall. Immature is like adult, but eyes dark brown. VOICE. Repeated loud call notes, similar to those of *C. leucoramphus* but slower, softer and higher-pitched. A more complex vocalization of 5 notes, possibly a song, in which low-pitched throaty notes alternated with high and low whistles.
Habitat. Subtropical to temperate, humid montane forests, at 1800–3300 m.
Food and Feeding. Appears to feed mostly on insects and other arthropods; also takes nectar and fruits. Forages in canopy or forest edges, actively probing into epiphytes and bark; also in bamboo. Found in small flocks; often in mixed-species foraging flocks with *Cyanolica* jays or *Buthraupis* mountain tanagers.
Breeding. Fledglings seen in Oct–Jan in Bolivia. No other information.
Movements. No information. Possibly some altitudinal movement.
Status and Conservation. Not assessed. Fairly common. Estimated geographical range based on spatial models would cover c. 58,000 km². Occurs in Carrasco National Park and Amboró National Park, both in Bolivia.
Bibliography. Fjeldså & Krabbe (1990), Jaramillo & Burke (1999), Mayer (2010), McCarthy (2006), Restall *et al.* (2006), Schulenberg *et al.* (2010), Young *et al.* (2009).

7. Subtropical Cacique

Cacicus uropygialis

French: Cassique à dos rouge **Spanish**: Cacique Subtropical
German: Nord-Scharlachbürzelkassike
Other common names: Curve-billed Cacique

Taxonomy. *Cassicus uropygialis* Lafresnaye, 1843, Bogotá, Colombia.
Sometimes regarded as conspecific with *C. microrhynchus*, but differs vocally. Monotypic.
Distribution. Sierra de Perijá, and Andes from W Venezuela (Táchira) and Colombia (all three cordilleras) S on E slopes to Peru and NW Bolivia (La Paz).
Descriptive notes. Male 29 cm, 68 g; female 25 cm, 53 g. Rather long-tailed cacique with long, slightly decurved bill. Male is mostly jet-black with slight bluish gloss, and with red patch in lower back and rump; iris light blue; bill ivory-coloured, tinged slightly yellow at base and slightly greenish on rest; legs black. Female is less glossy than male. Juvenile is duller than adult, with dark eyes.



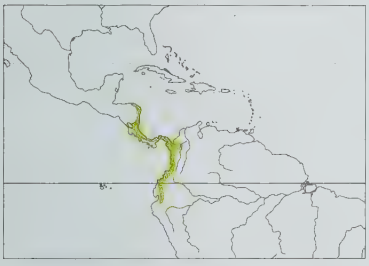
Voice. Song described as a series of whistles. Has variety of calls, one consisting of a three-part warble (1600–2100 Hz), another of sharp "keap!" notes.
Habitat. Humid subtropical montane forest, also forest edges; at 1000–2450 m.
Food and Feeding. Insects and other arthropods; also fruit and nectar, and known to take *Cecropia* fruits. Forages up to canopy level. Usually in small flocks; commonly found in mixed-species foraging flocks with other icterids, such as mountain caciques and *Psarocolius angustifrons*, or with *Cyanolica* jays.
Breeding. Reported as nesting in small colonies of up to twelve bag-shaped nests, hanging from isolated trees in ravines. No other information.
Movements. No information. Possibly some altitudinal movement.
Status and Conservation. Not assessed. Common to locally abundant. Has apparently extensive geographical range. Not likely to be globally threatened.
Bibliography. Hennessey & Gomez (2003), Hilty (2003), Hilty & Brown (1986), Jaramillo & Burke (1999), McCarthy (2006), Parkes (1970), Renjifo (1999), Restall *et al.* (2006), Ridgely & Tudor (1989), Salaman *et al.* (2002).

8. Scarlet-rumped Cacique

Cacicus microrhynchus

French: Cassique à bec mince **Spanish**: Cacique Lomiescarlata
German: Süd-Scharlachbürzelkassike
Other common names: Small-billed Cacique; Pacific Cacique (*pacificus*)

Taxonomy. *Cassiculus microrhynchus* P. L. Sclater and Salvin, 1865, Panama Railway, possibly Lion Hill Station, Panama.
Sometimes regarded as conspecific with *C. uropygialis*, but differs vocally. It has been suggested that race *pacificus* merits treatment as a full species, on basis of vocal differences; further research required. Two subspecies recognized.
Subspecies and Distribution.
C. m. microrhynchus (P. L. Sclater & Salvin, 1865) – E Honduras S in Caribbean lowlands (in Costa Rica and Panama also locally in Pacific lowlands) to E Panama (San Blas).
C. m. pacificus Chapman, 1915 – E Panama (Darién) and Pacific lowlands of Colombia S to SW Ecuador (El Oro).



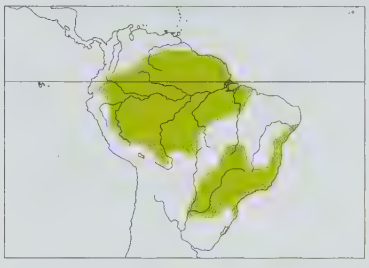
Descriptive notes. Male 23 cm and 62·5–71·7 g, female 20 cm and 50–57·6 g (nominate); male average 84·4 g, one female 61 g (*pacificus*). Nominate race is mostly black with slight gloss; small bright red patch on rump (often concealed by folded wings when bird perched); iris light blue; bill ivory-coloured, tinged slightly yellow at base and slightly greyish, bluish or greenish on rest; legs black. Sexes similar. Juvenile is duller than adult, with dark eyes. Race *pacificus* is similar in plumage to nominate, but larger, and with larger bill. Voice. Song of nominate race (by both sexes, from nest) a series of clear whistles, variable, sometimes shrill in tone and high-pitched, often a series of rising notes and then a sequence of falling notes. Songs of *pacificus* described as shorter, comprising four similar descending whistles; calls include a series of four loud modulated "wheo" whistles.
Habitat. Humid forest, primary forest and old second growth; also nearby shady plantations and clearings. Nominate race reported at up to 1100 m, and *pacificus* to 900 m.
Food and Feeding. Insects and other arthropods, small vertebrates, and fruit and nectar. Reported as raiding wasp (Vespidae) nests and eating the larvae. Known to feeds on arillate fruits of *Alchornea costaricensis* and nectar of *Marcgravia* vines. Mostly arboreal; often hangs upside-down while probing into crevices, bromeliads, dead leaves, and similar. Forages usually in groups of 4–10 individuals; commonly seen in mixed-species foraging flocks with oropendolas and other canopy passerines. Roosts in dense foliage in flocks of up to hundreds.
Breeding. Season Feb–Jun in Costa Rica and Feb–Aug in Panama; possibly double-brooded. Apparently monogamous. Solitary breeder in Costa Rica and most of Panama, though small colonies reported locally from C Panama (nominate race); *pacificus* reported as nesting in small colonies, but few data on this race. Nest built by female, taking 8–20 days, a purse 38–74 cm long, open at top, woven from brownish plant fibres (including roots and inflorescences), lined with seed down, suspended from tip of tree branch, including seasonally deciduous *Cordia alliodora*, or thorny pejibaye palm (*Bactris gasipaes*), sometimes hanging from lianas; often with wasp nest near nesting tree. Clutch 2 eggs, white with a few brownish and blackish spots and scrawls; incubation by female alone; chicks fed by both sexes; no information on duration of incubation and nestling periods; fledglings fed by both parents, and apparently sometimes also by other adults in post-breeding flocks.
Movements. Apparently resident.
Status and Conservation. Not assessed. Unlikely to be at any risk. Abundant in most of range. Found in several national parks and other protected areas, from Costa Rica S to Ecuador.
Bibliography. Hilty & Brown (1986), Jaramillo & Burke (1999), McCarthy (2006), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Skutch (1972), Stiles & Skutch (1989), Wetmore *et al.* (1984).

9. Red-rumped Cacique

Cacicus haemorrhous

French: Cassique cul-rouge **German**: Rotbürzelkassike **Spanish**: Cacique Lomirrojo

Taxonomy. *O.[riolus] haemorrhous* Linnaeus, 1766, French Guiana.
Mitochondrial DNA data indicate rather distant relationship with *C. cela*. Three subspecies recognized.
Subspecies and Distribution.
C. h. haemorrhous (Linnaeus, 1766) – SE Venezuela E to French Guiana, S to E Colombia, E Ecuador and N Brazil (Roraima).
C. h. pachyrhynchus Berlepsch, 1889 – Amazon Basin in Brazil (Amazonas and Pará S to Rondônia and NW Mato Grosso), E Peru and N Bolivia.
C. h. affinis Swainson, 1834 – E Brazil (Pernambuco and S Tocantins S to Santa Catarina), E Paraguay and NE Argentina (S to Corrientes).



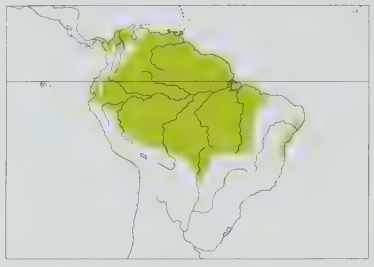
Descriptive notes. Male 29 cm, average 96·5 g; female mean 25·2 cm, 62–74 g. A large, black cacique. Male nominate race is glossy black, apart from bright red lower back and rump; iris light blue; bill ivory-coloured; legs black. Female is duller in colour than male, with iris brownish-blue. Juvenile resembles female. Races differ mostly in iridescence of black plumage of male and in bill shape: *pachyrhynchus* has thicker bill than others; *affinis* is less glossy, with rump paler red, and has more slender bill. Voice. Loud, complex and varied repertoire of songs and calls, particularly among males. Vocalizations of race *affinis* include odd sibilant noises sounding like bellows, also low-pitched warbles, e.g. "wa-shee" etc. Perched male in display to nest-building female produces stereotyped "woody" grating song; louder warbling song (4–5 notes) shared by males around colony (colony noises of *affinis* audible at long distances). During nesting season solitary males away from colony (possibly non-breeding juveniles) give long, rambling subsongs. Alarm call a loud harsh "kak-kak-kak", taken up by all colony-members.
Habitat. Forest (both primary and second growth), clearings and plantations in forests, forest edges, and gallery forest. In N half of range more of a forest-dwelling species than *C. cela*. E race *affinis* found in gallery forest and large forest patches, and breeds even in small towns and suburbs. In non-breeding season confined more to forests. Lowlands to 900 m; race *affinis* to 1200 m.
Food and Feeding. Insects and other arthropods, also small vertebrates, fruit and nectar. Wild fruits taken (by race *affinis*) include *Cabralea canjarana*, *Ficus clusiifolia*, *Myrcianthes pungens*, and arils of *Cupania vernalis*. Feeds on nectar of *Pseudobombax* and other Bombacaceae, of *Erythrina* and of the vine *Mucuna* (Fabaceae). Nestling diet mostly insects, including large greenish katydids (Tettigoniidae) and mantises (Mantidae). Seeks food mostly on trees, also on lianas and epiphytes. Obtains nectar of *Mucuna* flower by inserting bill and opening mandibles (*Mucuna* has explosive flowers that open only when pressure applied on wings and keel); takes caterpillars of butterfly *Astraptes talus*, which pupate within these flowers. Known to pollinate flowers of *Mucuna japura*. Forages usually in groups or flocks, even during breeding; post-breeding flocks in Argentina can contain 80 or more individuals.
Breeding. Season Sept–May in Suriname and Aug–Jan in Argentina. Dominant males successively polygynous, pair-bond ending with start of incubation. Breeds in conspicuous colonies, usually of 20–30 nests in Amazonia; race *affinis* in colonies of 9–85 nests in Brazil and up to at least 100 nests in Argentina (Iguazú National Park); may form mixed colonies with *Psarocolius decumanus*, *Psarocolius viridis* and *C. cela* in N part of range (Amazonia, Suriname); in Brazil, Plain (*Pachyramphus validus*) and Chestnut-crowned Becards (*Pachyramphus castaneus*) may nest in colony trees. Perched male displays with a bow to nest-building female. Nest built by female, taking 5–11 days (nominate race) or average of 18 days (*affinis*), an elongated purse wider at bottom than at top, length 34–45 cm in Suriname, 47–65 cm in Argentina, entrance slit near top, woven from diverse plant fibres, in Argentina commonly including strips of green palm leaves (e.g. of *Syagrus romanzoffiana* and *Acrocomia totai*), also orchid rhizomes and ferns, race *affinis* usually incorporating black rhizomorphs of *Marasmius* fungus in inner nest fabric, nest lined with dry leaves, and suspended from branch or palm frond; late-season nests (possibly replacements) in Argentina appear shorter and more hastily built; colonies located in one to few isolated trees, commonly diverse tree species, even exotic pines (*Pinus*), also tree-ferns, and in Argentina and Paraguay mostly in the palm *Syagrus romanzoffiana* (one *Syagrus* palm in Iguazú National Park was used as colony site for at least 30 years), in E Brazil also in trees in marshes; in some areas nests near human habitations, even in towns (e.g. in NE Argentina), probably as anti-predator strategy. In Argentina nests commonly usurped by Piratic Flycatcher (*Legatus leucophaius*); abandoned nests sometimes used by *Icterus pyrrhopterus*. Clutch 2 eggs, whitish with reddish-brown spots and blotches, mean dimensions 28·4 × 19·6 mm (Argentina); in Suriname, incubation by female, period 17 days, chicks fed by female, very occasionally assisted by male, nestling period 25–28 days; in SE Brazil (race *affinis*) average incubation period 18·3 days and nestling period 23·4 days. Nests parasitized locally by *Molothrus oryzivorus*.
Movements. Apparently sedentary. In NE Argentina moves to more continuous forest during non-breeding season, visiting colony sites from time to time.
Status and Conservation. Not globally threatened. Relatively scarce in N half of range, where it is rarer than *C. cela*; rare and local in Ecuador and much of Amazonia. Race *affinis* far more abundant. Within its extensive range, this species is found in many national parks, e.g. Canaima National Park (Venezuela), Iguazú National Park (Argentina) and Itatiaia National Park (Brazil).
Bibliography. Agostini (2004), Agostini & Sazima (2006), Argel-de-Oliveira & Figueiredo (1996), Belton (1985), Chatellenaz & Ferraro (2000), Duca & Marini (2004, 2005, 2008), Dunham (1971), Feekes (1981), Fraga (2007, 2011), Haverschmidt (1972b), Hilty (2003), Jaramillo & Burke (1999), Oniki & Willis (1983), Parkes (1970), de la Peña (1987), Pizo (1996, 2009), Sick (1993), Wright & Ferraro (1985).

10. Yellow-rumped Cacique

Cacicus cela

French: Cassique cul-jaune **German**: Gelbbürzelkassike **Spanish**: Cacique Lomiamarillo
Other common names: Lawrence's/Saffron-rumped Cacique (*vitellinus*, *flavicrissus*)

Taxonomy. *Parus Cela* Linnaeus, 1758, "in Indiis"; error = Suriname.
Analysis of mitochondrial DNA indicates closer relationship with *C. uropygialis* than with *C. haemorrhous*, being genetically rather distant from latter. Races form two distinctive groups, separated by Andes: W group (*vitellinus* and *flavicrissus*) possibly represents a separate species, differing from single-species "*cela* group" in plumage colour and voice. Three subspecies recognized.
Subspecies and Distribution.
C. c. vitellinus Lawrence, 1864 – C Panama S to N & C Colombia (Santa Marta, Tolima).
C. c. flavicrissus (P. L. Sclater, 1860) – W Ecuador and extreme NW Peru.
C. c. cela (Linnaeus, 1758) – lowlands E of Andes from Colombia (including Caribbean coast near Santa Marta), most of Venezuela, Trinidad, and the Guianas S to C Bolivia (Santa Cruz) and S Brazil (Mato Grosso do Sul); also, coastal E Brazil (Pernambuco S to SE Bahia).
Descriptive notes. Male average 28 cm, 109·3 g; female average 23 cm, 71 g. Male nominate race is mostly black with slight bluish gloss; lower back, rump, uppertail-coverts and rear abdomen yel-



low; variable amounts of yellow in upperwing, affecting several greater coverts and some median coverts; uppertail mostly black from above with yellow at the upper edges, undertail yellow; iris blue; bill ivory; legs blackish. Female is like male, but smaller and duller. Immature has dark eyes. Race *vitellinus* has yellow parts of plumage richer, more orange-yellow, than nominate, also wing patch smaller, bill greyish at base; *flavicrissus* is very like previous, but smaller. Voice. A common call is a warbling "k'weu"; alarm call a series of harsh "kwack". Nominate race is an outstanding mimic of many birds, including parrots (Psittacidae), woodpeckers (Picidae), many passerines and others, and even of mammals; its variable song often starts with harsh double note, "k'wek-k'wok", followed by imitations (e.g. in Suriname and Bolivia); Suriname males have extensive song repertoire that slowly changes through time, including song themes typical of each respective colony. Male songs in Amazonian Brazil include grating sounds and a pleasant double phrase, "kw'héé-kwa'hu". Males of race *vitellinus* not known to mimic, but still have varied song repertoire; songs may sound like harsh falsetto notes, or pleasant low-pitched liquid warbles, or rhythmic phrases with nasal tone, and overall effect is less harsh and more pleasant than that of nominate songs.

Habitat. Forest edges, gallery forest, second growth, savanna, plantations, and pastures with large trees or palms. In Amazonia occurs in *várzea* and *terra firme* habitats, but more abundant in former; race *flavicrissus* occurs in Tumbesian xeric forest with annual precipitation of less than 600 mm. Lowlands and foothills, to 1000 m (nominate race).

Food and Feeding. Insects and other arthropods, small vertebrates, fruits and nectar. Stomach contents include caterpillars and Orthoptera. Fruits taken include those of *Cecropia*, and the epiphytic *Coussapoa*. Feeds on floral nectar from trees and lianas such as balsa (*Ochroma pyramidale*), bacuri (*Platonia insignis*), *Quararibea*, etc.; is a pollinator of bacuri, an economically important tree. Within forests feeds mostly in canopy or upper strata. Almost invariably in flocks.

Breeding. Breeds in Apr–May in Panama (race *vitellinus*); throughout year (but rarely in May–Jun) in Suriname, Nov–Jan in E Brazil (Pernambuco), and at least Jun–Sept in Bolivia. Male successively polygynous, pair-bond lasting until egg-laying. Colonial nester, with up to at least 100 nests per colony; sometimes *C. haemorrhous* and several species of oropendola nest in same trees. Nest built by female, taking 5–14 days, a purse (38–50 cm in length) with roofed entrance at top, woven from plant fibres, mainly strips of palm leaves, and suspended from branch tip; nests often clustered around nest of an aggressive wasp species (e.g. of genus *Synoeca*, *Polybia*, or other), which helps to repel predators; colonies in Amazonia and elsewhere sometimes located in trees growing on tiny islands, or in the water, and in some areas (the Guianas) colonies near human habitations, also probably as anti-predator strategy. Nests not uncommonly usurped by Piratic Flycatcher (*Legatus leucophaius*) and *Icterus croconotus*. Clutch usually 2 eggs, whitish with scattered black and reddish spots, mean dimensions 28·5 × 19 mm (nominate race) and 30·2 × 20·2 mm (*vitellinus*); incubation by female, period 16 days; chicks fed by female, rarely also by male, nestling period 24–28 days. Nests parasitized locally (e.g. Panama) by *Molothrus oryzivorus*; presumed case of parasitism by *Molothrus bonariensis* (on race *flavicrissus*) not well documented.

Movements. Mostly resident. In W Ecuador, populations of *flavicrissus* in xeric deciduous forest observed only during wet season.

Status and Conservation. Not globally threatened. Widely distributed and rather abundant, probably spreading and increasing in numbers with deforestation. Race *vitellinus* occurs in Soberanía National Park (Panama) and other protected areas. This species' role in pollinating economically important bacuri tree may be significant.

Bibliography. Allen (1891), Cherrie (1916), Dunham (1971), Feekes (1977, 1981, 1982), Fleischer & Smith (1992), Fraga (2006), Fraga & Kreft (2007), Friedmann & Kiff (1985), Haverschmidt (1967, 1972b), Lamm (1948), Maués & Venturieri (1997), Meyer de Schauensee (1951), Myers (1935), Oniki & Willis (1983), Robinson (1985a, 1985b, 1985c, 1986a, 1986b, 1986c, 1986d, 1986e, 1988a, 1988b), Schönwetter & Meise (1981, 1982), Skutch (1954), Smith (1968, 1979), Tinoco (2009), Trainer (1987, 1988, 1989), Trainer & Parsons (2002), Webster & Robinson (1999), Wetmore *et al.* (1984).

Genus *OCYALUS* Waterhouse, 1841

11. **Band-tailed Oropendola**

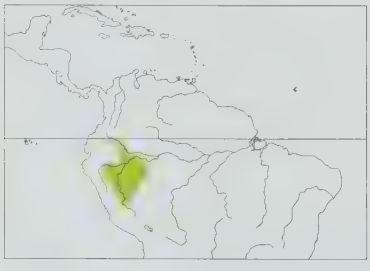
Ocyalus latirostris

French: Cassique à queue frangée **German**: Breitschnabel-Stirnvogel **Spanish**: Cacique Colibandeado

Taxonomy. *Cassicus latirostris* Swainson, 1838, Peru.

Genus sometimes subsumed in *Psarocolius*. In general morphology, size and behaviour appears closer to *Cacicus*, with voice rather like latter's. Mitochondrial DNA data, however, indicate close relationship with *Clypicterus oseryi*, the two forming a clade separate from the other oropendolas; a more distant relationship with *Cacicus haemorrhous* was weakly supported. Monotypic.

Distribution. W Amazonian lowlands in extreme S Colombia (around Leticia, in Amazonas), NE Ecuador, NE Peru (Loreto, Ucayali) and W Brazil (SW Amazonas and W Acre).



Descriptive notes. Male average 33·2 cm, 117·5 g; female average 24·5 cm, 74·8 g. Comparatively small oropendola looking all black at a distance, except for distinctive tail pattern in flight. Male has crown, nape and upper back dark chestnut; rest of plumage mostly velvety black, wing with bluish gloss; tail yellow with glossy black centre and tip, forming inverted T-pattern (usually concealed when bird perched); iris pale blue, rarely brown (possibly juvenile); bill variable, ivory-coloured with diffuse dusky wash around tip, or mostly dusky grey above, ivory-coloured below; legs black. Female is like male, but somewhat smaller and duller. Juvenile undescribed. Voice. Foraging calls described as liquid "chewop", "ke-cho" and "skeedelp-chop"; also a sharp "chiek". A more complex, two-part vocalization, "cho we-cho wo", with pleasant liquid tone, is probably the song. Repertoire and vocal timbre reminiscent of those of *Procacicus solitarius*.

Habitat. Amazonian floodplain-forest (*várzea*) along rivers, even on older islands; reported also in upland (*terra firme*) forest, but near rivers. Up to 300 m.

Food and Feeding. Stomach contents include unidentified fruits and caterpillars (Lepidoptera), but diet probably includes other arthropods, small vertebrates and nectar. Forages mostly below canopy. Often reported in mixed-species foraging flocks with *Psarocolius angustifrons* and *Cacicus cela*, and up to 50 individuals of present species reported in one such mixed flock in Brazil; rarely, in monospecific groups of 3–8 individuals.

Breeding. Season Aug–Sept in Peru and Brazil. Mating system seems monogamous to polygynous, but information on breeding minimal. Breeds solitarily or in colonies of up to 15–20 nests. One solitary nest in Brazil was a purse, open at top, similar in shape to that of *Cacicus haemorrhous*, woven from diverse plant fibres, built 17 m up and above a colony of *Clypicterus oseryi* in isolated *Cecropia* tree near small river; this nest contained chicks, fed by only one adult. No other information.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Very rare in Ecuador, where known from one old specimen and a few sight records; more abundant in Peru and Brazil; uncommon in Colombia. Occurs in some protected areas in Peru, e.g. Pacaya-Samiria National Reserve, and Brazil, e.g. Serra do Divisor National Park. May merit protected status in Ecuador.

Bibliography. Hardy *et al.* (1998), Hilty & Brown (1986), Jaramillo & Burke (1999), Price & Lanyon (2002b, 2004a), Remsen (1977), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Whitaker & Oren (1999).

Genus *CLYPICTERUS* Bonaparte, 1850

12. **Casqued Oropendola**

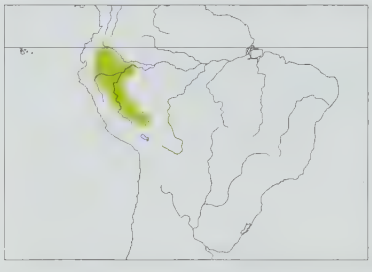
Clypicterus oseryi

French: Cassique casqué **German**: Helmstirnvogel **Spanish**: Cacique de Yelmo

Taxonomy. *Cassicus Oseryi* Deville, 1849, Pebas, Peru.

Genus formerly subsumed in *Psarocolius*, but mitochondrial DNA indicates that this species belongs to a separate clade together with *Ocyalus latirostris*; as its morphology is quite different from that of latter, a generic separation is recognized. Monotypic.

Distribution. W Amazonia from E Ecuador (Sucumbíos) and SE Colombia (Amazonas) S to E Peru, W Brazil (W Amazonas, Acre) and N Bolivia.



Descriptive notes. Male average 37 cm, 187·7 g; female average 29 cm, 101·4 g. Plumage is mostly rich chestnut, darkest on foreface, with greyish-olive throat and yellowish-olive upper breast and side of neck; upperwing chestnut, yellow edges of flight-feathers; tail dusky olive, outer feathers bright yellow; iris light blue, rarely pale yellowish-grey; bill variable, sometimes upper mandible dark grey, lower mandible yellow-green with dark grey tip, casque dull yellowish-grey to olivaceous grey, sometimes ivory-coloured with or without greenish tinge and with dark grey towards tip, sometimes entirely dark grey (variation in casque and bill colours perhaps related to age); legs black. Sexes similar but female much smaller, with smaller casque. Juvenile has dark eyes. Voice. Song variable, one type a "klow klow shrr-weo", with tonal quality of *Cacicus haemorrhous*; nesting colonies very noisy.

Habitat. Reported from both *várzea* and *terra firme* forests. Seems to breed mostly in *várzea* forests, in mid-successional to mature stages. Upland forest may be used mostly for foraging, or in non-breeding season. Lowlands to 400 m, locally to 750 m.

Food and Feeding. Diet probably arthropods, small vertebrates and nectar. Stomach contents include unidentified red berries. In Brazil seen to feed on fruits of a *Coussapoa* species (Moraceae). Reported as flocking with *Cacicus cela*. Roosts communally with other oropendolas and caciques.

Breeding. Season Sept–Nov in Peru. Polygynous, but detailed studies of breeding lacking. Colonies of 14–25 nests, located along small rivers; breeding activities highly synchronized, e.g. all nests in colony of 19 nests were built in about a week; sometimes nests with *Ocyalus latirostris*. Nest built by female, a purse, open at top, woven from diverse brownish plant fibres, in shape resembling that of colonial *Cacicus* species; all known colonies in Peru and Brazil were in isolated *Cecropia* trees. Incubation of eggs by female; male parental role is mostly that of nest-guarding and defence of colony against monkeys, toucans (Ramphastidae) and other predators. No other information.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Uncommon to locally common. Has recently extended its range N to Colombia. Found in several protected areas, including Manu National Park and Biosphere Reserve and Tambopata–Candamo Reserved Zone (Peru), Serra do Divisor National Park (Brazil) and Madidi National Park (Bolivia).

Bibliography. Cuao-Carranza (2007), Jaramillo & Burke (1999), Koepcke (1972), Leak & Robinson (1989), Parker *et al.* (1991), Price & Lanyon (2002b, 2004a), Restall *et al.* (2006), Ridgely & Tudor (1989), Whitaker & Oren (1999).

Genus *PROCACICUS* Fraga, 2005

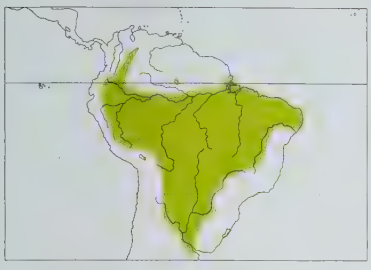
13. **Solitary Cacique**

Procacicus solitarius

French: Cassique solitaire **German**: Stahlkassike **Spanish**: Cacique Solitario

Other common names: Solitary Black Cacique

Taxonomy. *Cassicus solitarius* Vieillot, 1816, Paraguay.
Formerly included in genus *Archiplanus*. Often placed in genus *Cacicus*, but analysis of mitochondrial DNA indicates that this species is more closely related to *Psarocolius* than to other caciques. Monotypic.
Distribution. SW Venezuela (Táchira, Apure) S through E Colombia (Meta), E Ecuador and E Peru, Brazil (locally N of R Amazon on R Branco, in Roraima, more extensively S of Amazon E to Ceará, Pernambuco and W Bahia) S to C & E Bolivia, Chaco of Paraguay, N & E Argentina (S to Santiago del Estero, Santa Fe and Buenos Aires) and W Uruguay (locally along R Uruguay).



Descriptive notes. Male average 27·5 cm, 90·1 g; female average 23·5 cm, 80 g. Plumage is entirely black, with slight gloss; iris brown to chestnut-brown, exceptionally bluish (museum specimens); bill ivory-coloured; legs black. Differs from *Cacicus sclateri* in iris and bill colours and larger size. Sexes similar. Juvenile is duller black than adult. Voice. Song variable, with considerable individual repertoires. Song around nest usually starts with a series of low-pitched notes, and may contain pipe-like hollow sounds, sudden crescendos and odd harmonics; songs in other contexts may be shorter and simpler; mimics other bird species. In territorial conflicts between pairs, all individuals may vocalize for periods of 30 minutes or more. A common call is a loud nasal "kwah-kwah"; also cat-like calls.
Habitat. Mostly occurs in flooded forest and gallery forest along rivers and channels, extending to dense riparian vegetation on islands of main rivers (Amazon, Paraguay, Paraná, etc.); also occupies swamp-woodland (e.g. Esteros del Iberá, in Argentina). In drier Chaco of Bolivia, Paraguay and Argentina occurs locally in seasonal deciduous woodland (typically with dense undergrowth of spiny bromeliads), but often near seasonal river channels (*madrejones*) and swamps (*bañados*), also near artificial reservoirs (*represas*). Lowlands to 600 m, rarely to 1400 m. Avoids most rocky terrain.
Food and Feeding. Insects and other arthropods; also small vertebrates, particularly tree-frogs (Hylidae); also fruits and nectar. Insects include e.g. beetles (Coleoptera), Lepidoptera, Hymenoptera, and bugs (Hemiptera); reported as using one foot to hold cases of bagworm moths (*Oiketicus*, Psychidae) while extracting the insect by means of open-bill probing. Takes both wild fruits, e.g. terrestrial bromeliads and myrtaceous *Hexachlamys edulis*, and cultivated ones, e.g. oranges (*Citrus*). Takes nectar from flowers of *Erythrina* and the vine *Combretum lanceolatum*. Forages mostly at lower levels of vegetation and in undergrowth (e.g. among terrestrial bromeliads); rarely on the ground, where it jumps, rather than walks. Commonly probes with open bill (gaping) and even hammers into dry or rotten wood, often spending considerable time in extracting such prey as carpenter ants (*Camponotus*) and beetle larvae. Non-gregarious, forages usually in pairs or family groups; rarely seen in mixed-species foraging flocks.
Breeding. Season Oct–Jan in C Brazil and Oct–Dec in Argentina; in Argentina reported as double-brooded. Monogamous. Solitary nester, but older structures may be found near active nests. Nest built by female, a purse up to 120 cm long, open at top, woven from diverse plant fibres, reported materials in Argentina including adventitious roots of the vine *Cissus palmata*, strips of leaves from terrestrial bromeliads (e.g. *Deinacanthum urbanianum*), epiphytic bromeliads (*Tillandsia usneoides*), bark fibres and strips of palm leaves (general appearance of greenish or straw-coloured, not blackish, structure), lined mostly with dry leaves; suspended 2–5 m above ground from isolated branch tip, frequently over water. Abandoned nests sometimes used by other icterids, such as *Agelaioides badius* and *Icterus croconotus*. Clutch 2 eggs, white with sparse dark markings, dimensions 29·5 × 19·9 mm; incubation by female, period 17 days; chicks fed by both parents, both also defend nest, nestling period 18–19 days; family group can persist for some months. Eggs of *Molothrus bonariensis* reported from abandoned nests, but possibly these nests had been utilized by another icterid species.
Movements. Apparently resident throughout range.
Status and Conservation. Not globally threatened. Rather common in S part of range (R Paraná and R Paraguay basins); less abundant elsewhere. Tolerates moderate habitat disturbance, in Argentina breeding regularly in coastal urban reserves of Buenos Aires city. Found in several protected areas in Argentina, e.g. Kaa-Iya del Gran Chaco National Park (Bolivia), Pantanal Mato-grossense National Park (Brazil), San Rafael National Park (Paraguay), and Río Pilcomayo, Chaco and Mburucuyá National Parks (Argentina).
Bibliography. Beltzer (1986), Chatellenaz & Ferraro (2000), Di Giacomo, A.G. (2005), Di Giacomo, A.G. *et al.* (2010), Fraga (2005a), Hartert & Venturi (1909), Hayes (1995), Hilty (2003), Jaramillo & Burke (1999), López-Lanús (2008), Naka *et al.* (2006), Nores *et al.* (1991), de la Peña (1987), Pereyra (1938), Remsen & Parker (1983), Serié (1932), Sick (1993), da Silva & Colombo Rubio (2007).

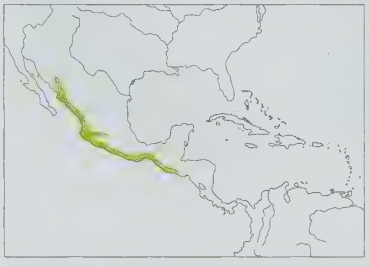
Genus *CASSICULUS* Swainson, 1827

14. Yellow-winged Cacique

Cassiculus melanicterus

French: Cassique à ailes jaunes **German**: Haubenkassike **Spanish**: Cacique Mexicano
Other common names: Crested/Mexican Cacique

Taxonomy. *Icterus melanicterus* Bonaparte, 1825, Temascaltepec, Mexico.
Often placed in genus *Cacicus*, but preliminary mitochondrial DNA data suggest an ancestral position within the cacique–oropendola clade. Is a rather distinctive species, geographically isolated from other caciques, with habitat preferences somewhat different from those of latter, and with nest resembling those of oropendolas. For all those reasons, placement in its own monotypic genus seems appropriate. Monotypic.
Distribution. W Mexico from Sonora S along Pacific slope to Chiapas, extending inland along Balsas drainage to SW México; also S Guatemala and El Salvador.



Descriptive notes. Male average 31·7 cm, 96·3 g; female average 27·8 cm, 69·9 g. A large and slender cacique. Male is mostly glossy black, including conspicuous long nuchal crest; most of upperwing-coverts contrastingly yellow, lower back to uppertail-coverts yellow, crissum yellow; tail black, broadly edged with yellow; iris dark brown; bill ivory-coloured, with variable greyish, bluish or yellowish tinge; legs dark grey. Female has shorter crest than male, is smaller and duller, slaty grey instead of black, and yellow feathers of tail fringed olive. Juvenile lacks crest, has black areas of plumage dusky, yellow parts tinged with greenish; immature is like female, but more brownish. Voice. Song variable, often "krrow-krrow-kshárá-chee". Has many calls, including whistles and rattles; common call an ascending "whik".
Habitat. Edges and clearings in dry to mesic deciduous forest, thorn-scrub, savanna and pastures with large trees, and plantations. In El Salvador frequents either coastal mangroves or riparian habitat. Roosts apparently in mangrove patches.
Food and Feeding. Insects and other invertebrates, probably small vertebrates, also fruits and nectar. Reported as feeding on brush-shaped inflorescences of *Combretum fruticosum*. Extracts nectar from *Erythrina* flowers; feeds on nectar also of the bat-pollinated tree *Ceiba acuminata*. Food delivered to nestlings included green katydids (Tettigoniidae) and earthworms (Oligochaeta). May form mixed-species foraging flocks with jays, such as San Blas Jay (*Cyanocorax sanblasianus*), also with other icterids, e.g. *Dives dives* and *Quiscalus mexicanus*.
Breeding. Season May–Aug. Mating system not well known, possibly ranging from monogamy to moderate polygyny. Nests solitarily or in small colonies of up to ten nests, sometimes extending to several trees. Courtship display by male involves vertical raising of tail and expanding of wings and crest. Nest a purse, open at top, 60–80 cm in length, external diameter at widest point 18 cm, woven from diverse plant fibres, in El Salvador including coconut palm fibres (*Cocos nucifera*), pieces of slender vines (mostly Bignoniaceae), rootlets and grass, bottom lined with dry leaves and grass, suspended from branch tip 6–18 m above ground, mostly in tall isolated leguminous tree, in Mexico often *Enterolobium cyclocarpum* or *Pithecellobium dulce*; in El Salvador other trees used included native species such as *Albizzia niopoides*, also exotics such as eucalypts (*Eucalyptus*), and 40% of nesting trees were near rural houses; nests sometimes attached to telephone or electricity wires. Clutch 2–4 eggs, pale blue, lightly spotted and streaked with grey and black, mean dimensions 28·6 × 20·1 mm; no information on incubation and nestling periods; both sexes reported as feeding chicks in El Salvador. Nests frequently parasitized by *Molothrus aeneus*; of 12 nests in S Mexico (Oaxaca), 11 each held one or two cowbird eggs.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Common to fairly common in most of range; rare in N. Has recently spread S and colonized S Guatemala and El Salvador, where possibly still expanding its range. Tolerates moderate habitat modification. Captured for cagebird trade in Mexico, with legal restrictions on season and quotas. Possible that escaped or released cagebirds have assisted its recent expansion. Present in several protected areas in Mexico, including e.g. Chacahua Lagoons National Park (Oaxaca) and Estación de Biología Chamela (Jalisco).
Bibliography. Baker *et al.* (1971), Dickerman (1960, 2007), Friedmann & Kiff (1985), Gryj *et al.* (1990), Howell & Webb (1995), Ibarra Portillo (2009), Jaramillo & Burke (1999), Komar & Dominguez (2001), Price & Lanyon (2004a), Rowley (1984), Urbina-Torres *et al.* (2009).



PLATE 72

inches 6

cm 15

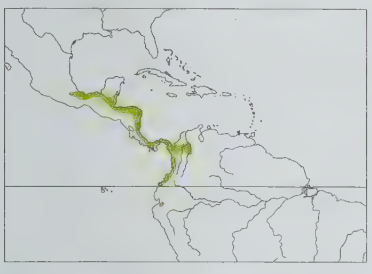
Genus *PSAROCOLIUS* Wagler, 1827

15. Chestnut-headed Oropendola

Psarocolius wagleri

French: Cassique à tête brune **German**: Rotkopf-Stirnvogel **Spanish**: Cacique Cabecicastaño
Other common names: Wagler's Oropendola

Taxonomy. *C.[acicus] Wagleri* G. R. Gray, 1844, no locality = Guatemala.
Formerly placed in a monotypic genus *Zarhynchus* because of its peculiar bill shape; recent analysis of mitochondrial DNA indicates, however, that it belongs to a clade containing the "Andean oropendolas" (*P. atrovirens* and montane races of *P. angustifrons*). Two subspecies recognized.
Subspecies and Distribution.
P. w. wagleri (G. R. Gray, 1844) – Atlantic slope from SE Mexico (Veracruz and N Oaxaca) S to Honduras and NE Nicaragua.
P. w. ridgwayi (van Rossem, 1934) – E Nicaragua S to W Colombia and SW Ecuador (Manabí, rarely to El Oro).



Descriptive notes. Male average 35 cm, 214 g; female average 28 cm, 113 g. Slightly crested. Male nominate race has dark purplish-chestnut on head and down to central breast; body and wing black with bluish gloss, becoming dark chestnut on rump and uppertail-coverts, rear flanks to undertail-coverts (and sometimes thighs) chestnut; tail yellow, central feather pair black, outer rectrices with black edges; iris pale blue; bill is expanded into swollen casque, and is ivory-coloured, sometimes with slight greenish tinge, tip and band along cutting edge pale bluish to grey; legs black. Female is like male, but smaller, with duller colours. Juvenile is duller than adult, eyes brownish (or even brownish and blue), bill brownish, some yellow feathers in forehead. Race *ridgwayi* is very like nominate, but has chestnut parts of plumage paler. Voice. Song short, but variable, consists of low "pop" sounds followed by harsh, crashing noises (likened to sound made by a machete cutting vegetation). Frequent call (Costa Rica, Panama) a liquid, low-pitched "waku-waku". Male produces audible wing noise in flight.
Habitat. Prefers forests, but often found in clearings and edges. In Costa Rica more common in foothills than in Caribbean lowlands, and reaches wet mountain forests. Found also in tall secondary forest with *Cecropia* and balsa (*Ochroma pyramidale*), and in plantations, large parks and even suburbs (e.g. in Panama City). Lowlands up to 1200 m (nominate race); *ridgwayi* up to 1700 m in Costa Rica.
Food and Feeding. Small vertebrates (frogs and lizards), also insects and other arthropods; also fruit and nectar of large flowers, e.g. of balsa. Orthopterans and beetles (Coleoptera) found in stomach contents. Often forages high in canopy. Probes and gapes in epiphytes.
Breeding. Season Jan–Jun. Polygynous. Colonial, with 15–60 (exceptionally 130) nests per colony, often located on several isolated trees, e.g. colony spread over seven Cuban royal palms (*Roystonea regia*) in Panama, but in Mexico more often in a single tree; often in mixed colonies with *Cacicus cela* and *P. decumanus* in S of range (S from Panama). Nest built by female, a purse 60–120 cm long, open at top, woven from diverse plant fibres such as *Tillandsia*, strips of lianas, palm leaves, etc., lined with pieces of dry and green leaves, suspended from branch tip of variety of plants, from palms (native and exotic) to alder trees (*Alnus acuminata*) in Costa Rican highlands; if unmolested, may nest near buildings or road (e.g. in former Panama Canal Zone); some colonies built in trees having nests of aggressive wasps (of genus *Synoeca* or *Stenopolybia*). Clutch 2 eggs, pale blue with brownish-black markings, mean dimensions 32·6 × 21·9 mm; incubation by female, period 17 days; chicks fed by female, nestling period up to 35 days; males guard and defend colony. Nests parasitized by *Molothrus oryzivorus*.
Movements. Short-distance seasonal and altitudinal movements, probably related to availability of fruiting trees.
Status and Conservation. Not globally threatened. Locally common to uncommon. Found in several protected areas, including Braulio Carrillo and Tapantí National Parks (Costa Rica), Soberanía National Park (Panama), and Los Katíos National Park (Colombia).
Bibliography. Chapman (1928), Crandall (1914), Fleischer & Smith (1992), Fraga (1987b), Hilty & Brown (1986), Howell & Webb (1995), Jaramillo & Burke (1999), Leck (1974), Price & Lanyon (2002b), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Skutch (1954), Smith (1968, 1983), Stiles & Skutch (1989), Wetmore *et al.* (1984).

16. Dusky-green Oropendola

Psarocolius atrovirens

French: Cassique olivâtre **German**: Grünschnabel-Stirnvogel **Spanish**: Cacique Verdioscuro

Taxonomy. *Cassicus atro-virens* d'Orbigny and Lafresnaye, 1838, Yungas of La Paz, Bolivia.
Recent analysis of mitochondrial DNA indicates that this species belongs to a clade containing also *P. wagleri* and montane races of *P. angustifrons*. Monotypic.
Distribution. E slope of Andes from C Peru (Huánuco) S to C Bolivia (Cochabamba and Santa Cruz, also nearby ridges e.g. Serranía Mosetenes).
Descriptive notes. Male average 42 cm, 299·4 g; female average 33 cm, 156·6 g. Plumage is dark olivaceous throughout, paler on throat and ear-coverts, darker on lores and on wing, and becoming russet on rump, uppertail-coverts and undertail-coverts; central pair of rectrices dark olive, remainder yellow, outer rectrices with dark olive edges; some adults have yellow on forehead; iris variable, brown, dark grey or light blue (perhaps age-related); bill ivory-coloured with slight greenish tinge; legs dark plumbeous. Sexes similar, female smaller than male. Juvenile is duller than adult, bill paler and yellower, eyes brown, forehead yellow, crown dusky, throat yellowish-white, underparts greyer, and patches of pale greyish or cream-coloured down often visible in underparts. Voice. Songs simpler, more percussive and shorter than those of most congeners, seldom lasting for more than 1 second; much song variation among males, some starting with a sequence of low-pitched notes and ending with slashing sounds, shrill metallic notes, or other variants; males seem to have a repertoire of different songs. Common calls include rattles, a "jog" and a shrill "chwik".



Habitat. Dry to wet mountain forests, often along river canyons; also around settlements and fruit plantations. Breeds at 800–2800 m; observed down to 400 m during austral winter.
Food and Feeding. Diet not much studied; probably feeds on insects and other arthropods, small vertebrates, fruit and nectar. Catches moths (Lepidoptera) and other nocturnal insects attracted by lights; reported as preying on hummingbirds (Trochilidae). Feeds on both wild fruits (e.g. *Cecropia*) and cultivated fruits (bananas, papayas, oranges). Consumes nectar from *Erythrina* trees. Forages mostly in canopy or subcanopy, probing and searching in clusters of dead leaves or epiphytes; sometimes feeds on the ground. Forms mixed-species foraging flocks with jays, such as Purplish Jay (*Cyanocorax cyanomelas*).
Breeding. Season Oct–Dec. Perhaps less polygynous than other oropendolas, but in Bolivia males displayed along stretches of mountain streams containing two or more colonies. Nests in small scattered colonies of 2–10 nests; isolated nests reported, and small colonies frequently have just one active nest. Nest a purse 85–110 cm long, open at top, woven from diverse brownish plant fibres (roots, palm fibres, strips of banana leaves, etc.), lined with leaves, sometimes of bamboo, suspended from roots or branch of small tree or shrub growing in crevice of rocky cliff, usually 7–12 m above rushing water of mountain stream; some colonies on isolated trees, usually over narrow stream or mountain path. Clutch 1–2 eggs, pale greenish-white, marked and spotted in shades of dark brown, mostly at large end, mean dimensions 36 × 24·2 mm. No other information. Not reported as a host of *Molothrus oryzivorus*, although the two species co-exist at lower elevations.
Movements. Some altitudinal movement apparent during austral winter.
Status and Conservation. Not globally threatened. Uncommon to locally common. Estimated global range c. 71,700 km². Found in several protected areas, including Manu National Park and Tambopata–Candamo Reserved Zone (Peru) and Cotapata, Carrasco and Amboró National Parks (Bolivia). Regarded as a pest and persecuted by fruit-growers.
Bibliography. Brumfield & Maillard (2007), Fraga (2004), Graves (1978), Jaramillo & Burke (1999), McCarthy (2006), Niethammer (1956), Price & Lanyon (2002b, 2004a, 2004b), Ridgely & Tudor (1989), Young *et al.* (2009).

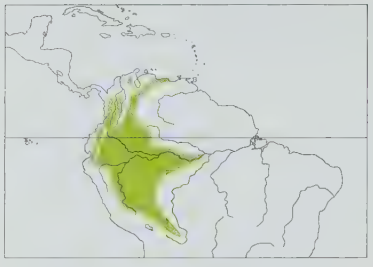
17. Russet-backed Oropendola

Psarocolius angustifrons

French: Cassique roussâtre **German**: Breithauben-Stirnvogel **Spanish**: Cacique Dorsirrufo
Other common names: Russet Oropendola; Black-billed Oropendola (*angustifrons*); Yellow-billed Oropendola (Andean races combined); Alfred's/Pale-billed Oropendola (*alfredi*); Oleaginous Oropendola (*oleagineus*); Olive-bellied Oropendola (*neglectus*)

Taxonomy. *Cassicus angustifrons* Spix, 1824, São Paulo de Olivença, south bank of upper River Solimões, west Amazonas, Brazil.
Taxonomy complex and confusing. Nominate race has blackish bill; the other six races, with yellow bill, may represent a distinct species. Recent fieldwork in foothills of Colombian E Andes revealed that race *neglectus* does not associate with nominate, the two behaving as separate species, and this supported by DNA studies indicating considerable sequence divergence between the four N Andean forms (Venezuela S to Ecuador) and nominate race; also, songs of some of N Andean races are distinctive. On other hand, DNA divergence between *alfredi* and nominate was relatively small, and songs of the two are similar, suggesting that they are conspecific (also, intermediate specimens reported from E Ecuador). Analyses of mitochondrial DNA indicate considerable divergence between some montane populations, which may deserve full species status, but a more detailed analysis of the full complex is needed. Proposed race *australis* (described from Santa Cruz, in C Bolivia) supposedly darker than *alfredi*, but considered to fall within range of variation of latter and therefore synonymized with it. Seven subspecies currently recognized.
Subspecies and Distribution.
P. a. oleagineus (P. L. Sclater, 1883) – mountains and foothills of coastal N Venezuela (from Carabobo E to Miranda).
P. a. neglectus (Chapman, 1914) – Sierra de Perijá (Colombia–Venezuela border); W Andes of Venezuela and E slope of E cordillera in Colombia (S to Caquetá).
P. a. salmoni (P. L. Sclater, 1883) – W & C Andes of Colombia (S to Nariño).
P. a. sincipitalis (Cabanis, 1873) – W slope of E Andes of Colombia (from Santander S to upper Magdalena Valley).
P. a. atrocastaneus (Cabanis, 1873) – W slope in Ecuador.
P. a. alfredi (Des Murs, 1856) – E Andean slopes and foothills from SE Ecuador (Morona Santiago) S to Peru and C Bolivia (Cochabamba and Santa Cruz).
P. a. angustifrons (Spix, 1824) – low E Andean foothills from S Colombia (S from Meta and Vaupés) S to E Ecuador and NE Peru (Loreto and N Ucayali) and W Brazil (Amazonian lowlands E to lower R Purús).
Descriptive notes. Male average 48 cm and 407 g, female 38 cm and 219 g (nominate); male average 46·5 cm and 284·3 g, female 36·2 cm and 172·7 g (*oleagineus*); two males 254 g and 278 g, six females 157–184 g (Venezuela). Nominate race has head olivaceous brown, body brown with russet tinge, becoming pale russet-brown on rump to uppertail-coverts; central rectrices dusky brown, remaining ones yellow, outer rectrices with dusky-brown edges and tips; iris dark brown; bill blackish; legs blackish. Sexes similar but female much smaller and lacks elongated nuchal feathers. Juvenile has head more yellow-tinged than adult, also yellow areas of tail duller. Races differ mainly in size and in colour of plumage, bill and eyes (irides tend to be blue in Ecuador, dark brown elsewhere): *oleagineus* is mostly yellowish-olive, back tinged rufous-brown, rump and undertail-coverts rufous-brown, also forehead more yellow (particularly on juvenile), central and outermost rectrices olive, remaining ones mostly yellow, bill greenish-ivory; *neglectus* is darker, with yellow superciliary lines, bill orange-yellow; *salmoni* is dark brown, blackish replacing olive in wings and

On following pages: 18. Crested Oropendola (*Psarocolius decumanus*); 19. Green Oropendola (*Psarocolius viridis*); 20. Amazonian Oropendola (*Psarocolius yuracares*); 21. Para Oropendola (*Psarocolius bifasciatus*); 22. Montezuma Oropendola (*Psarocolius montezuma*); 23. Black Oropendola (*Psarocolius guatimozinus*); 24. Baudo Oropendola (*Psarocolius cassini*).



tail, yellow on forehead more extensive, back chestnut, grading into russet on rump, bill ivory; *sincipitalis* is like previous, but paler; *atrocastaneus* is rufescent overall, with contrasting yellow forehead, orange-yellow bill, iris can be fully or partially blue; *alfredi* is more brownish-olive than last, paler and more yellowish-olive on head, with yellow forehead patch, body brownish-chestnut, becoming russet on rump and uppertail-coverts, central rectrices brownish-olive, remaining ones yellow with brownish-olive tips, bill pale greenish-yellow, eyes brown (Bolivia) or sometimes blue (Ecuador and N Peru). Voice. Male songs during bow displays shorter (0·7–1·7 seconds) and simpler than those of congeners, but individually and regionally variable. Song usually starts with low-pitched notes and increases in pitch and volume in a final crescendo. The species' Ecuadorian vernacular name *Cucupacho*, stressed either as "cucupachó" or "cucupácho", a good imitation of songs in E Ecuador, Peru and Bolivia; male *neglectus* song a crescendo, "up-up-rup chéó"; male *atrocastaneus* songs more distinctive and longer, with guttural notes, and ending in ringing rattles. Calls include harsh "chak" as alarm, and soft "whep" for contact.

Habitat. Nominate race occurs mostly in floodplain-forest (*várzea*) along "white-water" rivers, such as the Putumayo, Napo, Marañón–Amazonas and Ucayali; found in the earlier arboreal stages of riverine forest, particularly in *Cecropia* stands, and around oxbow lakes, but invades clearings in mature forest. Race *alfredi* inhabits *várzea* of S Peru and Bolivia, also forests, plantations and second growth along humid Andean foothills. Other races found in subtropical, wet montane forest, extending also to nearby plantations and clearings. Lowlands, locally to c. 2000 m in E Ecuador (nominate); 1000–2100 m in W Ecuador (*atrocastaneus*); 400–1800 m in N Venezuela (*oleagineus*); generally to 2500 m in Andes.

Food and Feeding. Almost omnivorous. In N Venezuela (race *oleagineus*), known to eat insects, small vertebrates (frogs), and nectar of *Erythrina*. Stomach contents of nominate race include wild fruits of *Cecropia* (of several species in *várzea*) and *Coussapoa*. In Chapare (Bolivia) *alfredi* feeds on many cultivated fruits, from oranges to papayas, and takes nectar from balsa flowers (*Ochroma pyramidale*). Often captures prey in epiphytic bromeliads or in "aerial litter". Forages in flocks, sometimes with other oropendolas and with *Cacicus cela*; montane races may flock with jays (Corvidae).

Breeding. Season Mar–Jun in N Venezuela (race *oleagineus*) and Sept–Mar in lowland Colombia (nominate); nest-building starts Jun–Jul and eggs and chicks found in Aug–Dec in C Bolivia (*alfredi*). All races polygynous. Colonial breeder, usually 2–20 nests often spread over 3–5 adjacent trees (not clustered), with up to three dominant males per colony; race *alfredi* in small colonies of up to 14 nests, 1–4 males visiting and displaying in colony; nominate race in Colombia in larger colonies (up to 29 nests), usually on isolated trees growing on small islands or in oxbow lakes, and may form mixed colonies with *Cacicus cela*, either in same tree or in nearby one. Nest built by female, taking 3–5 weeks, replacement nests (smaller and/or of poorer quality) may be built in 12 days; a purse 75–150 cm long, open at top, woven from coarse, brownish plant fibres, mostly from leaves of monocot plants such as Bromeliaceae, bananas (Musaceae), Cyclanthaceae and similar, lined with coarse wider fibres, suspended from branch tip or hung from epiphytic aroids (Araceae), usually 5–10 m above ground; several wild and cultivated species of medium-sized tree, including *Cecropia* and fruiting trees, are utilized; race *alfredi* builds in wide variety of medium-sized, wild and cultivated trees, particularly peach palms (*Bactris gasipaes*), commonly in trees growing in clearings and plantations, even in towns. Clutch 1–2 eggs, white to pale greenish white, variably marked with spots and lines of brown and reddish-brown, mean dimensions 36·5 × 24·2 mm; incubation by female, period 19–20 days; chicks fed by female, nestling period 30–32 days; male parental care limited to colony-guarding. Some nests in lowlands and foothills may be parasitized by *Molothrus oryzivorus*. Success variable; only one chick reared per nest in some populations.

Movements. Apparently sedentary in lowlands; otherwise some altitudinal movement.

Status and Conservation. Not globally threatened. Generally common in lowlands; uncommon to locally common in Andes. N Venezuelan race *oleagineus* is abundant in Henri Pittier National Park. Some Andean races may have declined in some parts of range; nominate race and *alfredi* able to adapt to human-modified environments and have increased in numbers.

Bibliography. Areta (2009b), Fraga & Kreft (2007), Hardy *et al.* (1998), Hilty (2003), Hilty & Brown (1986), Jaramillo & Burke (1999), McCarthy (2006), Niethammer (1956), Price & Lanyon (2002b, 2004a, 2004b), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Robinson, S.K. (1985a, 1988a, 1997), Salaman *et al.* (2002), Schäfer (1957, 1986), Zimmer (1930).

18. Crested Oropendola

Psarocolius decumanus

French: Cassique huppé **German**: Krähenstirnvogel **Spanish**: Cacique Crestado

Taxonomy. *Xanthornus decumanus* Pallas, 1769, Suriname.

Relationships uncertain; somewhat isolated from other members of genus. Birds from S of R Amazon sometimes treated as race *maculosus* (described from Yungas of Cochabamba, in Bolivia), but DNA data do not support this, showing only a certain distinctiveness for Andean populations. Three subspecies currently recognized.

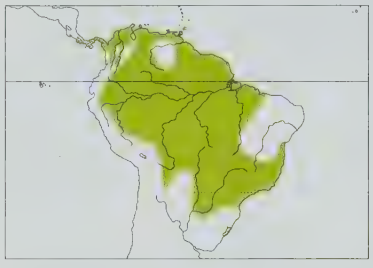
Subspecies and Distribution.

P. d. melanterus (Todd, 1917) – S Costa Rica, Panama, and N & W Colombia (W of E Andes).

P. d. decumanus (Pallas, 1769) – Colombia (E of Andes), Venezuela and the Guianas, S on E slope of Andes and S across Amazonia to N & E Bolivia, NW & NE Argentina (S to Jujuy and Salta and, in E, to Formosa and Corrientes) and E Brazil (S to N & W Paraná and São Paulo).

P. d. insularis (de Dalmas, 1900) – Trinidad and Tobago.

Descriptive notes. Male average 47 cm, 284·6 g; female average 37 cm, 158 g. Male nominate race is black overall, with slight gloss, becoming chestnut on rump, uppertail-coverts and undertail-coverts; a few thin feathers form small black crest; tail yellow, central feather pair black; birds from region of Bolivia, C Brazil, Paraguay and N Argentina ("*maculosus*") frequently have variable number of pale yellow feathers in body, but this character sometimes shown by individuals from elsewhere (e.g. Venezuela); iris blue; bill is expanded into casque, and is ivory to pale yellow; legs black. Female is like male, but smaller and somewhat duller, with much of plumage brownish-tinged (not pure black); crest greatly reduced and generally not visible in field. Juvenile resembles female, but still duller, with eyes dark brownish, bill tinged brown. Races differ little: *melanterus* is more glossy black and less chestnut than nominate; *insularis* is smaller and more chestnut than others. Voice. Male song during display usually starts with low-pitched liquid notes, accelerates into variable and complex rattling crescendo, and ends with 2–3 seconds of rhythmic wing-flaps (wing-flapping noise not reliably reported for other oropendolas). Gives repeated harsh "kak-kak-kak" in alarm.



Habitat. Edges and clearings of tropical, subtropical and lower montane forests, also in second growth, gallery forest (particularly in the Pantanal and in Paraguay), savanna and plantations with large trees. Over most of its range, not regularly found in unbroken primary forest. Lowlands and low hills, generally below 1000 m; nominate race mostly below 1700 m, rarely to 2600 m.

Food and Feeding. Diet fruits, insects and spiders (Araneae); also small vertebrates, such as tree-frogs (Hylidae); also floral nectar. Consumes both wild fruits (*Cecropia*, *Cayaponia*, *Cordia*) and cultivated fruits (oranges, papayas, mangos). Insects in stomach contents include beetles (of families Cerambycidae and Curculionidae) and caterpillars. Takes nectar from flowers of several trees, commonly *Erythrina*, also from the vine *Combretum lanceolatum*. Forages mostly in trees, in upper stratum, rarely in lower strata or on ground. Will join mixed-species foraging flocks with other icterids and jays (Corvidae).

Breeding. Season Jan–Jun in Venezuela and Oct–Dec in NW Argentina. Breeds in colonies of 2–43 nests, most colonies having fewer than ten nests, largest colonies reported from NW Argentina and Trinidad (where it is the only member of its genus); reported in mixed colonies with caciques and several congeners. Displaying male performs a deep bow while singing. Nest built by female, a purse 70–160 cm long (replacement nests of same female usually shorter), open at top, and having characteristic elongated pyriform shape, rather neatly woven from diverse plant fibres (strips of lianas, palm leaves, fibres from bromeliads, etc.), lined mostly with dry leaves, and suspended from high branch tip of tree, usually an isolated one, and in gallery forest (Paraguay and NE Argentina) often over river or channel; some nests in Amazonian Bolivia included blackish *Marasmius* rhizomorphs in the attachment, and fibres of Spanish moss (*Tillandsia usneoides*) also reported; females steal nest material from each other, also from nests of other birds, including *Cacicus chrysopterus*. Nests sometimes usurped by Piratic Flycatcher (*Legatus leucophaius*). Clutch 2 eggs, bluish-white, pale grey or buff with blackish spots and lines, mean dimensions 35·9 × 24·5 mm; incubation by female, period 17–19 days; chicks tended by female, nestling period 28–34 days; male parental care limited to colony-guarding. One of the most important hosts of *Molothrus oryzivorus* throughout much of range (records from Trinidad and Venezuela S to N Argentina); alleged record of parasitism by *Molothrus bonariensis* in Argentina invalid.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Common in much of range; scarcer in S of range. Recently invaded Costa Rica. Has increased in NW Argentina. Declines recorded in NE Argentina, where now rare in Misiones, and in SE Brazil, where formerly extended S to Santa Catarina. Extirpated in Cauca Valley and some other areas of Colombia. The most widespread and ecologically tolerant oropendola; apparently able to tolerate partial deforestation more than are its congeners. Present in many protected areas, e.g. Henri Pittier National Park (Venezuela), Pantanal National Park (Brazil), Amboró National Park (Bolivia) and Calilegua and Baritú National Parks (Argentina), among others. Regarded as an agricultural pest in fruit orchards and plantations in Trinidad, Venezuela, NW Argentina and other regions, and locally persecuted.

Bibliography. Abe (1996), Allen (1891), Di Giacomo & López-Lanús (2000), Drury (1962), ffrench (1991), Fraga (2002), Guimaraes (1926), Haverschmidt (1972b), Hilty & Brown (1986), Jaramillo & Burke (1999), Price & Lanyon (2002b, 2004a, 2004b), Ragusa-Netto (2002a), Ramírez-Llorens *et al.* (2003), Reidy (2009), Sandoval *et al.* (2010), Schäfer (1957, 1986), Schubart *et al.* (1965), da Silva & Colombo Rubio (2007), Skutch (1996), Tashian (1957).

19. Green Oropendola

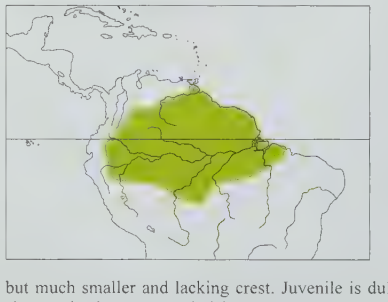
Psarocolius viridis

French: Cassique vert **German**: Grünschopf-Stirnvogel **Spanish**: Cacique Verde

Taxonomy. *Oriolus viridis* Statius Müller, 1776, Cayenne, French Guiana.

Analysis of mitochondrial DNA indicates present species is closer to *P. yuracares* than to *P. decumanus*. Populations in NE Peru sometimes separated as race *flavescens* (described from Xeberos, in E Peru), but this separation seems unwarranted. Monotypic.

Distribution. E & S Venezuela, the Guianas, and SE Colombia (Vichada and Amazonas), E Ecuador, E Peru and N Bolivia (E Pando) E across most of Amazonian Brazil (E to Marajó I and W Maranhão, S to N Rondônia).



Descriptive notes. Male average 48·5 cm, 405 g; female average 37 cm, 215 g. Male has head to back and most of underparts yellowish-olive, a few thin feathers forming small green nuchal crest; small bare area on lores and around eye pink to dull orange; wing dusky olive, rump and uppertail-coverts, belly, thigh and crissum chestnut; tail yellow, central feather pair and outer edge of outermost pair dusky olive; iris pale blue; bill is expanded into casque, and is pea-green with orange-red distal half; legs blackish. Differs from similar *P. yuracares* in colours of back and wing, eye and bill, and bare parts of face. Female is like male, but much smaller and lacking crest. Juvenile is duller than adult, with greyish wash below, less chestnut in plumage, eye dark brown. Voice. Male songs variable and complex, usually more musical than those of congeners. In Venezuela loudest part of song (1–2 seconds long) consists of liquid up-and-down rhythmic motifs, e.g. "glop-glop-glop-glup-glup" and the like, forming a bass line with narrow pitch range (400–950 kHz), complex harmonics on top of this creating tonal quality of a wooden percussion instrument (such as a marimba). Other males change harmonics through a second, higher-pitched motif, producing mild dissonant effect. Songs commonly start with a descending whistle (barely audible at distance) and/or rattling sounds. Main call "chak-chak"; also mewing sounds.

Habitat. Tall humid forests, preferably primary forest. Found from *várzea* and gallery forest to lower montane forest (e.g. Sierra de Lema, in Venezuela). Rare in disturbed forest. Lowlands to 1100 m.

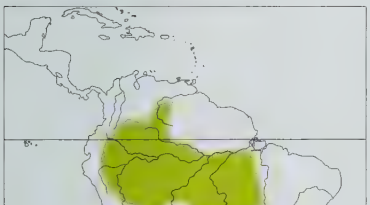
Food and Feeding. Insects and other arthropods; stomach contents from Suriname and Brazil include orthopterans (of family Tettigoniidae), bugs (Hemiptera), Coleoptera (of families Elateridae and Curculionidae), lepidopteran caterpillars, and spiders (Araneae). Consumes fruit and nectar, but no details available. Forages in groups, rather high in forest canopy.
Breeding. Season Feb–Apr in Venezuela and Suriname and Jul–Dec in Brazil (Amazonas). Probably moderately polygynous. Breeds in rather small colonies, usually with only 2–10 nests, well-spaced (not clustered); sometimes in mixed colonies with *P. decumanus* (Venezuela) or with *Cacicus haemorrhous* (Suriname and Brazil). Singing male may perform a deep bow, and may display while jumping into nests; displaying male also shakes wings, usually with no audible wing-flaps. Nest built by female, purse-shaped and open at top (shorter than that of *P. decumanus*, and lacks elongated pyriform shape), woven from diverse plant fibres such as roots, dark fungal rhizomorphs, epiphytes, strips of lianas, etc., and suspended from branch tip mostly 20–25 m above ground; prefers tall trees and may use same ones year after year, e.g. a mulateiro (*Peltogyne*) 25 m tall in Brazil (near Manaus) was used for nesting for at least three years. Clutch 2 eggs, greenish-white, marked purple-brown, dark brown and grey, mean dimensions 33·7 × 22·8 mm; incubation by female; male parental care probably limited to nest-guarding. No other information. Reported as a host of *Molothrus oryzivorus*.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Relatively abundant throughout most of Amazonia and the Guianan region; scarcer or local at edge of its range, e.g. in NE Venezuela (Sucre) and in S Amazonia. Rare in Bolivia, where there are very few records, all since year 2000; probably of only marginal occurrence in that country. Appears to be the most forest-adapted of the oropendolas, being sensitive to deforestation. Occurs in several protected areas, including, among others, Canaima National Park (Venezuela), Tuparro National Park (Colombia) and Tapajós National Park (Brazil).
Bibliography. Crandall (1940), Fraga (2004), Haverschmidt (1968, 1972b), Haverschmidt & Mees (1994), Hellmayr (1937), Hilty (2003), Hilty & Brown (1986), Jaramillo & Burke (1999), Oniki & Willis (1983), Price & Lanyon (2004a, 2004b), Restall *et al.* (2006), Ridgely & Tudor (1989), Schubart *et al.* (1965), Snethlage (1928a), Tobias & Seddon (2007).

20. Amazonian Oropendola

Psarocolius yuracares

French: Cassique bicolore **German**: Olivkopf-Stirnvogel **Spanish**: Cacique Amazónico
Other common names: Olive Oropendola

Taxonomy. *C.[assicus] yuracares* d'Orbigny and Lafresnaye, 1838, territory of the Yuracares (= Chapare), Cochabamba, Bolivia.
Sometimes placed in genus *Gymnostinops*. Often considered conspecific with *P. bifasciatus*, mainly because intermediate-looking individuals that are thought to be hybrids occur in area of range overlap in E Amazonian Brazil (Pará); no details of pairing behaviour or other aspects of natural history in contact zone are yet available, and further research required. Both species sometimes considered part of the group formed by *P. montezuma*, *P. guatimozinus* and *P. cassini*. Also, analysis of mitochondrial DNA indicates closer relationship of present species with *P. viridis* than with *P. decumanus*. Two subspecies currently recognized.
Subspecies and Distribution.
P. y. yuracares (d'Orbigny & Lafresnaye, 1838) – Amazon and upper Orinoco Basins from S Venezuela (W Bolívar) and Colombia (Meta and Guainía) S to E Ecuador, E Peru and C Bolivia (Santa Cruz), E to C Brazil (E to R Negro and R Tapajós).
P. y. neivae (E. Snethlage, 1925) – S Pará (between R Tapajós and R Tocantins) to N Goiás and Mato Grosso, in EC Brazil.



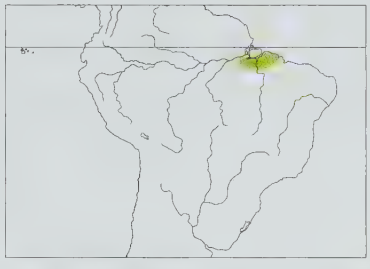
Descriptive notes. Male average 51 cm, 449·6 g; female average 42 cm, 259·2 g. Male nominate race has head to mantle and breast bright olive-green or olive-yellow (amount of yellow in colour varies individually, even within a single population), a few thin grey feathers forming small nuchal crest; bare pink facial patch; wing and rear parts of body bright chestnut; tail yellow, central pair of rectrices olive-green; iris dark brown; bill is expanded into casque, and is dark grey with reddish-orange tip; legs blackish. Female is smaller than male and without crest. Juvenile is duller than adult, and has much duller bare facial patch. Race *neivae* lacks yellow hue in foreparts, being darker olive, almost blackish, on head. Voice. Male song often a thin descending whistle, followed by a complex rattle with woody undertones, and ending in loud warble or a sustained note, with complex harmonics; song appears less variable than that those of congeners, even when geographically well-separated populations compared (e.g. Venezuela compared with Bolivia). Calls include soft "yok" and louder "awk".
Habitat. *Terra firme* forest, ranging into humid submontane forest; sometimes found in plantations and secondary growth. Nominate race up to 600 m.
Food and Feeding. Stomach contents from Brazil include insects, i.e. grasshoppers (Acrididae) and other orthopterans and lepidopteran larvae, also snails (Gastropoda) and fruit. Commonly drinks nectar of balsa flowers (*Ochroma*). Forages in trees at canopy level. In humid submontane forest in Chapare (C Bolivia) uses gaping to open mats of epiphytes and moss growing on trunks and main branches. In this region sometimes seen in mixed-species foraging flocks with other oropendolas, and with *Cacicus cela*.
Breeding. Season Jan–Apr in Venezuela and Aug–Nov in Bolivia. Polygynous. Colonial: in Venezuela (lower R Caura basin) two colonies held, respectively, two and four males and 14 and 17 nesting females, most nests packed into 3–4 thick clusters, with two or three relatively isolated nests, one tree used also by nesting *Cacicus haemorrhous*; in Bolivia two small colonies, one with six nests, also one large colony of 60 nests in two separate clusters, at least one displaying male at each cluster, this tree used also by *P. decumanus* and *Cacicus cela*. During display, male may perform a deep bow while singing. Nest built by female, a long purse suspended from branch tip, in Venezuela isolated *Erythrina* trees used for three consecutive years, in Bolivia *Socratea* palms emerging above canopy (the large colony in emergent tree near fruit orchards and farms). No other information.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Common in most of range; rare and local in Venezuela and Ecuador. Has extensive distribution. Found in several protected areas, including, among others, Serrania de la Macarena National Park (Colombia), Jaú National Park (Brazil) and Madidi and Carrasco National Parks (Bolivia). Regarded as a pest by fruit-growers in Bolivia.
Bibliography. Fraga & Kreft (2007), Haffer (1974), Hilty & Brown (1986), Jaramillo & Burke (1999), McCarthy (2006), Price & Lanyon (2002b, 2004a, 2004b), Restall *et al.* (2006), Rodríguez-Ferraro (2006), Schubart *et al.* (1965), Snethlage (1925).

21. Para Oropendola

Psarocolius bifasciatus

French: Cassique du Para **German**: Parastirnvogel **Spanish**: Cacique de Pará
Other common names: Spix's Oropendola

Taxonomy. *Cassicus bifasciatus* Spix, 1824, Belém, Pará, Brazil.
Sometimes placed in genus *Gymnostinops*. Often considered conspecific with *P. yuracares*, mainly because intermediate-looking individuals that are thought to be hybrids occur in area of range overlap in Pará; no details of pairing behaviour or other aspects of natural history in contact zone are yet available, and further research required. Both are sometimes considered part of the species group formed by *P. montezuma*, *P. guatimozinus* and *P. cassini*. Monotypic.
Distribution. E Pará and W Maranhão (S of R Amazon and E of R Xingu), in E Amazonian Brazil.



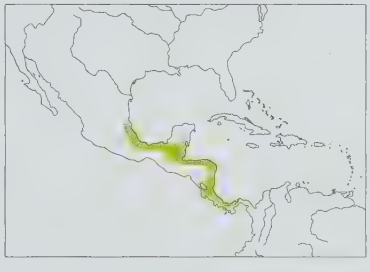
Descriptive notes. Male 47–53 cm, 430 g; female 34·5–38 cm, 198 g. A large chestnut oropendola with a black hood. Male is mostly black, blending into rich chestnut on back, rump, wings, flanks and crissum; has a few elongated crown feathers, which form a smallish black crest; bare pink-coloured face patch; tail yellow, with central pair of rectrices black; iris brown; bill is expanded into swollen casque, and is black with orange-red tip; legs blackish. Female is rather similar to male, but overall is somewhat duller and lacks the crest. Juvenile undescribed. Voice. No information available.
Habitat. Inhabits tall humid forest and nearby plantations.
Food and Feeding. Little information available. Reported as feeding on cultivated fruits; probably omnivorous, as other large oropendolas.
Breeding. Season Feb. A colony of four nests observed in 1920 near San Antonio do Prata (Pará): nests looked like elongated bags more than 50 cm long, and were attached to tips of highest branches of a huge dead or leafless tree growing between forest and plantations. No further information.
Movements. Apparently resident.
Status and Conservation. Not assessed. Besides its relatively small range, this species seems rare and local; probably declining as a result of deforestation. Protected in a few reserves, such as Floresta de Caxiuana, in Pará; in Maranhão, the species could be protected if the proposed Gurupi Biological Reserve becomes properly established.
Bibliography. Haffer (1974), Jaramillo & Burke (1999), McCarthy (2006), Novaes & Lima (1998), Oren (1991), Price & Lanyon (2004a), Ridgely & Tudor (1989), Snethlage (1925, 1935b).

22. Montezuma Oropendola

Psarocolius montezuma

French: Cassique de Montezuma **Spanish**: Cacique de Moctezuma
German: Montezumastirnvogel
Other common names: Great Oropendola

Taxonomy. *Cacicus Montezuma* Lesson, 1831, Mexico.
Sometimes placed in genus *Gymnostinops*. Forms a species group with *P. guatimozinus* and *P. cassini*, and all three possibly conspecific; *P. bifasciatus* and *P. yuracares* sometimes considered part of same group. Monotypic.
Distribution. Atlantic slope of E Mexico from San Luis Potosí S to Quintana Roo, and Caribbean slope from Belize S to C Panama (Colón).



Descriptive notes. Male average 47·5 cm, 521 g; female average 39·2 cm, 246 g. The largest icterid, some males reaching 562 g. Has bare facial skin pale blue, conspicuous pink wattle at base of bill; head and upper breast black, rest of body deep dark chestnut; remiges chestnut with blackish tips; tail yellow, central pair of rectrices black; iris brown; bill is expanded into swollen casque, and is black with orange distal half; legs black. Sexes similar, female considerably smaller than male. Juvenile resembles adult, but duller in colour. Voice. Loud and impressive male song starts with low-pitched gurgles, grows to a remarkable crescendo in pitch and volume, with complex harmonics, and ends in a long note; individual and geographical variations occur. Alarm call mostly a repeated "krrak".
Habitat. Humid tropical forest, often in clearings and edges (particularly when breeding); also riparian forest along rivers and channels, second-growth forest, shady pastures, and plantations (bananas, cacao, etc.). To 1600 m.
Food and Feeding. Insects and other arthropods, also frogs and other small vertebrates; also much fruit, and nectar of large flowers e.g. balsa (*Ochroma pyramidale*). Vertebrates killed include fledgling Black-faced Grosbeak (*Caryothraustes poliogaster*) and chicks of Lance-tailed Manakins (*Chiroxiphia lanceolata*). Among native fruits taken are those of the trees *Bursera simaruba*, *Chrysophyllum mexicanum* and *Spondias mombin*, the palm *Thrinax radiata*, and even those of the herbaceous *Rivina humilis*; cultivated fruits eaten include bananas, akee (*Blighia sapida*), cacao, etc. In Mexico, five species of native tree germinated from collected excrement of this oropendola. Feeds mostly in trees, in upper level, rarely in lower strata or on the ground. Females, because of smaller size, may find food in smaller and thinner branches than those searched by males. When not breeding forms mixed-species foraging flocks with other icterids and jays, often with Brown Jays (*Psilorhinus morio*).
Breeding. Season Feb–Aug in Mexico (Quintana Roo) and Jan–Aug in Costa Rica. Mating system harem polygyny. Colonial breeder, 21–85 (average 57·5) nests per colony in Quintana Roo and 3–172 (average 31) nests per colony in Costa Rica, colonies located on one to few isolated trees,

usually not in unbroken forest, clusters of thickly packed nests clearly visible within largest colonies; males around colony form linear hierarchy based on dominance during aggressive episodes, top-ranking or alpha male remains in colony for 52–68% of time, beta and next ranking males visit during temporary absences of alpha male; DNA-fingerprinting study of 21 chicks showed that alpha males sired 33% of chicks, beta males 19%, remaining chicks sired by lower-ranking males and those displaying away from colony. When displaying, breeding male performs a deep bow, and may even jump to the side of a nest. Nest built by female, taking 13–18 days, a purse 60–180 cm long, open at top, woven from rather coarse plant fibres, in Mexico mostly fibres from palm leaves (*Sabal*, *Cocos*), strips of banana leaves and *Cyperus*, bottom of nest lined with dry leaves (female commonly steals material from neighbouring nests), suspended from branch tip 13–33 m above ground; seems to prefer certain species of tree, among native ones *Ceiba pentandra*, *Cordia alliodora*, *Bursera simaruba*, *Brosimum alicastrum*, etc.; may build colony over river, channel or even road, or near buildings if unmolested. Clutch 2 eggs, white or buffish-white with blackish spots and scrawls, mean dimensions 39·4 × 25·4 mm; incubation by female, period 17–18 days; chicks fed by female, nestling period c. 35 days. Nests parasitized by *Molothrus oryzivorus*, the latter's eggs usually removed from nest by the host. Males may attack nest predators and brood parasites. Reported as rearing normally one chick in Costa Rica, the second nestling to hatch usually surviving for only a few days.

Movements. Apparently sedentary; possibly some local altitudinal movements in Costa Rica and Panama.

Status and Conservation. Not globally threatened. Locally common to uncommon. Tolerates, and may even prosper from, moderate deforestation. Found in many national parks and other protected areas.

Bibliography. Crandall (1914), Cunningham & Lewis (2006), Fraga (1986, 1989), Haffer (1974), Howell, S.N.G. & Webb (1995), Howell, T.R. (1964), Jaramillo & Burke (1999), Nava Solorio (1994), Price & Lanyon (2002b), Skutch (1954), Smithe (1966), Stiles & Skutch (1989), Webster (1994a, 1994b, 1994c, 1995, 1997), Webster & Robinson (1999), Wetmore *et al.* (1984), Wolf (1971).

23. **Black Oropendola**

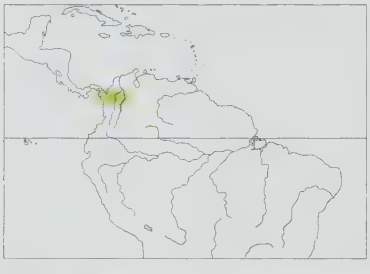
Psarocolius guatimozinus

French: Cassique noir **German**: Mohrenstirnvogel **Spanish**: Cacique Negro

Taxonomy. *Ostinops guatimozinus* Bonaparte, 1853, Garrapata, River Magdalena, Antioquia, Colombia.

Sometimes placed in genus *Gymnostinops*. Forms a species group with *P. montezuma* and *P. cassini*, and all three possibly conspecific; *P. bifasciatus* and *P. yuracares* sometimes considered part of same group. Monotypic.

Distribution. E Panama (Panamá and Darién) and NW Colombia (Chocó, Antioquia and Caldas).



Descriptive notes. Male c. 47 cm, female c. 39 cm. Has bare facial skin pale blue, pink wattle at base of bill; otherwise mostly black, becoming dark chestnut on scapulars, upperwing-coverts, lower back to uppertail-coverts (except rearmost ones, black) and undertail-coverts; tail yellow, short central pair of rectrices black; thin crest of black feathers; iris brown; bill is expanded into swollen casque, and is black with orange tip; legs blackish. Sexes similar, female considerably smaller than male and with shorter crest. Juvenile undescribed. Voice. Male in display has loud song with low-pitched gurgles and high-pitched metallic notes; resembles that of *P. montezuma*, but sometimes lacks crescendo. Low "cruk" call described.

Habitat. Humid forest and forest edge, also nearby plantations; to 800 m.

Food and Feeding. Few details available on diet; presumably feeds on insects and other arthropods, small vertebrates, fruit, and nectar of large flowers. Forages at higher levels of forest. Seen to probe in flowers and to use open-bill gaping inside them. Singly and in small groups, rarely in larger groups.

Breeding. Season Feb in Panama and Apr–Jun in Colombia. Probably polygynous. Nests in colonies of up to at least 20 nests. Male gives deep bows while singing. Nest a long purse, open at top, lined with pieces of dry leaves, attached to branch tips. Clutch apparently 2 eggs, white or pinkish-white with blackish and brownish spots and scrawls, mean dimensions 34·6 × 24·8 mm. No further information.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Restricted-range species: present in Darién Lowlands EBA and Nechí Lowlands EBA. Uncommon to locally common. Range sufficiently extensive, and populations seem stable. Occurs in Darién National Park, in Panama.

Bibliography. Haffer (1974), Hardy *et al.* (1998), Hilty & Brown (1986), Jaramillo & Burke (1999), Price & Lanyon (2002b, 2004a), Restall *et al.* (2006), Ridgely & Tudor (1989), Wetmore *et al.* (1984).

24. **Baudo Oropendola**

Psarocolius cassini

French: Cassique de Cassin **German**: Braunmantel-Stirnvogel **Spanish**: Cacique de Cassin
Other common names: Chestnut-mantled Oropendola

Taxonomy. *Gymnostinops cassini* Richmond, 1898, Río Truandó, northern Chocó, Colombia.

Sometimes placed in genus *Gymnostinops*. Forms a species group with *P. montezuma* and *P. guatimozinus*, and all three possibly conspecific; *P. bifasciatus* and *P. yuracares* sometimes considered part of same group, and bare facial parts of present species resemble those of *P. bifasciatus*. Monotypic.

Distribution. Coastal lowlands and foothills of NW Colombia (Chocó and NW Antioquia).



Descriptive notes. Male 46 cm; female 39·5 cm. Has bare facial skin and malar wattle pink; otherwise hood and underparts mostly black, becoming rich chestnut on back, rump, wings, flanks and crissum; tail yellow, central pair of rectrices black; iris brown; bill is expanded into swollen casque, and is black with orange tip; legs blackish. Distinguished from *P. guatimozinus* (also present in NW Colombia) mainly by combination of pink (not blue) bare facial patch and chestnut wings, also by lack of crest. Sexes similar, female smaller and duller than male. Juvenile undescribed. Voice. Little known. Male song reported as similar to those of *P. guatimozinus* and *P. montezuma*.

Habitat. Limited information. Observed in lowland forests (primary and secondary) growing on sandy soil or along rivers, and with relatively open canopy; to 400 m in foothill forests. Possibly some preference for primary forest with naturally broken canopy, including very tall emergents, in which it has been seen to forage.

Food and Feeding. Few data. Diet includes fruit and insects, but no further details of diet. Seems to forage mostly in canopy, in groups of up to ten individuals. Reported in mixed-species foraging flocks with *P. wagleri*.

Breeding. Season at least Jan–Mar; one nesting colony observed in Mar 1991; another had 13 nests (7 inactive, 6 with nestlings) in Feb 2011. Nests at the 2011 colony were elongated purses of coarse fibres, suspended from fronds of unidentified palm. Colony visited by *Molothrus oryzivorus*. No further information.

Movements. Probably resident.

Status and Conservation. ENDANGERED. Restricted-range species: present in Darién Lowlands EBA. Rare. Until very recently known from only five localities, including headwaters of R Acandí, where breeding colony had been recorded in 1991, and a site N of Ensenada de Utría National Park (near Pacific coast), where two individuals found in 1997 and six observed two years later. In 2010, during an expedition in W Andes, two groups, totalling 70–80 individuals, were discovered c. 120 km from Ensenada de Utría National Park, close to the only other site where a very few were thought to survive. These two newly discovered groups are not within a protected zone, and deforestation in the area is accelerating. Further surveys being conducted in order to determine the precise conservation actions required. Habitat alteration and destruction, increasing in W Colombia, are the most serious threats to this very rare species. Suggestions that it may occur in nearby areas of Panama need to be followed up.

Bibliography. Anon. (2010d), Butchart & Stattersfield (2004), Ellery (2011), Haffer (1974), Hilty & Brown (1986), Jaramillo & Burke (1999), Restall *et al.* (2006), Ridgely & Tudor (1989), Stattersfield & Capper (2000), Strewe (1999), Strewe & López-Lanús (2002).



PLATE 73 ➤



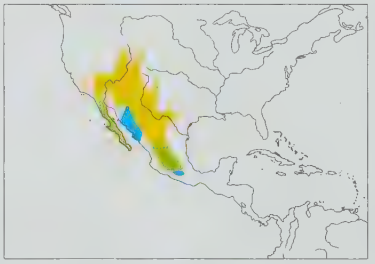
Genus *ICTERUS* Brisson, 1760

25. Scott's Oriole

Icterus parisorum

French: Oriole jaune-verdâtre **German**: Scott-Trupial **Spanish**: Turpial de Scott

Taxonomy. *Icterus Parisorum* Bonaparte, 1838, Mexico.
DNA data indicate that this species is closely related to *I. graduacauda* and *I. chrysater*. Monotypic.
Distribution. Breeds from SW USA (S California, Nevada, Utah, New Mexico and Texas) S to W & C Mexico (to S Baja California, Michoacán and Oaxaca); non-breeding range mostly in Mexico.
Descriptive notes. 19–22 cm; male average 34·7 g, female average 31·4 g. Male has head, breast and upperparts black, rump and uppertail-coverts yellow; upperwing black, pale yellow epaulet and white wingbars, narrow white edges of flight-feathers; tail black with yellow basal patches; belly to undertail-coverts yellow; iris dark brown; bill black, bluish-grey base of lower mandible; legs dark grey. Female has face and upper breast mottled yellowish and blackish, rest of head and upperparts olive, streaked dusky, becoming yellowish-olive on rump; upperwing as on male, but yellow less extensive; tail dark olive, edged yellowish-olive; underparts yellowish-olive; bare parts as for male. Immature resembles female. Voice. Song, by both sexes, rather long, with repetitions of short series of flute-like warbles, reminiscent of song of *Sturnella neglecta*. Female may sing when in or around nest. Call a nasal "cheh".



Habitat. Breeds in arid and semi-arid foothills and canyons with open woodland. Woodland types include pinyon–juniper (*Pinus–Juniperus*), oak scrub (*Quercus*), riparian woodland, groves of *Washingtonia* palms, and shrubs such as Joshua tree (*Yucca brevifolia*), other yuccas (e.g. *Yucca mohavensis*) and agaves (*Agave*); in parts of Mexico also in acacia (*Acacia*) and mesquite (*Prosopis*) woodland. Seldom seen in extreme, treeless deserts. To 3000 m; in S California at 300–2500 m.
Food and Feeding. Insects and other arthropods, small vertebrates, fruit and nectar. Insect prey include lepidopteran caterpillars, also grasshoppers and crickets (Orthoptera), and ants (Formicidae); rarely, feeds on wintering monarch butterflies (*Danaus plexippus*). Reported as eating small lizards. Takes native fruits, including those of several species of cactus; also visits orchards to feed on figs (*Ficus*) and peaches (*Prunus persica*). Visits flowers of native plants such as *Agave salmiana* and candlewood/ocotillo (*Fouquieria*), and also of cultivated ones, such as *Hibiscus*. Finds prey on low vegetation or on ground, and probes in clusters of dead leaves; com-

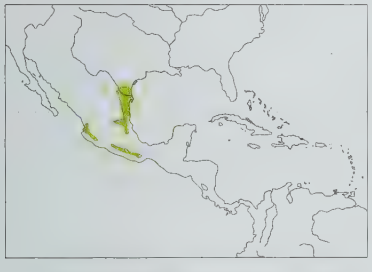
monly robs plants of nectar by piercing long corolla tubes. Found in pairs and in flocks of up to 20 individuals. May join mixed-species foraging flocks.
Breeding. Season Apr–May; reportedly double-brooded. Probably monogamous; pair-bond often maintained for entire breeding season, but only five of 24 pairs kept same mate in following season. Solitary breeder, territories reported as large, but few quantitative data; in USA (Texas) nests of neighbouring pairs 150–170 m apart. Nest built by female, a shallow bag or cup of plant fibres, commonly yucca fibres, lined with soft grass, hair, cotton or similar material, external diameter 10·5–13 cm, external depth 9 cm, frequently attached to older lower leaves of crown of yucca, and partially hidden among them, sometimes attached or supported by side branches (rather than suspended from rim as are most oriole nests); uses many species of tree, including, among others, sycamores (*Platanus*), oak, candlewood/ocotillo, palms, yuccas, junipers. Nests sometimes usurped by breeding House Finches (*Carpodacus mexicanus*). Clutch 2–4 eggs, pale blue with spots, blotches and lines in blackish, shades of brown and grey, mean dimensions 23·6 × 16·8 mm; incubation by female, period 14 days; chicks fed by both sexes, nestling period 14 days; both parents mob nest predators such as jays (Corvidae) and hawks (Accipitridae). Nests frequently parasitized by *Molothrus aeneus*. In a study of 85 nests, only 25% of eggs produced fledglings. Yearling males rarely mate and breed.
Movements. Medium-distance migrant, with little overlap between breeding and non-breeding ranges. Most winter in Mexico (from Baja California, Sinaloa and Coahuila S to Guerrero and Oaxaca). Autumn departure in USA from mid-Jul, spring arrival begins in late Mar; reported as migrating N in spring along coast of Baja California. Small numbers overwinter in S California and nearby Arizona. Also some altitudinal movement. Vagrants reported from many W states of USA, with a few records as far E as Louisiana, and recorded also in Ontario (Canada).
Status and Conservation. Not globally threatened. Uncommon to locally common. Annual censuses in USA reveal slight fluctuations in numbers. Tolerates moderate habitat modification, and frequently visits gardens and orchards. Found in several protected areas in USA and Mexico.
Bibliography. Bendire (1895), Bent (1958), Brower & Calvert (1985), Calvert *et al.* (1979), Cardiff & Remsen (1981b), Dixon (1960), Flood (2002), Howell & Webb (1995), Jaramillo & Burke (1999), Leck (1974), Lowther (1995), Miller & Stebbins (1964), Price *et al.* (2007), del Rio & Eguiarte (1987).

26. Audubon's Oriole

Icterus graduacauda

French: Oriole d'Audubon **German**: Schwarzkopftrupial **Spanish**: Turpial de Audubon
Other common names: Black-headed Oriole

Taxonomy. *Icterus graduacauda* Lesson, 1839, Mexico.
DNA data indicate that this species is closely related to *I. parisorum* and *I. chrysater*. Race *audubonii* intergrades with nominate. Proposed race *richardsoni*, described from Oaxaca (Chimalapa, in Tehuantepec), in S Mexico, synonymized with *dickeyae*. Four subspecies recognized.
Subspecies and Distribution.
I. g. audubonii Giraud, 1841 – extreme S USA (S Texas) and NE Mexico (Nuevo León and Tamaulipas).
I. g. graduacauda Lesson, 1839 – E Mexico (San Luis Potosí, S Tamaulipas and NW Veracruz).
I. g. nayaritensis van Rossem, 1938 – W Mexico (Nayarit and W Jalisco).
I. g. dickeyae van Rossem, 1938 – S Guerrero and Oaxaca (Sierra Madre), possibly also Chiapas, in S Mexico.



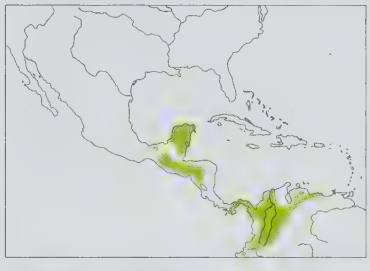
Descriptive notes. 21·5–24 cm; 31–52 g, male average 47 g, female average 45·7 g. Male nominate race has head to upper breast black, upperparts olivaceous yellow; upperwing and tail black, lesser and median wing-coverts yellow, flight-feathers narrowly edged white; belly to undertail-coverts lemon-yellow; iris dark brown; bill black, bluish-grey base of lower mandible; legs grey. Female is duller than male, more olive above, including nape and edges of tail. Juvenile has black of hood replaced with dull olive-green. Race *audubonii* differs from nominate mostly in larger size, also has tertials broadly edged white, greater wing-coverts tipped white (white wingbar); *nayaritensis* is more sexually dimorphic, with male brighter yellow and female duller olivaceous; *dickeyeae* has thicker bill than others, lacks olive tinge in back, and shows less white in wing. Voice. Song, by both sexes, a slow series of whistles and warbles, with rich harmonics, the notes rather pure and not varying much in pitch; said to resemble sound made by a boy learning to whistle. Alarm note a nasal "yee".
Habitat. Occupies many habitats, including humid evergreen forest, semi-deciduous forest, cloudforest, pine–oak (*Pinus–Quercus*) forests, gallery forest, and thorn-forest; also shady coffee plantations. In USA found in live oak (*Quercus virginiana*) forest, riparian forest and thickets, also in mesquite (*Prosopis*) woodland and scrub. Visits orchards, parks and gardens near its natural habitat. Usually found in denser vegetation than that preferred by other orioles. Up to 2500 m (*dickeyae*).
Food and Feeding. Insects and other arthropods, possibly small vertebrates, also seeds, fruits and nectar. Insects include adult and larval beetles (Coleoptera) and caterpillars (Lepidoptera). Wild fruits taken include hackberries (*Celtis*), beans of mesquite, and cactus fruits; cultivated fruits include peaches (*Prunus persica*), apples, plums, and loquat (*Eriobotrya japonica*). Takes sunflower seeds (*Helianthus*) from garden feeders. Forages in pairs; in non-breeding season may occur in groups of up to 8–10 individuals, also in mixed-species foraging flocks with other orioles, tanagers and jays (Corvidae). Regarded as shier, or more secretive, than other orioles.
Breeding. Season Apr–Jun in USA (Texas) and Apr–Sept in Mexico; probably two or three broods per season. Probably monogamous. Breeds as isolated territorial pairs during. Nest basket-shaped, built from palm fibres, grass and horsehair, relatively small, external diameter 8–10 cm, external depth 7–9·5 cm, placed at variable height, often among abundant twigs and leaves, and usually attached by rim and sides to small branches and twigs, sometimes supported by twigs below; in Texas commonly in mesquite, and nest trees in Mexico include *Liquidambar styraciflua*, cypress, *Ficus cotinifolia* and *Enterolobium cyclocarpum*. Clutch 3–5 eggs, bluish to greyish-white with spots and streaks in shades of brown, purple and blackish, mean dimensions 25·1 × 18 mm; incubation by female, no information on duration; chicks fed by both parents, nestling period 11–12 days; both sexes chase and mob cowbirds and potential nest predators. Nests parasitized by *Molothrus aeneus* and *Molothrus ater*; reported as rearing *Molothrus aeneus* chicks.
Movements. Apparently sedentary; probably some altitudinal movement in highlands.
Status and Conservation. Not globally threatened. Classified as "Rare" in the USA (Yellow WatchList priority species for conservation). Uncommon to rare in USA; uncommon to locally fairly common in Mexico. Estimated global population 200,000 individuals, of which great majority (at least 95%) in Mexico. Local populations along both sides of lower Rio Grande (Texas and Tamaulipas) have declined, and in many places disappeared, following clearing of woodland for irrigated agriculture; the species is now absent in Laguna Atacosa and Santa Ana National Wildlife Refuges. Habitat fragmentation, woodland clearance and urban development facilitate brood parasitism by cowbirds: parasitism by *Molothrus aeneus* may now be a relevant problem.
Bibliography. Bendire (1895), Bent (1958), Binford (1989), Flood (1990), Flood *et al.* (2002), Howell & Webb (1995), Jaramillo & Burke (1999), Lebbin *et al.* (2010), Lowther (1995), McCarthy (2006), Price *et al.* (2007), Rich *et al.* (2004).

27. Yellow-backed Oriole

Icterus chrysater

French: Oriole noir et or **German**: Schwarzflügeltrupial **Spanish**: Turpial Dorsidorado
Other common names: Lesson's Oriole; Honda Oriole ("*hondae*")

Taxonomy. *Xanthornus chrysater* Lesson, 1844, Mexico.
DNA data indicate that this species is closely related to *I. parisorum* and *I. graduacauda*. Hybridizes rarely with *I. mesomelas*. Proposed taxon *hondae* (based on two specimens from upper Magdalena Valley, in Colombia) appears undiagnosable; included within race *giraudii*. Three subspecies recognized.
Subspecies and Distribution.
I. c. mayensis van Rossem, 1938 – N Yucatán Peninsula (SE Mexico).
I. c. chrysater (Lesson, 1844) – C & S Yucatán Peninsula (S to Belize) and S Mexico (inland S Veracruz, extreme E Oaxaca and Chiapas) S to N Nicaragua.
I. c. giraudii Cassin, 1848 – C Panama (on both coasts) to NW Venezuela (Miranda), C & SW Colombia and extreme NW Ecuador (Esmeraldas).



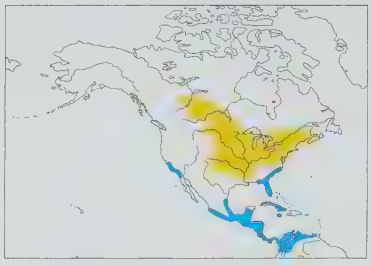
Descriptive notes. c. 21–24 cm; male average 51·8 g, female average 48·7 g. Male nominate race is golden-yellow, with contrasting black forehead to throat and upper breast, and solidly black wing and tail; iris dark brown; bill black, bluish-grey base of lower mandible; legs grey. Female is similar to male but slightly duller, with olivaceous wash on crown and back. Juvenile lacks black on head and breast, and rest of plumage is duller than adult; immature olivaceous yellow, less contrasted, and with variable amount of black on head. Race *mayensis* is like nominate but smaller; *giraudii* is slightly smaller than nominate, black on face often more extensive, sexes alike in plumage. Voice. Song varies in length, in Panama 4–8 ascending and descending whistles, in Colombia 5–10 notes; in Santa Marta (N Colombia) said to have two parts, the first containing ascending whistles, the second repeated notes. Song quality varies from one location to another; at some sites reported as loud, rich and musical, at others as rambling, repetitive or monotonous. Common call "teea".
Habitat. Found in varied habitats, including native pine (*Pinus*) woodlands in Mexico, Belize and Nicaragua, montane oak (*Quercus*) woodland in Mexico, Guatemala and El Salvador, and dry thorn-woodland and scrub in N Yucatán (Mexico); in Panama occurs at edges of primary and secondary forest, and in N Colombia (Santa Marta) mostly in coffee plantations, clearings and cultivated land with patches of forest. Mostly 500–2500 m (nominate race) up to 2800 m (*giraudii*).
Food and Feeding. Insects, other arthropods, fruits and nectar. Insects in stomach contents from Panama included beetles (of families Cerambycidae and Curculionidae), cockroaches (Blattodea), ichneumon wasps (Ichneumonoidea), and many caterpillars (Lepidoptera); other arthropods included spiders (Araneae). Feeds on flowers of balsa trees (*Ochroma pyramidale*). Feeds on wild and cultivated fruits, including bananas. Feeds on fruits of native tree *Talisia olivaeformis* (Sapindaceae), using bill and legs to extract the inner pulp. In Panama takes nectar from forest-edge shrubs *Aphelandra sinclairiana* and *Heliconia*, in the first case removing by force and mandibulating the tubular corollas. Forages in pairs, in family groups and in small flocks of up to ten individuals; sometimes in mixed-species foraging flocks with jays (Corvidae).
Breeding. Season Feb–May in Panama, and egg-laying also in Jan in Colombia. Probably monogamous. Solitary breeder. One nest in Panama was a basket-like structure resembling that of *I. spurius*, made from dry grass, resistant but translucent, external diameter 11 cm, external depth 9–13 cm, suspended 7 m above ground from three points of forked branch of tree; other, undescribed nests were found in palms. Clutch 2–3 eggs, whitish with purplish-brown blotches and a few dark scrawls, mean dimensions 25·1 × 17·2 mm. Reported as host of *Molothrus bonariensis*. No further information available.
Movements. Appears resident; possibly some altitudinal movement by highland populations of nominate race.
Status and Conservation. Not globally threatened. Uncommon to locally fairly common. Tolerates, and even thrives in, modified habitats; apparently invaded Santa Marta region of N Colombia following establishment of coffee cultivation. Found in several protected areas, such as Sian Ka'an Biosphere Reserve (Mexico) and Barro Colorado Nature Monument (Panama).
Bibliography. Howell, S.N.G. & Webb (1995), Howell, T.R. (1972), Jaramillo & Burke (1999), Leck (1974), McCarthy (2006), Miller (1947), Norton (1975), Olson (1983a), Price *et al.* (2007), Restall *et al.* (2006), Russell (1964), Stiles & Skutch (1989), Thurber *et al.* (1987), Wetmore *et al.* (1984), Willis & Eisenmann (1979).

28. Baltimore Oriole

Icterus galbula

French: Oriole de Baltimore **German**: Baltimoretrupial **Spanish**: Turpial de Baltimore
Other common names: Northern Oriole (when treated as conspecific with *I. bullockii*)

Taxonomy. *C.*[*oracias*] *Galbula* Linnaeus, 1758, America = Virginia, USA.
DNA data indicate that this is sister-species of *I. abeillei*. Formerly treated as conspecific with latter and with *I. bullockii*; hybridizes extensively with *I. bullockii* in a belt from S Canada (Alberta and Saskatchewan) S in Great Plains to S USA (Oklahoma and Texas), but assortative mating (or selection against hybrids) evident at several locations. Monotypic.
Distribution. Breeds in S Canada from NE British Columbia and Alberta E to S Ontario, S Quebec and Nova Scotia, S in C & E USA to C Texas, C Mississippi, NW Georgia, W Virginia and N Delaware; winters mostly in Florida, coastal California, Cuba and Jamaica, and Mexico S to N Colombia and Venezuela.



Descriptive notes. 18–22 cm; male average 34·3 g, female average 33·2 g. Male has head to upper back and to throat and upper breast black, lower back to uppertail-coverts and entire underparts below central breast bright orange; upperwing black, lesser and median coverts bright orange, greater coverts broadly tipped white, flight-feathers broadly edged white; tail black, outer rectrices terminally orange; in fresh (non-breeding) plumage has narrow orange feather tips on head and back, broader white wing edgings; iris dark brown; upper mandible black, blue-grey cutting edges, lower mandible blue-grey; legs dark grey to blue-grey. Female is variable in plumage, sometimes very like male, more often with olive-brown to orange-brown areas on head and upperparts, wing duller, lesser coverts brownish with dark centres, sometimes tinged yellow or orange, median coverts darkish at base, broadly tipped white (not orange), underparts duller, more orange-yellow; bare parts as for male. Juvenile is similar to dull female, but head and upperparts usually olive with orange tinge, throat and underparts light golden-orange, flanks olive. Voice. Song relatively short, a series of pleasing flute-like whistles, usually no more than 10 notes in total, mean duration less than 1·5 seconds; individually variable. Female sings rarely, song simpler than male's, sometimes in apparent duet with latter. Common calls include a chatter and an ascending whistle.

Habitat. Woodland edges, large clearings, orchards, parks and gardens; in non-breeding range found in wider variety of habitats, from canopy of humid forest to second growth, flowering trees in savanna, and coffee and cacao plantations. Sea-level to 3000 m.

Food and Feeding. Arthropods, and various plant items. Arthropods include insects, mainly Lepidoptera and their larvae (caterpillars), beetles (Coleoptera) and bugs (Hemiptera), and spiders (Araneae). Caterpillars represent 30% of total food, and include several spiny or hairy species in genera *Hyphantria*, *Euvanessa* and *Hemerocampa*; commonly preys on gregarious tent caterpillars (*Malacosoma*), which it extracts by tearing the webs. Plant food includes wild berries (e.g. *Rubus*, *Amelanchier*), cultivated fruits (grapes, cherries) and green peas. In non-breeding range feeds also on bananas, tomatoes and oranges, and punctures large fruits to obtain pulp and juice; in Panama feeds on fruits of *Bursera simaruba*; feeds on fruits of *Cecropia*, and takes nectar from flowering legume trees in genera *Erythrina*, *Inga* and *Calliandra*, also from the vine *Combretum fruticosum* and the epiphyte *Norantea*. Forages in trees and bushes; arthropod prey mostly gleaned from foliage of trees. On breeding grounds rarely social, foraging mostly as single individuals; on wintering grounds may forage in small groups, e.g. of up to 15 individuals in Costa Rica, at times in mixed-species foraging flocks. In winter often roosts communally.

Breeding. Season May–Jun; single-brooded. Monogamous; extra-pair copulations reported, but apparently rare. Solitary, nearest-neighbour distance usually 45–60 m, but nesting density may increase markedly during outbreaks of tent caterpillars; defends relatively small area around nest tree (feeding areas of neighbouring pairs commonly overlap), and defends nesting territory against both conspecifics and *I. bullockii*. Nest built mostly by female, a pouch 15–20 cm long and 8–9 cm wide (wider at bottom than at top), woven from plant fibres such as grass and stems (in cities and gardens, artificial materials such as string and plastic may be used), lined with soft materials such as seed plumes or feathers, attached to rather high branch, usually 5–22 m above ground, and concealed by foliage; generally in broadleaf tree such as cottonwood (*Populus*), elm (*Ulmus*), maple (*Acer*) or sycamore (*Platanus*), often isolated tree, at woodland edge, along channel or stream, or in urban park. Clutch 3–7 eggs, usually 4–5, pale greyish-white to bluish-white, streaked, blotched and scrawled with brown, mauve or black, mean dimensions 23·2 × 16 mm; incubation by female, period 12 days; chicks fed by both sexes, nestling period 12–14 days; male may feed incubating or brooding female, and both sexes defend nest. Rarely parasitized by *Molothrus ater*, as parents remove parasite's eggs from nest. Rarely, male breeds in first year.

Movements. Migratory. Leaves breeding grounds from Jul. Main migration route down Atlantic slope of Mexico. Some winter in coastal S California and North Carolina S to Florida (USA), but most migrate to S Mexico, Central America and NW South America (Colombia and Venezuela, rarely S to Ecuador); rare in Cuba, Bahamas and Jamaica, Sept–May. Very rare in Hispaniola and Puerto Rico, and accidental or vagrant S to Lesser Antilles and Cayman Is. Some individuals move N as far as New England, often taking advantage of bird feeders, but most apparently fail to survive the winter. Ringing data from Guatemala suggest that wintering orioles there were mostly transient, without fixed home ranges. Spring arrival on breeding grounds starts in April, and generally complete by late May. Vagrants recorded in Greenland, Iceland, Norway, British Is, Netherlands and Azores; up to end 2007, some 23 records from Britain and 2 from Ireland: most records in autumn, but species has overwintered and been recorded in spring.

Status and Conservation. Not globally threatened. Common to locally common; common in N & C parts of non-breeding range. Estimated global population 6,000,000 individuals. Able to live in modified environments.

Bibliography. Beletsky (1982a, 1982b), Bendire (1895), Bent (1958), Carling *et al.* (2011), Cruden & Hermann-Parker (1977), Dixon (1989), Flood (1984, 1985), Graf & Greeley (1976), Gryj *et al.* (1990), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Jaramillo & Burke (1999), Lee Cinty & Birch (1998), McCarthy (2006), Misra & Short (1974), Neudorf & Sealy (1992), Omland & Kondo (2006), Omland *et al.* (1999), Raffaele *et al.* (1998), Rising (1970, 1973, 1983, 1996b), Rising & Flood (1998), Rogers *et al.* (1982), Rohwer & Johnson (1992), Rohwer & Manning (1990), Sealy (1980), Sibley & Short (1964), Slack (2009), Stiles & Skutch (1989), Timken (1970).

PLATE 74 ➤



PLATE 74

inches 4

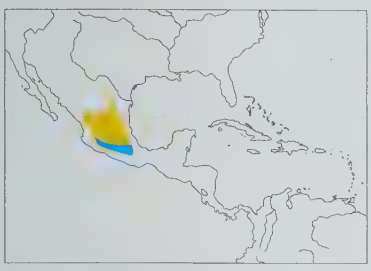
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29. Black-backed Oriole

Icterus abeillei

French: Oriole d'Abeillé **German**: Schwarzmanteltrupial **Spanish**: Turpial Dorsinegro
Other common names: Abeille's Oriole

Taxonomy. *Xanthornus Abeillei* Lesson, 1839, Mexico.
Sometimes treated as conspecific with *I. bullockii*, but DNA data indicate that it is sister to *I. galbula*; all three formerly treated as conspecific. Monotypic.
Distribution. Breeds in C Mexico from Durango and Nuevo León S to Michoacán and Veracruz; winters in C Mexico mostly along transvolcanic belt S to Oaxaca.



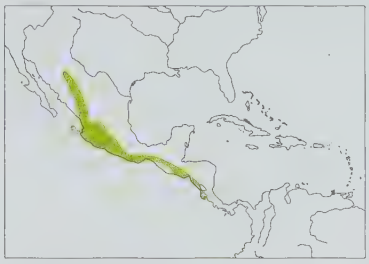
Descriptive notes. 18–20·5 cm; 31–37 g. Male has crown to side of head, nape and upperparts black, orange supraloral line, narrow orange crescentic patch above and below eye (looking like spectacles); upperwing black, median and greater coverts white (forming large white patch), flight-feathers broadly edged white; tail black, outer three feather pairs yellow with black tip; chin and median throat stripe black, rest of throat and underparts orange-yellow, flanks and exterior of thighs black; iris dark brown; upper mandible black with grey cutting edges, lower mandible blue-grey; legs blue-grey. Female is much duller than male, with black areas, including wing and tail, replaced with olivaceous grey, and throat dull orange with white median stripe, breast dull orange, becoming greyish-white on belly and flanks. Juvenile resembles female, but duller, with less white in wing, and buffish below, with yellowish throat; immature male also like female, but has black throat stripe and lores, also darker feather centres above, and is brighter orange below. Voice. Song a rich warbie, often with some scratchy notes, covering rather wide frequency range, resembles that of *I. bullockii*. Calls include loud chatter and nasal "chay".
Habitat. Breeds in open forest, clearings and forest edge, riparian habitats, orchards and gardens; in winter also found in oak (*Quercus*) and pine (*Pinus*) montane forests, and in fir (*Abies*) forests. Breeds at 1500–3000 m, sometimes up to 3900 m; winters at similar elevations.
Food and Feeding. Insects, spiders (Araneae), fruits, nectar. One of main avian predators of the toxic monarch butterfly (*Danaus plexippus*) that winters in Mexico; feeds mostly on less toxic internal parts of the butterflies. Forages in pairs and small groups.
Breeding. Season Apr–Aug. No other published information.
Movements. Apparently a short-distance migrant within C Mexico.
Status and Conservation. Not globally threatened. Fairly common to common. Estimated global population in range 50,000–500,000 individuals. Occurs in some protected areas, such as Pico de Orizaba National Park.
Bibliography. Arellano-Guillermo *et al.* (1993), Brower & Calvert (1985), Edwards (1972), Hardy *et al.* (1998), Howell & Webb (1995), Jaramillo & Burke (1999), Kondo *et al.* (2004), McCarthy (2006), Omland & Kondo (2006), Price *et al.* (2007), Rising (1970, 1973).

30. Streak-backed Oriole

Icterus pustulatus

French: Oriole à dos rayé **German**: Piroltrupial **Spanish**: Turpial Dorsilistado
Other common names: Scarlet-headed Oriole ("*pustulatus* group"); Tres Marias Oriole (*graysonii*); Sclater's Oriole ("*sclateri* group")

Taxonomy. *Ps.*[*arocolius*] *pustulatus* Wagler, 1829, Mexico.
DNA data indicate that present species is sister to *I. bullockii*. Races often divided into three groups, "*pustulatus* group" (nominate race and *microstictus*) in N of range, single-species "*graysonii* group" on Tres Marias Is (off WC Mexico) and "*sclateri* group" (*formosus*, *maximus*, *alticola*, *sclateri* and *pustuloides*) in S of range. Groups sometimes thought to represent three distinct species, but mitochondrial-DNA divergence among mainland races slight; on other hand, insular *graysonii*, isolated for longer time, may warrant treatment as a full species, but scant information available on its behaviour and breeding biology. In Mexico, birds from S Sinaloa S to S Nayarit sometimes placed in separate race *yaegeri*, those from SW Jalisco S to S Guerrero in *dickermani*, and birds in interior C & S Mexico in *interior*, but diagnostic characters of these uncertain. Other proposed races are *flammulatus* (described from Monte Redondo, in Honduras), subsumed in *alticola*, and *connectens* (interior El Salvador), which is intermediate between *alticola* and *sclateri* and is merged with latter. Eight subspecies currently recognized.
Subspecies and Distribution.
I. p. microstictus Griscom, 1934 – W Mexico from Sonora and W Chihuahua S to Jalisco.
I. p. graysonii Cassin, 1867 – Tres Marias Is, off W coast of Mexico (Nayarit).
I. p. pustulatus (Wagler, 1829) – S Mexico from Colima S to Puebla, W Veracruz and N Oaxaca.
I. p. formosus Lawrence, 1872 – S Mexico (S Oaxaca and Chiapas) S to NW Guatemala.
I. p. maximus Griscom, 1930 – R Negro valley, in NC Guatemala.
I. p. alticola W. deW. Miller & Griscom, 1925 – Guatemala and W Honduras.
I. p. sclateri Cassin, 1867 – Pacific coast from El Salvador S to NW Costa Rica.
I. p. pustuloides van Rossem, 1927 – Volcán San Miguel, in EC El Salvador.
Descriptive notes. 19–21 cm; male average 43·1 g, female average 34·6 g; sexes combined 31·8–41·6 g (*microstictus*), 29–39·4 g (*graysonii*), male average 57 g (*alticola* and *sclateri*). Male nominate race has head and chest deep orange, contrasting black lores and chin to upper breast; upperparts orange, rather heavy black streaks on mantle and back; tail black, feathers with whitish tips, outer edge of outermost rectrix white; lesser upperwing-coverts orange, rest of upperwing black, median coverts broadly tipped white (prominent wingbar), greater coverts edged and tipped whitish (pale panel), flight-feathers edged whitish; underparts orange to orange-yellow; iris dark brown; bill black, basal half of lower mandible bluish-grey; legs bluish-grey. Female is similar to male, but slightly less richly coloured. Juvenile resembles dull female, but no black on lores and chin to breast, has crown olive-tinged, back greyer and almost unstreaked, less white in wing, dirty yellowish below; immature similar to female. Races differ mainly in intensity of bright coloration, amount of streaking on back, and size: *microstictus* is like nominate, but brighter, head and chest orange-yellow to fiery orange-red, black streaks above smaller, female sometimes duller and greener than male; *graysonii* has orange-yellow head, fewer black streaks on back; *alticola* has orange-yellow head, back so heavily streaked as to look solidly black; *sclateri* resembles previous in having orange-yellow head, but back is evenly streaked black and yellow; *formosus* resembles last, but smaller, and streaks above are in form of tear-shaped black spots; *maximus* is similar to *alticola*, but paler, more yellow than orange-yellow; *pustuloides* differs from nearby populations (*sclateri*) in smaller size and deep orange head. Voice. Song, by both sexes, mostly a melodic warbled series of whistles, somewhat like that of a vireo (Vireonidae), sometimes including dissonant "churr" notes; females usually sing less frequently than males. Common calls include chatters and a sharp "chit".



Habitat. Occupies canopy and edges of deciduous forest, swamps with palo verde (*Parkinsonia aculeata*) shrubs, thorny woodland and scrub, savannas, and trees at roadsides and villages. Occurs from lowlands up to c. 500 m; races *maximus* and *alticola* also range higher, locally reaching up to 2000 m. In El Salvador, *pustuloides* lives in xeric woodland at 800–1000 m, sometimes in nearby lowlands.
Food and Feeding. Insects and other arthropods, also nectar and fruits. Two stomachs from El Salvador contained only insects. Gleans insects from foliage, and extracts larvae of beetles (Coleoptera) from rotten wood. Feeds on several fruits and arils of native plants. Takes nectar from flowers of the trees *Erythrina breviflora*, *Erythrina oliviae* and *Pseudobombax ellipticum* in Mexico, also from brush-like inflorescences of the vine *Combretum fruticosum* (individuals captured near the vine had pollen in plumage). Also catches bees (Apoidea) near flowers. Forages mostly in pairs and in family parties, occasionally in larger groups.
Breeding. Season May–Jul, later in N and at higher elevations. Probably largely monogamous; polygyny recorded. Solitary breeder. Nest a pensile bag 25–50 cm long, sometimes longer (to 70 cm), made from plant fibres and fungal rhizomorphs (reported as stealing nesting material from unguarded nests of conspecifics, and behaviour reciprocated by latter), placed rather high up in bush or tree, sometimes suspended from power line; often in thorny tree, including acacia (*Acacia*) species that harbour aggressive stinging ants (Formicidae), and reported also as nesting near wasp (Vespidae) nests; may nest in same tree with other orioles (mostly *I. gularis*, also *I. pectoralis*) and diverse birds, e.g. Rose-throated Becard (*Pachyramphus aglaiae*) and *Campylorhynchus* wrens. Clutch 3–4 eggs, rarely 5, white to pale blue with dark brown lines and blotches, mean dimensions 26 × 17·4 mm; incubation period 12–14 days; chicks fed by both sexes, nestling period c. 14 days. Nests are regularly parasitized by *Molothrus aeneus*, e.g. two of eleven nests in Oaxaca were parasitized; adults of present species have been reported feeding fledgling of *Molothrus oryzivorus* in Nicaragua.
Movements. Apparently resident; in 1930s, race *sclateri* reported as making some local movements. Rare visitor in SW USA (Arizona, California).
Status and Conservation. Not globally threatened. Fairly common to common; locally rather abundant. Race *microstictus*, recorded very occasionally in SW USA, bred in Arizona in 1993 and subsequently in some years. The insular Tres Marías population (*graysonii*) deserves protection, because of its tiny global range and its distinctiveness.
Bibliography. Bent (1958), Cortés-Rodríguez *et al.* (2008), Cruden & Toledo (1977), Dickerman (2007), Dickey & van Rossem (1938), Eguiarte *et al.* (1987), Gómez (1983), Gryj *et al.* (1990), Janzen (1971), Jaramillo & Burke (1999), Kaufman (1983), Lowther (1995), McCrary & Gates (2007), Phillips (1995), Price *et al.* (2008), Rowley (1984), Stiles & Skutch (1989), Toledo & Hernández (1979).

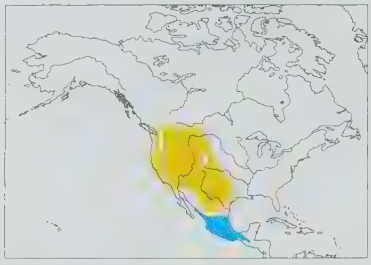
31. Bullock's Oriole

Icterus bullockii

French: Oriole de Bullock **German**: Bullocktrupial **Spanish**: Turpial de Bullock
Other common names: Northern Oriole (when lumped with *I. galbula*)

Taxonomy. *Xanthornus Bullockii* Swainson, 1827, "Table land" [of Mexico] = Temascáltepec, México State, Mexico.
DNA data indicate that present species is sister to *I. pustulatus*. In the past usually treated as conspecific with *I. galbula* and *I. abeillei*. Hybridizes extensively with former in a belt from S Canada (Alberta and Saskatchewan) S in Great Plains to S USA (Oklahoma and Texas), but assortative mating (or selection against hybrids) evident at several locations. Smaller race *parvus* possibly not worthy of recognition, and size difference within species apparently clinal; retained pending further study. Proposed race *eleutherus* (from N Texas, in S USA), supposedly more orange than nominate, considered to fall within range of variation of latter. Two subspecies tentatively recognized.
Subspecies and Distribution.
I. b. bullockii (Swainson, 1827) – breeds SW Canada (from S British Columbia, S Alberta and SW Saskatchewan) S in W USA (except C California S to W Arizona) to N Mexico (Sonora, Chihuahua and Coahuila); winters C Mexico S to C Guatemala.
I. b. parvus van Rossem, 1945 – breeds SW USA (from C California, S Nevada and W Arizona) S to NW Mexico (extreme N Baja California and extreme NW Sonora); winter range uncertain.
Descriptive notes. 19–23 cm; male average 37·9 g, female average 37·8 g. Male nominate race has crown to nape and back black, black eyeline and thin black stripe from chin to upper breast; rest of head, lower back to uppertail-coverts and entire underbody orange; upperwing black, median and greater coverts mostly white (prominent wingpanel), flight-feathers broadly edged white; tail black, outer rectrices orange with black tips; in fresh (non-breeding) plumage has narrow greyish feather tips on head and back, whitish tips below, broader white wing edgings; iris dark brown; bill bluish-grey, black culmen; legs bluish-grey. Female considerably duller than male, has head and facial markings olivaceous, head and upper breast duller yellow-orange, belly greyish-white; back and

On following pages: 32. Jamaican Oriole (*Icterus leucopteryx*); 33. Orange Oriole (*Icterus auratus*); 34. Yellow Oriole (*Icterus nigrogularis*); 35. Altamira Oriole (*Icterus gularis*); 36. Yellow-tailed Oriole (*Icterus mesomelas*); 37. Spot-breasted Oriole (*Icterus pectoralis*); 38. White-edged Oriole (*Icterus graceannae*); 39. Venezuelan Troupial (*Icterus icterus*); 40. Campo Troupial (*Icterus jamacaii*); 41. Orange-backed Troupial (*Icterus croconotus*).



wings paler and greyer, lacks striking white wingpanel, instead has white wingbar formed by broad tips of median coverts, sometimes with a faint second white wingbar formed by narrow tips of greater coverts; tail olivaceous, tinged orange; some birds with black on throat. Juvenile similar to female; young male acquires adult plumage through intermediate stages. Race *parvus* is smaller than nominate but otherwise similar. VOICE. Song, by both sexes, a short series of whistles, less musical than song of *I. galbula*, sometimes with notes repeated 2–5 times in a row. Calls include clicks, harsh "chuck" sounds and a short rattle.

Habitat. Open deciduous woodland with cottonwoods (*Populus*) and sycamores (*Platanus*), often in riparian habitat; open oak (*Quercus*) woodland in California, xeric mesquite (*Prosopis*) woodland, farms and ranches. Prefers areas with large trees mixed with grassland and herbaceous plants. Sea-level to at least 3000 m.

Food and Feeding. Omnivorous; stomach contents 79% animal matter, 21% vegetable. Insects include caterpillars of Lepidoptera, ants (Formicidae), weevils (Curculionidae), stink-bugs (Pentatomidae) and scale insects (Coccoidea); black olive scales (*Saissetia oleae*) found in 45 stomachs, amounting to 5% of food. Preys also on spiders (Araneae), and rarely on small lizards. Feeds on small fruits such as juneberries (*Amelanchier*), blackberries and raspberries (*Rubus*), elderberries (*Sambucus*), also some cultivated fruits. Takes nectar from flowers of the trees *Erythrina breviflora* and *Pseudobombax ellipticum* in Mexico (is a secondary pollinator of latter species); in California visits flowers of introduced eucalypts (*Eucalyptus*). Hunts for insects by gleaning in foliage; also picks insects from spider webs. Often forages in flocks of up to 20 individuals, even during breeding season.

Breeding. Season Apr–Jun, earlier in S of range; single-brooded. Mostly monogamous, in California study only two of 96 males were bigamous; pair-bond generally lasts for only one breeding season. Nests solitarily or in small loose colonies, in latter case with density of 15–18 nests/ha. Territorial behaviour variable; at low food density only nest-site defended, and female may forage up to 1 km from site. Nest built mostly by female, a pendent pouch c. 10 cm in length, woven from horsehair, plant fibres and grass, lined with wool or feathers, attached to a few thin branches, or more rarely to larger branch, commonly 3–8 m above ground, and usually not far from water in isolated tree, at woodland edge, in shelter-belt, or in farm or ranch; many trees used for nesting, including exotic eucalypt and native mesquite; colonies in California sometimes located near nests of Yellow-billed Magpies (*Pica nuttalli*), which provide some protection against predators. Clutch 3–7 eggs, usually 4–5, pale bluish to greyish-white, finely spotted and scrawled in shades of brown, mean dimensions 23·6 × 16·2 mm; incubation by female, period c. 12 days; chicks fed by both parents, nestling period 14 days; both sexes defend nest; in parts of W USA (Washington and California) fledglings may join groups, or crèches, of up to 100 individuals, attended by several adults. Nests parasitized by the cowbirds *Molothrus ater* and *Molothrus aeneus*; in experimental study, this icterid removed most cowbird eggs from its nests. In SW USA (California), 191 nests produced average of 2·67 fledged chicks, giving success rate of 53·4%. Rarely, males in California breed in first year.

Movements. Short-distance to medium-distance migrant. Nominate race leaves breeding grounds in Jul–Aug, many probably moving initially SW to moult, before continuing to Mexico, where arrival in S mainly Sept–Oct. Return migration begins in late winter; reaches S parts of breeding range from mid-Mar, but in N does not arrive until early to middle part of May, some not until Jun, females generally 1–2 weeks later than males. Scattered records of nominate race, mainly in autumn and winter, from as far E as Atlantic seaboard of Canada and USA, and also from Gulf Coast states; at least some of these, however, possibly referable to *I. galbula* (formerly treated as conspecific). Non-breeding grounds of race *parvus* not known; believed to lie in S part of breeding range and possibly farther S in NW Mexico.

Status and Conservation. Not globally threatened. Common or fairly common in most of range. Estimated global population of 3,800,000 individuals, and occurs in modified habitats. This species' consumption of the scale insect *Saissetia oleae*, a pest of citrus trees as well as olives (*Olea*), could make it beneficial to agriculture.

Bibliography. Bendire (1895), Bent (1958), Butcher (1991), Butcher & Rowher (1988), Carling *et al.* (2011), Cruden & Toledo (1977), Dixon (1989), Edinger (1988), Eguiarte *et al.* (1987), Howell & Webb (1995), Jaramillo & Burke (1999), Lee Cinty & Birch (1998), Lowther (1995), McCarthy (2006), Miller (1931), Misra & Short (1974), Omland *et al.* (1999), Richardson & Bolen (1999), Richardson & Burke (1999, 2001), Rising (1973, 1983, 1996b), Rising & Williams (1999), Rohwer & Johnson (1992), Rohwer & Manning (1990), Rohwer *et al.* (1989), Rothstein (1977), Sibley & Short (1964), Williams (1982).

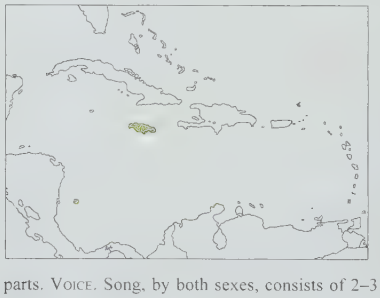
32. **Jamaican Oriole**

Icterus leucopteryx

French: Oriole de Jamaïque **German**: Jamaikatrupial **Spanish**: Turpial Jamaicano

Taxonomy. *Ps.* [*arocolius*] *Leucopteryx* Wagler, 1827, Jamaica.
Appears not closely related to other Caribbean members of genus. Race *bairdi* of Cayman Is apparently extinct. Two extant subspecies recognized.

Subspecies and Distribution.
I. l. leucopteryx (Wagler, 1827) – Jamaica.
I. l. lawrencii Cory, 1887 – San Andrés I (E of Nicaragua).



Descriptive notes. 21 cm; c. 34–42 g. Male nominate race is mostly olivaceous yellow, brighter and yellower on belly, with black mask and throat to upper breast; upperwing black, coverts contrastingly white (striking wing patch), inner remiges (including tertials) broadly edged white; tail black; iris dark brown; bill bluish-grey, black culmen; legs dark grey. Female is similar to male, perhaps slightly duller. Immature is dull olivaceous green, with reduced black areas on head, more black on wings, and tail dusky green. Race *lawrencii* is brighter than nominate, more yellow-green, becoming lemon-yellow on underparts. VOICE. Song, by both sexes, consists of 2–3 musical, modulated whistles, e.g. "tie-tiewu", "tie-tiewu-tiewu" and similar (often transliterated as "Auntie Katie"), in rapid succession. Call a single or 2-note whistle, also a short chatter.

Habitat. Most types of forest and woodland in Jamaica, from coast to mountains, but rarely in mangroves. Also visits gardens. Sea-level to tops of mountains; mostly in lowlands.

Food and Feeding. Insects, other arthropods, possibly small vertebrates, also nectar and fruit. Reported as feeding on fruits of seven species of native plant in genera *Trophis*, *Guapira*, *Clusia*, *Pithecellobium*, *Miconia*, *Bursera* and *Trichilia*; cultivated fruits taken include papayas, oranges and bananas, and particularly annonas (*Annona*). Takes nectar from introduced *Erythrina*; also visits hummingbird (Trochilidae) feeders. Often finds arthropods by removing pieces of bark with the bill to expose hidden items, an unusual habit among orioles; also searches in epiphytic bromeliads. Uses pecking and gaping techniques to extract fruit pulp. Forages in pairs and in family groups.

Breeding. Season Mar–Aug. Probably monogamous. Solitary breeder. Nest built by both sexes, a pouch woven from fibres taken from palm leaves, also with black fungal rhizomorphs, horsehair, and pieces of epiphytic Spanish moss (*Tillandsia usneoides*), suspended from branch fork or between two parallel twigs (unlike nests of Caribbean congeners, not stitched to leaves). Clutch 3–5 eggs, white with sparse dark brown marks, mean dimensions 24·5 × 16·8 mm; chicks fed by both sexes. Reported as a host of invading *Molothrus bonariensis*. No further information.

Movements. Apparently sedentary.

Status and Conservation. Not globally threatened. Restricted-range species: present in Jamaica EBA and in San Andrés Island and Cayman Islands Secondary Areas. Common in Jamaica; abundant on San Andrés. Cayman Is race *bairdi*, restricted to Grand Cayman, last reported in 1967 and believed now extinct, reasons for its demise being unknown; this icterid, smaller and brighter yellow-green than nominate race, inhabited town gardens, as well as woodland.

Bibliography. Bradley (1995), Brown & Degia (1994), Gosse (1847), Hardy *et al.* (1998), Hilty & Brown (1986), Jaramillo & Burke (1999), Lack (1976), Omland *et al.* (1999), Price *et al.* (2007), Raffaele *et al.* (1998).

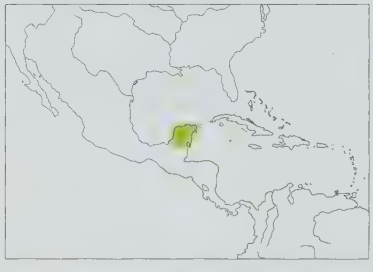
33. **Orange Oriole**

Icterus auratus

French: Oriole orange **German**: Goldtrupial **Spanish**: Turpial Yucateco

Taxonomy. *Ict.*[*erus*] *auratus* Bonaparte, 1850, Mérida, north Yucatán, Mexico.
According to DNA data, this species' closest relatives are *I. nigrogularis* and *I. leucopteryx*. Monotypic.

Distribution. SE Mexico (Yucatán Peninsula S to SC Campeche) and NE Belize; also Mujeres I, off NE Quintana Roo.



Descriptive notes. 19–21 cm; 26·7–36·1 g, one female 27 g. A small, slender oriole. Male has black lores and black median throat stripe extending to upper breast; rest of head bright orange, body orange-yellow above and below; scapulars black, tipped orange, upperwing black, lesser coverts orange, median coverts white, greater coverts tipped white, secondaries and tertials edged white, primaries edged white at bases (forming small white patch); tail black, indistinct greyish tip; iris dark brown; bill straight, black, basal half of lower mandible bluish-grey; legs bluish-grey. Female is duller than male, orange-yellow with olive wash, and sometimes streaked on back. Immature is like female, but more washed with olive, and with tail olive, not black. VOICE. Song a slow series of alternating ascending and descending whistles; also a fast "chuchuchuchu". Common call a nasal "nyeek".

Habitat. Seasonally deciduous forest, mesic to arid woodland and scrub, second growth, abandoned farmland; mostly in lowlands.

Food and Feeding. Not much information. Diet presumably insects and other arthropods, fruits and nectar. Commonly feeds on fruits of native tree *Talisia olivaeformis* (Sapindaceae), less frequently on fruits of medicinal tree *Metopium brownie* (Anacardiaceae). Task of obtaining *Talisia* fruit requires use of bill and legs to extract inner pulp from harder shell. Forages singly and in pairs; often with other orioles.

Breeding. Season Jul; one colony was asynchronous, some pairs building nests while others feeding fledglings. In Quintana Roo both solitary and colonial nester; colonies of 20–35 nests, up to five nests in one tree; in one colony there were also single nests of *I. cucullatus* and *I. prosthemelas*, and nests of Black Catbirds (*Melanoptila glabrirostris*). Nest a pouch 7·5 cm in external diameter and 12·5 cm in external depth, woven from blackish or yellowish fibres, attached to slender branches 1–9 m above ground in shrub or tree located in flooded scrub, or near *cenotes* (natural water-holes or ponds in limestone). No further information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Common to fairly common. Found in Sian Ka'an and Calakmul Biosphere Reserves, in Mexico, and commonly seen around protected Maya ruins.

Bibliography. Howell & Webb (1995), Howell *et al.* (1992), Jaramillo & Burke (1999), Kantak (1979), Omland *et al.* (1999), Price *et al.* (2007).

34. **Yellow Oriole**

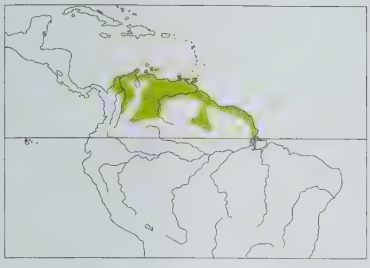
Icterus nigrogularis

French: Oriole jaune **German**: Orangebrusttrupial **Spanish**: Turpial Amarillo

Taxonomy. *Xanthornus nigrogularis* Hahn, 1819, north Brazil.
Four subspecies recognized.

Subspecies and Distribution.
I. n. nigrogularis (Hahn, 1819) – NW & NE Colombia (Caribbean region S to middle Magdalena Valley, and in Meta and Vichada), Venezuela (from Zulia E, mostly N of R Orinoco, to Delta Amacuro), Guyana, Suriname and French Guiana, and N Brazil (Roraima and Amapá).
I. n. curasoensis Ridgway, 1884 – Netherlands Antilles (Aruba, Curaçao and Bonaire).
I. n. helioeides A. H. Clark, 1902 – Margarita I, off N Venezuela.
I. n. trinitatis E. J. O. Hartert, 1913 – Trinidad, and nearby NE Venezuela (Paria Peninsula).

Descriptive notes. 20–21 cm; male average 39·5 g, female average 37·4 g (Suriname). Male nominate race has black area around eye and lores (mask) and in narrow band from chin to upper breast (bib); remainder of head and body bright orange-yellow; wing and tail black, lesser and median



wing-coverts yellow, greater coverts tipped white, primaries edged white basally, inner secondaries and tertials edged white; iris dark brown; bill black, blue-grey at base of lower mandible; legs grey. Female is similar to male, but with olivaceous tinge in yellow areas of plumage. Juvenile is duller and greenish, lacking black mask and bib, and with greenish tail. Races differ mainly in size, bill size and plumage coloration: *curasoensis* is paler yellow overall than nominate, with more white in wing, longer bill; *helioeides* is larger and stronger-billed than nominate, plumage more orange-tinged, has most white in wing; *trinitatis* resembles previous, but bill on average smaller, and has least white in wing (lacking on primaries). Voice. Song relatively soft, consists of repeated flute-like notes mixed with buzzes and harsher notes. Mimicry of other birds reported. Alarm call "chet-chet-chet".

Habitat. In Caribbean region mostly in arid to semi-arid woodland and scrub, with cacti, mesquite (*Prosopis*) and acacia (*Acacia*); in seasonally dry Llanos del Orinoco of interior Colombia and Venezuela frequents open woodland and edges of gallery forest; in Trinidad avoids unbroken forest and dry savannas. In Suriname found mostly in mangroves. Also cultivated land with trees and shrubs, riparian habitat, parks and gardens in towns. Lowlands below 800 m, but reported at up to 1800 m.

Food and Feeding. Stomach contents of 14 birds from Netherlands Antilles all included animal matter, and in eight cases also vegetal matter. Insects were mostly small beetles (Coleoptera), flies (Diptera), lepidopteran caterpillars, with some cicadas (Cicadidae) and grasshoppers (Orthoptera); other arthropods were spiders (Araneae) and wind scorpions (Solifugae). Feeds also on fruits of Barbados cherry (*Malphigia punicifolia*) and date palms (*Phoenix dactylifera*). Takes nectar from flowers of the trees *Erythrina fusca* and *Pithecellobium saman*. Usually in pairs or small groups.

Breeding. Season Jan–Aug in Trinidad, Feb–Aug in Suriname, and May–Sept in *llanos* of Venezuela. Apparently monogamous and territorial. Solitary nester. Nest a pendent pouch 25–50 cm long, 11 cm in diameter at bottom, woven from diverse plant fibres, mostly grass and palm fibres (colour of nest varies from greyish-brown to reddish-brown), sometimes fragments of plastic or paper, or string, incorporated, nest walls thicker at bottom, which contains lining of softer materials; attached to tree or shrub branch, often high in tamarind (*Tamarindus indica*) in Netherlands Antilles, or to *Avicennia* mangrove elsewhere; reported as nesting also in coconut palm (*Cocos nucifera*); may build close to older, disused nests; in Venezuela may nest close to aggressive birds, such as Great Kiskadee (*Pitangus sulphuratus*) or colonies of *Cacicus cela*. Nests usurped by Piratic Flycatcher (*Legatus leucophaius*) in Trinidad, possibly also in Venezuela. Clutch usually 2–3 eggs, in Santa Marta region of Colombia ten nests had 3 eggs, six held 2 eggs, and one 5 eggs (perhaps from two females), greenish-white or creamy white with sparse spotting and blotching in brownish, mauve and black, mean dimensions 24·6 × 16·6 mm (ten eggs from Trinidad average 27·1 × 17·9 mm); no information on incubation and nestling periods and on roles of sexes in parental care. Nests parasitized by *Molothrus bonariensis* in Trinidad.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Common throughout most of range. Very abundant in N Venezuela and on nearby islands; also numerous in parts of Netherlands Antilles, but rare on Bonaire.

Bibliography. Allen (1905), Belcher & Smooker (1937), Cherrie (1916), Cruz & Andrews (1989), Haverschmidt (1951, 1968), Haverschmidt & Mees (1994), Hilty (2003), Jaramillo & Burke (1999), Losada-Prado *et al.* (2004), Manolis (1982), Price *et al.* (2007), Ridgely & Tudor (1989), Rutkis (1972), Todd & Carriker (1922), Voous (1983).

35. Altamira Oriole

Icterus gularis

French: Oriole à gros bec **German**: Schwarzkehltrupial **Spanish**: Turpial de Altamira
Other common names: Lichtenstein's/Black-throated Oriole

Taxonomy. *Ps.*[*arocolius*] *gularis* Wagler, 1829, Tehuantepec, Oaxaca, Mexico.

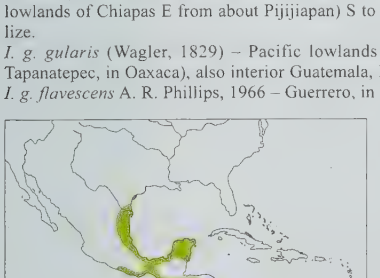
Following recent revision, several proposed races now considered to be based on age differences in plumage and other features: thus, *tamaulipensis*, described from Alta Mira (Tamaulipas), in E Mexico, *yucatanensis*, from Yucatán Peninsula, and *troglodytes*, from San Felipe (Retalhuleu), on Pacific slope of Guatemala, all subsumed in *mentalis*; and *gigas*, from Sacapulas (valley of R Negro), in C Guatemala, and *xerophilus*, from Progreso (Motagua Valley), in SW Guatemala, both synonymized with nominate. Three subspecies currently recognized.

Subspecies and Distribution.

I. g. mentalis Lesson, 1831 – extreme S USA (lower Rio Grande Valley, in Texas) and E & S Mexico (to Yucatán Peninsula, across Isthmus of Tehuantepec to Matias Romero area, also Pacific lowlands of Chiapas E from about Pijijiapan) S to Guatemala (to La Avellana region), and N Belize.

I. g. gularis (Wagler, 1829) – Pacific lowlands of S Mexico (Isthmus of Tehuantepec S to Tapanatepec, in Oaxaca), also interior Guatemala, El Salvador, Honduras and W Nicaragua.

I. g. flavescens A. R. Phillips, 1966 – Guerrero, in S Mexico.



Descriptive notes. 23–25·5 cm; male average 85·7 g, female average 69·4 g. A robust oriole with thick straight bill. Nominate race has head and underparts bright orange, with black lores and chin to uppermost breast (bib); mantle and back black, rump and uppertail-coverts orange to orange-yellow; upperwing black, orange to yellow shoulder patch (lesser and median coverts), greater coverts broadly tipped white (prominent wingbar), primaries broadly edged white at base (small patch on closed wing), and secondaries and tertials edged white; tail black; iris brown; bill black, basal half of lower mandible bluish-grey; legs bluish-grey. Sexes similar. Juvenile has orange areas of plumage yellowish, lacks black bib, has mantle and back olive, wing and tail dusky, greater coverts tipped paler, no shoulder patch; immature similar to adult but duller, back orange-tinged olive, pale colours in wing greatly reduced. Race *mentalis* is like nominate, but smaller; *flavescens* is intermediate in size between nominate and previous, and differs in having orange areas of plumage replaced by yellow. Voice. Song a varied series of loud whistles, sometimes combining slow and fast sections. Calls include nasal "nyenk", often repeated, also "chiu" and plaintive "chu wee chu".

Habitat. Woodland and scrub, riparian woodland, savannas; seems to have a liking for *Mimosa* trees. Lowlands to 1500 m.

Food and Feeding. Arthropods, presumably also small vertebrates; also fruits and nectar. Ants (Formicidae) found among stomach contents. Feeds on fruits of the native trees *Celtis* (Ulmaceae), *Ehretia tinifolia* (Boraginaceae) and *Talisia olivaeformis* (Sapindaceae); reported also as feeding on cultivated fruits. Nestling diet in S USA (Texas) mostly insects, with a good proportion of cryptic stick-insects (Phasmida). Forages in pairs and in small groups; often mixes with other orioles.

Breeding. Season late Apr–Aug in USA and NE Mexico, May–Jul in S Mexico (Oaxaca) and Mar–Jun in El Salvador; apparently double-brooded. Monogamous. Solitary breeder, territories well spaced. Nest built by female, work taking up to 26 days, an elongate pensile bag 35–65 cm long (the biggest nest built by any oriole), resembling nest of *Cacicus*, made from grass and other plant fibres, usually placed rather high up and exposed in tree, often a thorny one, including acacia (*Acacia*) species harbouring aggressive stinging ants, or sometimes hanging from power line; in El Salvador may nest in same tree as other orioles (*I. pustulatus* and *I. pectoralis*); in USA (Texas) sometimes with Great Kiskadees (*Pitangus sulphuratus*) and Couch's Kingbirds (*Tyrannus couchii*), both aggressive to avian predators. Clutch 3–4 eggs, rarely 5, bluish-white with blackish lines, scrawls and spots, mean dimensions 27·4 × 18·8 mm; incubation by female, period 14 days; chicks fed by both sexes, no information on duration of nestling period. Nests parasitized by *Molothrus aeneus*, e.g. one of six nests in Oaxaca (S Mexico) was parasitized.

Movements. Resident.

Status and Conservation. Not globally threatened. Common to fairly common throughout range. A rather abundant oriole in some places, with increasing populations. First recorded in S USA in 1930s, and first confirmed breeding in 1951; since then has increased in numbers to become commonest member of genus in Rio Grande Valley.

Bibliography. Binford (1989), Brush (1998b), Dickerman (2007), Dickey & van Rossem (1938), Flood (1989), Grimes (1953), Hathcock & Brush (2004), Howell & Webb (1995), Janzen (1971), Jaramillo & Burke (1999), Kantak (1979), Lowther (1995), McCarthy (2006), Pleasants (1981, 1993), Rowley (1984), Steinbacher (1981), Sutton & Pettingill (1943).

36. Yellow-tailed Oriole

Icterus mesomelas

French: Oriole à queue jaune **German**: Gelbschwanztrupial **Spanish**: Turpial Coliamarillo

Taxonomy. *Ps.*[*arocolius*] *mesomelas* Wagler, 1829, Chalcaltianges, Veracruz, Mexico.

Hybridizes rarely with *I. chrysater*. Form *I. xantholemus*, known only by type specimen supposedly from Ecuador, was previously thought to be immature of present species or perhaps a hybrid of unknown parentage, but has now been shown to be a synonym of *Xanthopsar flavus*. Four subspecies recognized.

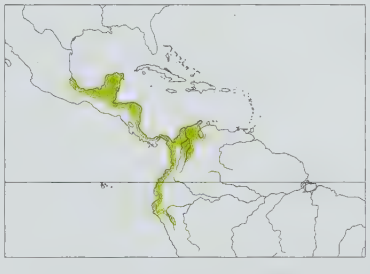
Subspecies and Distribution.

I. m. mesomelas (Wagler, 1929) – S Mexico (from Veracruz) S to Honduras.

I. m. salvinii Cassin, 1867 – Caribbean lowlands from Nicaragua S to W Panama (Bocas del Toro).

I. m carrikeri Todd, 1917 – Panama (from E of Canal) S on both coasts to W & C Colombia and NW Venezuela (Zulia).

I. m. taczanowskii Ridgway, 1901 – Pacific coast of Ecuador and NW Peru (Tumbes, also upper Marañón Valley).



Descriptive notes. 20·5–23·5 cm; male average 49·7 g, female average 38·5 g. Nominate race has face, throat to centre of breast, mantle and back, most of wing and central tail feathers black; remainder of head and underparts, rump, uppertail-coverts and outer tail feathers bright yellow, more golden on head; lesser, median and most of inner greater upperwing-coverts bright yellow (striking epaulet), inner secondaries and tertials edged yellowish, primaries edged white distally; iris dark brown; bill black, base of lower mandible grey; legs bluish-grey. Sexes similar. Juvenile is greenish-yellow above and drab yellow bellow; immature has black face and throat like adult, but dusky olivaceous upperparts, wing and tail. Races differ mainly in plumage coloration, bill shape and size: *salvinii* lacks yellowish edgings on secondaries, is more orange-tinged on head; *carrikeri* resembles previous, but on average paler orange, and has smaller bill; *taczanowskii* is smaller in size, and has tertial edges white, more extensive yellow in tail. Voice. Rich mellow song, by both sexes, consists of repeated phrases in which warbles mixed with trills; songs in Ecuador harsher in tone. Call a nasal "chew", also harder "chuk" or "chik".

Habitat. Inhabits humid places, including thick low shrubbery and bamboo, second-growth forest, swamp-forest, also banana plantations; commonly near water. Lowlands to c. 500 m; locally to 1000 m (*salvinii*), and up to 1750 m (*taczanowskii*).

Food and Feeding. Insects and other arthropods, e.g. centipedes (Chilopoda); also some fruit and nectar (including *Erythrina*). Stomach contents included ants (Formicidae), cockroaches (Blattodea), crickets (Orthoptera), several families of beetles (Coleoptera), and caterpillars. Feeds on fruits on the native trees *Ehretia tinifolia* (Boraginaceae) and *Talisia olivaeformis* (Sapindaceae). Unlike congeners, tends to keep low down in dense vegetation. Arthropods usually gleaned from foliage. Forages in pairs and in family groups; sometimes with other orioles.

Breeding. Season Apr–Jun in Costa Rica and Panama, and Sept–Nov in N Colombia. Probably monogamous. Solitary breeder. Nest a pendent shallow basket woven from slender plant fibres, with strong but open fabric, external diameter 11–12 cm, external depth 9 cm, attached to parallel twigs or branch fork 2–4 m up in tree; one nest in Colombia was attached to underside of leaf of an ornamental palm species growing in garden. Clutch 3 eggs, light blue with spots of brown and black, mean dimensions 23·9 × 17·8 mm; incubation by female, period 14 days; chicks fed by both parents, nestling period 12–13 days.

Movements. Appears resident.

Status and Conservation. Not globally threatened. Fairly common to common in much of range; uncommon in Peru. Widely captured as a cagebird, and for that reason locally scarce in Costa Rica. Found in many protected areas, such as Barro Colorado Nature Monument and Soberanía National Park (Panama).

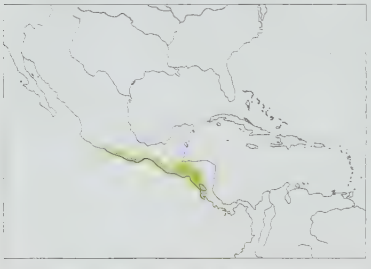
Bibliography. Barreiro & Pérez del Val (2000), Darlington (1931), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Jaramillo & Burke (1999), Kantak (1979), McCarthy (2006), Olson (1981c, 1983a), Ridgely & Greenfield (2001a, 2001b), Schulenberg & Parker (1981), Skutch (1954), Stiles & Skutch (1989), Wetmore *et al.* (1984).

37. Spot-breasted Oriole

Icterus pectoralis

French: Oriole maculé **German**: Tropfentrupial **Spanish**: Turpial Pechipinto
Other common names: Spotted Oriole

Taxonomy. *Ps.*[*arocolius*] *pectoralis* Wagler, 1829, Totolapán, Oaxaca, Mexico.
Closely related to *I. graceannae*. Four subspecies recognized.
Subspecies and Distribution.
I. p. carolynae Dickerman, 1981 – S Mexico (Pacific slope of Guerrero and adjacent Oaxaca).
I. p. pectoralis (Wagler, 1829) – SE Mexico (E Oaxaca and C Chiapas S to Tonalá).
I. p. guttulatus Lafresnaye, 1844 – SE Mexico (from Pijiapán, in Chiapas) S to arid valleys of Guatemala, Honduras and NW Nicaragua.
I. p. espinachi Ridgway, 1882 – SW Nicaragua (Rivas) and NW Costa Rica (Guanacaste).
Introduced (race *espinachi*) in SE USA (Miami, in Florida) and on Cocos I, in Costa Rica.



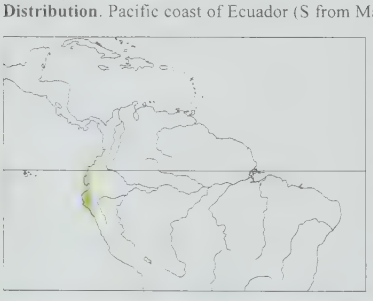
Descriptive notes. c. 21 cm; male 52·6 g, female 44·9 g. Male nominate race is mostly pale orange, somewhat deeper orange on head, with black face, throat to upper breast, mantle and back, wing and tail; lesser and median upperwing-coverts orange-yellow, primaries edged white at base (forming small pale patch), inner secondaries and tertials broadly edged white (prominent white patch on closed wing); pale orange below, breast and breast side with black spots; iris dark brown; bill black, base of lower mandible grey; legs greyish-blue. Female is similar to male, but slightly duller. Juvenile has orange parts of plumage duller and yellower, with olive-brown back, lacks black on face and breast, median and greater coverts tipped yellowish; immature more like adult, but duller, back feathers black with olive fringes, black spots on breast often absent. Races differ mainly in plumage: *carolynae* is similar to nominate, but breast spots larger, usually forming black band on side of breast that meets black of throat; *espinachi* is like nominate, but more brightly coloured; *guttulatus* is the most brightly orange. Voice. Male song a slow series of rich clear whistles, variable, sometimes phrases repeated several times, sometimes series protracted; female song simpler. Calls include loud nasal "nyeh" notes, often repeated, also sharper notes.
Habitat. Arid thorny woodland and scrub, with acacia (*Acacia*), mesquite (*Prosopis*), etc.; also edges of shade coffee plantations, pastures with large trees, trees around ranches, and in villages. Lowlands; reported at up to 900 m (*guttulatus*).
Food and Feeding. Insects and other arthropods, fruits and nectar. Gleans insects from foliage, also finds hidden prey in rolled leaves. Commonly observed at flowers of *Erythrina* trees, also in *Caesalpinia* and *Gliricidia*. Forages in pairs and in family groups; also in small non-breeding flocks. Often associates with other orioles.
Breeding. Season Apr–Jul; second broods reported. Monogamous; territorial. Nest built by female, with some help from male, said to be more carefully woven than those of congeners, a pensile pouch of grass, vine tendrils, thin roots, other plant fibres and black fungal rhizomorphs, 25–60 cm in external height, 15 cm wide at base, bottom lined with fine fibres, placed rather high up (6–18 m) in bush or tree, often in thorny tree, including acacia species that harbour aggressive stinging ants (Formicidae), or sometimes suspended from power line; tree may contain active nests of other orioles, particularly *I. gularis* and *I. pustulatus*. Clutch 3 eggs, bluish-white with blackish and lilac spots and scrawls, mean dimensions 22·8 × 17·8 mm; incubation by female only, chicks fed by both sexes, no information on duration of incubation and nestling periods. Nests parasitized by *Molothrus aeneus*; reported as a host of *Molothrus oryzivorus* in Nicaragua, where seen to feed fledgling of that species.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common to uncommon throughout most of range; locally common in Mexico; uncommon and local in Costa Rica. Generally less abundant than other orioles in the same habitats, but tolerant of human-made modifications of habitat. Introduced successfully in S Florida (USA) and on Cocos I (off Costa Rica); first confirmed breeding in Florida in late 1940s, presumably following escape of cagebirds, and appears to be thriving in 21st century.
Bibliography. Brookfield & Griswald (1957), Dickerman (1981a, 2007), Dickey & van Rossem (1938), Gillespie (2000), Gómez (1983), Howell & Webb (1995), Janzen (1971), Jaramillo & Burke (1999), Lowther (1995), McCrary & Gates (2007), Owre (1973), Skutch (1954), Stiles & Skutch (1989).

38. White-edged Oriole

Icterus graceannae

French: Oriole leucoptère **German**: Weißschwingentrupial **Spanish**: Turpial Aliblanco

Taxonomy. *Icterus Grace-Annae* Cassin, 1867, Ecuador or Peru.
Monotypic.
Distribution. Pacific coast of Ecuador (S from Manabí) and Peru (S to La Libertad).



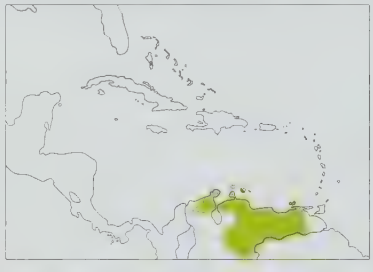
Descriptive notes. 19–20 cm; male average 45·9 g, female average 37·1 g. Plumage is mostly orange-yellow, with black lores (mask), throat to upper breast and back; wing mostly black, lesser and median coverts pale yellow (medians palest), innermost secondaries and tertials broadly edged white basally (prominent patch on closed wing); tail black, outermost feather edged white, sometimes up to three adjacent rectrices with white tips; iris dark brown; bill black, base of lower mandible grey; legs greyish-blue. Sexes similar. Juvenile is duller and greener-looking than adult, with back feathers tipped olive, lesser and median coverts dull blackish with yellow tips, white on tertials and inner secondaries less striking. Voice. Song described as a series of musical phrases, each one repeated several times. Calls include a nasal whistle.
Habitat. Desert scrub, xeric deciduous woodland with mesquite (*Prosopis*), also Tumbesian dry forest with *Ceiba trichistandra*; extends into nearby modified habitats. Mostly below 400 m, but to 1700 m in Loja (Ecuador) and to 1300 m in Piura (Peru).
Food and Feeding. Little information. Diet presumably arthropods, nectar and fruit. Found in pairs and in family groups.
Breeding. Season Feb–Mar in Ecuador, but somewhat variable, dependent on rains; one nest found in May in Peru. Apparently monogamous. Solitary. Two nests in Ecuador each a pendent bag, externally 8–10 cm wide and 9–11·5 cm deep, a third nest described as a shallow bag, made from pale brown plant fibres, so thin that structure almost transparent, attached by rim to twigs 1·8–4 m above ground in "arrayán" tree (*Myrcianthes*), *Prosopis juliflora* or *Scutia*. Clutch 2–3 eggs, cream-coloured with diffuse dark brown spots and blotches, mean dimensions 24·7 × 17·8 mm; chicks fed by both sexes. Parasitized by *Molothrus bonariensis*, one nest containing three of latter's eggs and two host chicks. No other information.
Movements. Apparently resident, even during dry season.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tumbesian Region EBA. Seems to be relatively numerous and tolerant of moderate disturbances. Estimated range of occurrence c. 78,000 km².
Bibliography. Jaramillo & Burke (1999), Knowlton (2010), Marchant (1958, 1960), Omland *et al.* (1999), Price *et al.* (2007), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Tinoco (2009).

39. Venezuelan Troupial

Icterus icterus

French: Oriole troupiale **German**: Orangetrupial **Spanish**: Turpial Venezolano
Other common names: (Common) Troupial

Taxonomy. *O.*[*riolus*] *icterus* Linnaeus, 1766, "in America calidiore" = Cumaná, Sucre, Venezuela.
Closely related to *I. jamacaii* and *I. croconotus*, and all are often regarded as conspecific, but no intermediates known, and no hybrids reported in areas where sympatry with escaped cagebirds occurs (e.g. around Belém, in Pará, in N Brazil). Distribution of black and orange in plumage of race *metae* slightly approaches that of *I. croconotus*, but this probably convergence, as other characters of *metae* are unique. Three subspecies recognized.
Subspecies and Distribution.
I. i. ridgwayi (E. J. O. Hartert, 1902) – N Colombia (Guajira and N Cesar) and lowlands of N Venezuela E to Sucre and Margarita I; also Netherlands Antilles (Aruba and Curaçao).
I. i. icterus (Linnaeus, 1766) – N & C Venezuela from Carabobo and W Apure to S Monagas and N Bolívar.
I. i. metae Phelps, Jr & Aveledo, 1966 – W Venezuela (S Apure) and adjacent NE Colombia (Arauca, Vichada).
Introduced (*ridgwayi*) to Puerto Rico, Virgin Is and E Netherlands Antilles (Bonaire).



Descriptive notes. 23–27 cm; in Venezuela, male average 67·3 g, female average 58·5 g; for introduced population in Puerto Rico, male 65·5–88 g, female 60·9–73·1 g. Nominate race has head to upper nape and upper breast black (ragged lower border on breast), hindcollar, rump to uppertail-coverts and underparts below breast rich orange-yellow, lower mantle and back black; upperwing black, lesser coverts orange, median and inner greater coverts white, tertials and inner secondaries with broad white outer edges (elongated white patch extending from epaulet to rear tertials on closed wing); tail solidly black; iris yellow, conspicuous area of bright blue bare skin around eye; bill black, basal half of lower mandible grey; legs bluish-grey. Sexes similar. Juvenile is patterned much like adult, but duller, more yellowish and brownish-black, with bare ocular patch smaller and greyer. Race *ridgwayi* is larger than nominate, with longer bill and stronger legs; *metae* differs in having the whole nape and lower back orange, instead of black (variable, some individuals very like nominate), and has all greater upperwing-coverts black, dividing white wing patch into two. Voice. Song, by both sexes, loud repetitions of rich melodious phrases of 2–4 elements, e.g. "troo-pear-pééá", elements usually warbles or modulated whistles, rarely pure notes; song quite variable, order of elements may change, several elements may occur in a single population, and pauses between notes vary in length. Pair-members sometimes duet. Mimicry of other birds recorded. Calls include nasal notes and pleasant whistles. In flight produces audible wing noise.
Habitat. In Aruba and coastal Venezuela found in xerophytic woodland of acacia (*Acacia*) and arborescent cacti. Nominate race and *metae* mostly in pastures and savanna in dry or seasonal woodlands. On Curaçao (*ridgwayi*) mainly in old fruit plantations, particularly of mango (*Mangifera indica*) and sapodilla (*Manilkara zapota*). In Puerto Rico, where introduced, most common in drier SW corner. Lowlands.
Food and Feeding. Nectar, fruits, seeds, arthropods and small vertebrates. Stomach contents from Aruba and Curaçao included mostly insects, i.e. lepidopteran larvae, adult beetles (Coleoptera) and adult hymenopterans, also fruits. Nectar obtained from flowers of, among others, *Pithecellobium saman*, *Erythrina* species (e.g. *Erythrina poeppigiana*) and *Cereus* cacti; reported as eating floral parts of *Opuntia wentiana* on Aruba. Feeds on cultivated papayas (*Carica*), mangos, sapodillas and annonas (*Annona*), and wild fruits (cacti). Seeds taken include those of grasses of genus *Andropogon*. Forages in pairs and in family groups, sometimes with other orioles (e.g. *I. nigrogularis*). In *llanos* of Colombia and Venezuela, roosts individually in nests of other bird species, mostly those of Rufous-fronted Thornbird (*Phacellodomus rufifrons*).
Breeding. Season Mar–Dec, during both wet and dry seasons, in Colombia and Venezuela, and probably in all months on Aruba and Curaçao; usually attempts two or three broods per season. Presumably monogamous. Solitary breeder, strongly territorial. In N of range (Aruba, Curaçao and coastal Venezuela), race *ridgwayi* commonly builds shallow pensile pouch of plant fibres, lined with finer material, attached to arborescent cactus (*Stenocereus griseus*) or to small tree (acacia, *Crescentia cujete*), but may utilize old nest of *I. nigrogularis* or Tropical Mockingbird (*Mimus gilvus*), or domed stick nest of Pale-breasted Spinetail (*Synallaxis albescens*); in *llanos* of Venezuela, nominate race usually uses covered stick nest built by Rufous-fronted Thornbird or nest of other oriole or Great Kiskadee (*Pitangus sulphuratus*), sometimes interacting aggressively with other birds in order to pirate such nests, and destroying eggs and small chicks (even of competing troupial pairs); Rufous-fronted Thornbird nest is multi-chambered, and present species may eventually co-exist with other birds (even thornbirds) using same structure; nesting behaviour of race *metae* probably similar to that of nominate; when using furnariid nest, commonly removes sticks to enlarge original entrance, or opens new ones, to gain easier access to brood-chamber, invariably

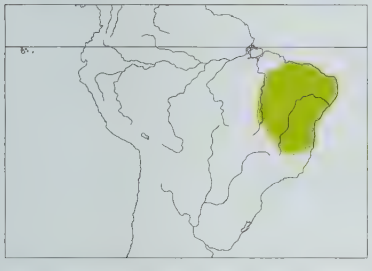
adding a lining of plant fibres. Clutch usually 3 eggs, sometimes 2, pinkish-white, spotted and marked in black, brown and grey, mean dimensions 27·8 × 20 mm (*ridgwayi*), 28 × 18·4 mm (nominate); incubation by female, no information on duration; chicks fed by both sexes, nestling period 21–23 days; both sexes defend nest. Nests parasitized by *Molothrus bonariensis*.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Common to fairly common or locally common; said to be abundant on Aruba and Curaçao. Reports of this species from several of the Lesser Antilles believed to involve escaped cagebirds. Following introductions of race *ridgwayi* in Netherlands Antilles (Bonaire), Puerto Rico and Virgin Is (St Thomas), appears to have succeeded in establishing viable populations. Much prized as a cagebird and commonly captured for this purpose. Occurs in several protected areas in Venezuela (e.g. Guatopo and Aguaro-Guariquito National Parks) and Colombia.
Bibliography. Ascanio (1997), Cherrie (1916), Cruz & Andrews (1989), Earsom (2004), Hilty (2003), Hilty & Brown (1986), Lindell (1996), Lindell & Bosque (1999), Restall *et al.* (2006), Ridgely & Tudor (1989), Skutch (1969), Thomas (1979), Voous (1983), Wiley (1985).

40. Campo Troupial

Icterus jamacaii

French: Oriole des campos **German**: Campotrupial **Spanish**: Turpial Brasileño
Other common names: Campo Oriole

Taxonomy. *O.*[*riolus*] *Jamacaii* J. F. Gmelin, 1788, Ceará, Brazil.
Closely related to *I. icterus* and *I. croconotus*; the three are often regarded as conspecific, but no intermediates or hybrids known in limited areas where ranges of present species and *I. croconotus* overlap in Brazil (R Palmeiras, in Tocantins), and no hybrids reported in areas where sympatry with escaped captives occurs (e.g. around Belém, in Pará, in N Brazil). Proposed taxon *paraguayae* (described from 265 km W of Puerto Casao, in Paraguayan Chaco), sometimes treated as a race of present species or of *I. croconotus*, is subsumed in race *strictifrons* of latter. Monotypic.
Distribution. NE Brazil from Maranhão and Tocantins E to Rio Grande do Norte and Paraíba, S to N Minas Gerais.



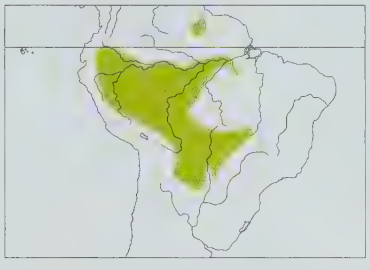
Descriptive notes. c. 23–26 cm; male average 67·3 g, female average 58·5 g. Has head to upper breast black (ragged lower border on breast), mantle, rump to uppertail-coverts and underparts below breast rich orange-yellow, back black; upperwing black, lesser and median coverts yellowish-orange, inner remiges (including longer tertials) with broad white outer edges (prominent patch on closed wing); tail solidly black; iris yellow, small area of blue bare skin around eye; bill black, base of lower mandible grey; legs bluish-grey. Sexes similar. Juvenile is similar in pattern to adult, but duller, generally looking brownish-black and dull yellowish-orange. Voice. Song, by both sexes, consists of repetitions of whistled melodious phrases, e.g. "swéét-chip-swéét-tru-rú", with second and fourth notes much shorter; may also sing repeated series of pleasant warbles, "chwe koro che-che koro che-che...", partners sometimes combining in duet. Known to mimic other birds. Calls include various harsh notes, also "crik". Produces audible wing noise in flight.
Habitat. Clearings and edges in primary and secondary *caatinga* (dry forest); regularly visits orchards and gardens, even in small towns. Lowlands.
Food and Feeding. Insects and other arthropods, probably small vertebrates; also nectar and fruits. Insects in stomach contents included 126 larvae of flies (Diptera), also beetles (Coleoptera) and bugs (Hemiptera). Feeds on fruits of cacti, also on those of cultivated plants such as papayas (*Carica*), mangos (*Mangifera indica*) and annonas (*Annona*). Takes nectar from flowers of *Erythrina* and *Cereus*. Quite arboreal, often hanging upside-down while foraging. Forages singly, in pairs and in family parties.
Breeding. Season Dec–Mar (Minas Gerais); breeds during rainy season. Presumably monogamous. Solitary breeder, probably territorial. Does not build a nest, instead utilizes covered nest built by other species, mostly furnariids such as Rufous-fronted Thornbird (*Phacellodomus rufifrons*) or Caatinga Cachalote (*Pseudoseisura cristata*); uses old nest or usurps new one, adds some lining material. May aggressively interact with other species, such as *Agelaioides fringillarius*, to obtain such nests. Only one individual, presumably female, incubates eggs, both sexes defend nest. No other information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Reasonably common. Apparently has expanded its range W into E Pará. Very popular as a cagebird throughout Brazil, and much trapped; nests near human settlements are raided and chicks collected. Effects of trapping on wild populations not known; research needed. Replacement of *caatinga* forest and woodland by pastures and irrigated crops may be having adverse impact on local populations. Reported from several protected areas (e.g. Serra das Almas Natural Reserve, Seridó Ecological Station, Canudos Biological Station), which will integrate the Caatinga Biosphere Reserve (in formation).
Bibliography. Fraga (2006), Jaramillo & Burke (1999), Novaes & Lima (1998), Pacheco & Olmos (2006), Pinto (1967), Santos *et al.* (2010), Schubart *et al.* (1965), da Silva & Oren (1990).

41. Orange-backed Troupial

Icterus croconotus

French: Oriole à dos orange **German**: Orangerückentrupial **Spanish**: Turpial Amazónico
Other common names: Orange-backed Oriole

Taxonomy. *Ps.*[*arocolius*] *croconotus* Wagler, 1829, "Mexico"; error = River Tapajós, Pará, Brazil.
Closely related to *I. icterus* and *I. jamacaii*; the three are often regarded as conspecific, but no intermediates or hybrids known in limited areas where ranges of present species and *I. jamacaii* overlap in Brazil (R Palmeiras, in Tocantins), and no hybrids reported in areas where sympatry with escaped captives occurs (e.g. around Belém, in Pará, in N Brazil). Proposed taxon *paraguayae* (described from 265 km W of Puerto Casao, in Paraguayan Chaco), sometimes treated as a race of *I. jamacaii*, is subsumed in race *strictifrons* of present species. Two subspecies recognized.
Subspecies and Distribution.
I. c. croconotus (Wagler, 1829) – S Guyana and adjacent N Brazil (Roraima and NW Amazonas); also SE Colombia (Putumayo), E Ecuador (Napo and Pastaza) and E Peru E in Brazil S of R Amazon to W Pará (R Tapajós, R Araguaia) and Tocantins, and S to NW Bolivia (Pando).
I. c. strictifrons Todd, 1924 – E Bolivia (Beni and Santa Cruz) E to C Brazil (Mato Grosso), and S through Paraguayan Chaco to N Argentina (Salta, Formosa and Chaco).



Descriptive notes. c. 23 cm; male average 48 g, female average 41 g. Nominate race has face, throat and upper breast black, crown to nape, neck side and upperparts, and underparts below breast rich orange-yellow, scapulars black; upperwing black, lesser and median coverts yellowish-orange, inner secondaries and some tertials with broad white outer edges (prominent patch on closed wing); tail solidly black; iris yellow, small area of bluish bare skin around eye; bill black, base of lower mandible grey; legs dark bluish-grey. Sexes similar. Juvenile is like adult in pattern, but much duller and lacks orange epaulet. Race *strictifrons* is like nominate, but with less black on forehead, more white in wing, also reputedly paler than nominate (but darkness of orange hue in plumage varies with nutritional status). Voice. Song, by both sexes, a repetition of whistled melodious phrases, e.g. "chee-chew-hwe-chew"; sequence of elements and pauses between elements variable. Partners often duet. Calls little known; in Peru, one contact call a loud and brief modulated whistle, "pee-o", with strong metallic overtones. Produces audible wing noise in flight.
Habitat. Nominate race mostly in riparian forest and edges of lakes, also in clearings and secondary growth; in Amazonia restricted mostly to *várzea* and rarely seen far from rivers. Race *strictifrons* inhabits similar habitat in Pantanal; S populations of this race frequent xeric, mostly deciduous *chaco* woodland and scrub, with thorny mesquite trees (*Prosopis*), arborescent cacti, and evergreen shrubs in genera *Capparis* and *Maytenus*. Lowlands; nominate race to 700 m.
Food and Feeding. Nectar, fruits, insects and other arthropods, and small vertebrates. Nectar taken from wild flowers, including, among others, *Erythrina*, *Cereus*, and many genera in Bombacaceae; also visits inflorescences of *Combretum lanceolatum*. Its role as potential pollinator is unstudied. Race *strictifrons* in the Chaco may rob tubular flowers of *Tabebuia*, *Cercidium* and *Capparis* by opening corolla tube or by crushing entire flowers. Quite arboreal, often hangs upside-down while foraging; in the Chaco seen to search clumps of epiphytic bromeliads (*Tillandsia duratii*). Usually forages in pairs or in family groups; associates with *I. pyrrhopterus*.
Breeding. Season Jul–Aug in S Colombia, and in S of range breeds during rainy season (Nov–Mar) in dry Chaco. Probably monogamous. Solitary breeder. Does not build a nest, instead utilizes covered nest built by other species, in Amazonia frequently *Psarocolius* or cacique (particularly *Cacicus cela*), in Paraguayan Chaco seen to inspect nests of *Procacicus solitarius*, and in Argentinian Chaco uses nest of thornbird (*Phacellodomus*); uses old abandoned nest or pirates new one, fighting with nest-builders and other birds, e.g. pair using a *Cacicus cela* nest near in Peru persistently harassed male oropendolas that displayed in same tree; in Argentina lines nest with dry yellow roots of a menispermaceous vine (possibly *Cissampelos*). Clutch probably 2–3 eggs; brood of three chicks reported from Argentina. No other information.
Movements. Mostly sedentary; local movements have been reported at edge of range in Argentinian Chaco.
Status and Conservation. Not globally threatened. Uncommon to locally common. Local but sometimes common in most of Amazonia; rather uncommon and local in Chaco, where possibly declining because of deforestation. Popular as a cagebird, and regularly trapped in Argentina, Bolivia, Brazil, Colombia and probably also rest of range; effects of trapping on wild populations have not been researched. This species' role as a pollinator of plants is potentially important, but hitherto unstudied. Found in several protected areas, e.g. Amacayacu National Park (Colombia), Pantanal Matto-grossense National Park (Brazil), Kaa-Iya del Gran Chaco and Amboró National Parks (Bolivia), and Defensores del Chaco and Agripino Enciso National Parks (Paraguay).
Bibliography. Allen (1891), Brodkorb (1937), del Castillo & Clay (2004), Di Giacomo (2005), Ericson & Amarilla (1997), Hoy (1968), Jaramillo & Burke (1999), Maugeri & Drozd (2006), Novaes & Lima (1998), Pacheco & Olmos (2006), Pearson (1974), Ragusa-Netto (2002a), Robinson (1985a), da Silva, J.F. & Colombo Rubio (2007), da Silva, J.M.C. & Oren (1990).



PLATE 75

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42. Bar-winged Oriole

Icterus maculialatus

French: Oriole unifascié **German**: Bindentrupial **Spanish**: Turpial Alibarrado

Taxonomy. *Icterus maculi-alatus* Cassin, 1848, Vera Cruz, Mexico; error = Cobán, Vera Paz, Guatemala.
Closest relatives uncertain. Monotypic.
Distribution. S Mexico (E Oaxaca and Chiapas) across C Guatemala to N El Salvador; possibly also Honduras.



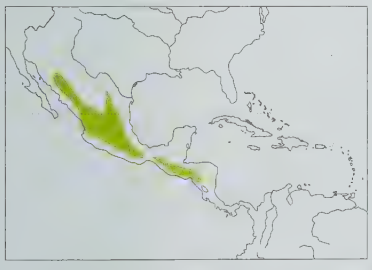
Descriptive notes. 20·5–23 cm; 31–59 g. Male has head to upper breast and back black, rump yellow, underparts below breast golden-yellow; upperwing black, yellow shoulder patch (lesser and median coverts), greater coverts broadly tipped white (conspicuous white wingbar), flight feathers edged white; tail solidly black; iris dark brown; bill black, base of lower mandible bluish-grey; legs bluish-grey. Female differs from male in having crown, entire upperparts (including rump), wings and tail olive, lacks yellow shoulder patch, has median coverts tipped yellowish, greater coverts tipped whitish. Juvenile is like female, but duller and browner, with no black on head, tips of greater coverts plain (no wingbar). Voice. Song a slow series of whistles and warbles. Common call a dry chatter.
Habitat. Xeric oak (*Quercus*) scrub and woodland, semi-deciduous woodland, open areas; mostly at 500–1800 m in mountain ranges and isolated volcanoes.
Food and Feeding. Little information. Diet probably insects and other arthropods, fruit and nectar. Visits flowering trees (possibly *Erythrina*) with other orioles. Usually found in pairs, family groups or small flocks.
Breeding. Birds in breeding condition during May–Jun. No other information.
Movements. Some local movements apparent, perhaps related to blooming seasons of trees.
Status and Conservation. Not globally threatened. Restricted-range species: present in North Central American Highlands EBA. Locally rare to uncommon, and generally scarce. Total range covers c. 80,000 km², and no indication of any declines. Probably the least known member of the genus.
Bibliography. Griscom (1932), Hardy *et al.* (1998), Howell & Webb (1995), Jacobsen *et al.* (2010), Jaramillo & Burke (1999), Peterson, Escalona-Segura & Griffith (1998), Peterson, Navarro-Sigüenza *et al.* (2003), Thurber *et al.* (1987).

43. Black-vented Oriole

Icterus wagleri

French: Oriole cul-noir **German**: Waglertrupial **Spanish**: Turpial Culinegro
Other common names: Wagler's Oriole

Taxonomy. *Icterus wagleri* P. L. Sclater, 1857, Mexico.
Related to *I. prosthemelas*. Two subspecies recognized.
Subspecies and Distribution.
I. w. castaneopectus Brewster, 1888 – NW Mexico in interior Sonora and Sinaloa and adjacent W Chihuahua.
I. w. wagleri P. L. Sclater, 1857 – C & S Mexico (from Durango, Coahuila and Nuevo León) S across C Guatemala, N El Salvador and SW Honduras to W Nicaragua.



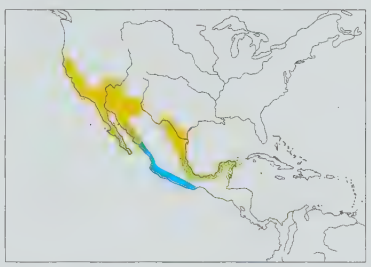
Descriptive notes. 20·5–23 cm; 36·7–46·3 g, male average 41·3 g, female average 39 g. Male nominate race has head, throat, upper breast, mantle and upper back black, uppertail-coverts, lowermost belly and undertail-coverts black; rest of body orange-yellow, faint chestnut tinge just below black breast; upperwing black, orange-yellow epaulet (lesser and median coverts); tail solidly black; iris brown; bill black, base of lower mandible bluish-grey; legs bluish-grey. Female is like male, but duller, on average more yellow, less orange. Juvenile is duller than adult, crown and upperparts olive-buff, superciliary line and face and faint supercilium yellowish, median and greater upperwing-coverts tipped buff, underparts dull yellow; immature resembles juvenile, but crown and upperparts olive-grey, variable amount of black in face (lores, throat) and upper breast, tail blackish-brown. Race *castaneopectus* is very like nominate, but chestnut coloration below breast more extensive. Voice. Song not too musical, a mix of fast warbles with twittering and nasal or rasping notes. Calls include nasal "nye".
Habitat. Inhabits dry woodland and scrub, open areas with scattered trees; mostly in uplands, 500–2500 m.
Food and Feeding. Insects and other arthropods, also fruits and nectar. Gleans arthropods from foliage. Takes nectar from flowering trees of *Pseudobombax ellipticum* and *Erythrina oliviae*, and from brush-like inflorescences of the vine *Combretum fruticosum*. Frequent visitor to flowers of maguey (*Agave salmiana*) in Mexico. Usually in pairs or family groups. Dominant over both *I. bullockii* and *I. pustulatus* at flowering trees.
Breeding. Season Jun–Jul in S Mexico (Oaxaca) and May–Jul in El Salvador. Probably monogamous. Breeds solitarily. Shallow hammock-shaped nest, made from plant fibres, suspended at low or medium elevation in tree, sometimes stitched to underside of palm or banana leaves; one nest was attached to cables within a log cabin. Clutch 3–4 eggs, creamy white with dark brown and yellowish blotches, mostly at large end, mean dimensions of eggs attributed to this species 25 × 17·8 mm; combined incubation and nestling periods 34 days. Nests sometimes parasitized by *Molothrus aeneus*.
Movements. Undertakes some altitudinal movement, also local movements dependent on flowering season of trees. In S USA, nominate race accidental in Texas and *castaneopectus* accidental in Arizona.
Status and Conservation. Not globally threatened. Rather abundant, common to fairly common in most of range.
Bibliography. Binford (1989), Dickey & van Rossem (1938), Eguiarte *et al.* (1987), Gómez-Aiza & Zuria (2010), Gryj *et al.* (1990), Howell & Webb (1995), Jaramillo & Burke (1999), Komar *et al.* (2000), Lowther (1995), Toledo & Hernández (1979), Wauer (1970).

44. Hooded Oriole

Icterus cucullatus

French: Oriole masqué **German**: Maskentrupial **Spanish**: Turpial Enmascarado

Taxonomy. *Icterus cucullatus* Swainson, 1827, Temascáltepec, Mexico.
Proposed race *restrictus*, described from W Mexico (Agiabampo, in extreme S Sonora), is synonymized with *nelsoni*; described races *duplexus* (from Mujeres I, off NE Yucatán, in Mexico), *cozumelae* (from Cozumel I, off NE Yucatán) and *masoni* (from Manatee, in Belize) are all subsumed in *igneus*. Five subspecies recognized.
Subspecies and Distribution.
I. c. nelsoni Ridgway, 1885 – breeds in SW USA (N California E to W Texas), S to NW Mexico (N Baja California, Sonora and N Chihuahua); non-breeding range extends S to Sinaloa (W Mexico).
I. c. trochiloides Grinnell, 1927 – C & S Baja California (from San Ignacio S to Cabo San Lucas).
I. c. cucullatus Swainson, 1827 – breeds from S USA (S Texas in middle Rio Grande Valley) S along edge of Mexican Plateau (Chihuahua and Nuevo León) to Puebla, Oaxaca and S Veracruz; winters from Jalisco S to Guerrero and S Oaxaca, in S Mexico.
I. c. sennetti Ridgway, 1901 – breeds from S USA (S Texas in lower Rio Grande Valley) S to E Mexico (S Tamaulipas); winters S to N Guerrero and Morelos, in S Mexico.
I. c. igneus Ridgway, 1885 – S Mexico from E Tabasco, N Chiapas and coastal Yucatán Peninsula (including adjacent islands of Holbox, Mujeres, Cozumel and others) S to N Belize.



Descriptive notes. 18·5–20 cm; male average 24·3 g, female average 23·1 g. A small orange-yellow oriole. Male nominate race is mostly deep orange, including most of head and neck and entire underparts below breast, but with loral area, face and chin to upper breast black, and mantle, scapulars and back black; upperwing black, white shoulder patch (median coverts) and narrower white wingbar (tips of greater coverts), remiges edged white; tail black with white tips; iris dark brown; bill black, bluish-grey base of lower mandible; legs blue-grey. Female has crown and nape greyish olive-yellow, upperparts olive, greyer on mantle, rump olive-green, face, throat and underparts yellowish, belly paler, flanks washed grey; upperwing blackish, median and greater coverts tipped white, remiges edged white, tail olive with paler sides; bare parts much as on male. Juvenile is similar to female, but much duller, olive-brown above and light olive-yellow below, belly whitish, wingbars buffish; immature male resembles female, but with blackish lores and bib. Races differ mainly in plumage tone and in bill length and shape: *nelsoni* male is paler orange-yellow than nominate, female has dull olive upperparts and yellowish-olive underparts; *trochiloides* is like previous in plumage colour, but both sexes have longer and thinner bill; *sennetti* male is yellow, rather than orange, female duller than nominate; *igneus* is even more richly coloured than nominate, male almost flame-orange, female strongly orange-yellow below. Voice. Song, covering wide frequency range, is a fast series of warbles, clicks and some chattering or rasping notes, also some mimicry of other species. Calls include whistled "wheet", hard "chit" and fast chatter.
Habitat. Palm groves (e.g. of *Washingtonia*), riparian habitats with scattered trees such as willows (*Salix*) and sycamores (*Platanus*), mesquite (*Prosopis*) woodland and scrub, deciduous woodland. Also parks and gardens, particularly those with native or exotic palms. Occurs from lowlands up to 1500 m.
Food and Feeding. Insects and other arthropods, nectar and fruits. Insects reported include lepidopteran caterpillars and beetles (Coleoptera). Takes nectar from flowers of wild and cultivated plants, including the tree *Erythrina breviflora*, the vine *Combretum fruticosum*, the weedy tree tobacco *Nicotiana glauca*, and herbaceous plants such as *Scrophularia californica*. Feeds on small berries, also cultivated loquats (*Eriobotrya japonica*). Punctures long tubular flowers to extract nectar; attracted to hummingbird (Trochilidae) feeders in gardens. Forages singly and in pairs sometimes in small groups; in non-breeding season may join other orioles, e.g. *I. graduacauda* and *I. gularis*.
Breeding. Season Apr–Jul in USA (California) and Feb–Sept in Mexico; depending on latitude, two or more broods reared per season, and recent evidence indicates that some N migrants breed again Jul–Aug in W Mexico (Sinaloa and S Baja California). Nest built by both sexes, cup-shaped, opening at side or top, made from slender wiry grasses, yucca (*Yucca*) and palm fibres, sparse lining of plant down or feathers, length 9–10 cm, average diameter 7·6 cm, placed at variable height in tree, e.g. California sycamore (*Platanus racemosus*), eucalypt (*Eucalyptus*) or oak (*Quercus*) among many others, or in wild or cultivated palm (54% of nests in some areas); nests in palms are pensile and stitched to underside of a leaf, in other sites can be semi-pensile and attached to twigs at top and sides; reported also as building in epiphytic *Tillandsia* and in clumps of mistletoe (Loranthaceae), and sometimes in building, with nest attached to thatched roof. Nest sometimes usurped by House Finch (*Carpodacus mexicanus*). Clutch 3–5 eggs, sometimes (race *trochiloides*) 2–4, white with buffish or bluish tinge, and with spots, blotches and irregular marks in blackish-brown, purple and grey, mean dimensions 21·6 × 15·2 mm; incubation by female, period 12–14 days; chicks fed by both sexes, no information on duration of nestling period; both

On following pages: 45. Black-cowled Oriole (*Icterus prosthemelas*); 46. Orchard Oriole (*Icterus spurius*); 47. Fuertes's Oriole (*Icterus fuertesi*); 48. Bahama Oriole (*Icterus northropi*); 49. Cuban Oriole (*Icterus melanopsis*); 50. Hispaniolan Oriole (*Icterus dominicensis*); 51. Martinique Oriole (*Icterus bonana*); 52. St Lucia Oriole (*Icterus laudabilis*); 53. Montserrat Oriole (*Icterus oberi*); 54. Puerto Rican Oriole (*Icterus portoricensis*); 55. Orange-crowned Oriole (*Icterus auricapillus*); 56. Moriche Oriole (*Icterus chrysocephalus*); 57. Epaulet Oriole (*Icterus cayanensis*); 58. Variable Oriole (*Icterus pyrrhopterus*).

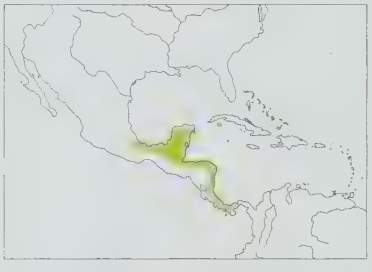
parents defend nest. Nests parasitized particularly by *Molothrus aeneus*, and reported as rearing its chicks; also by *Molothrus ater*.
Movements. N populations are short-distance migrants; those farther S in Mexico (particularly race *igneus*) seem mostly resident. N races *nelsoni* and nominate migrate S to W & S Mexico, and NE race *sennetti* moves S to S Mexico. Leaves Arizona breeding grounds Aug (adults) to Sept (immatures); arrives in California breeding grounds from late Mar. Vagrants recorded in coastal regions of NE USA and SW Canada.
Status and Conservation. Not globally threatened. Common to fairly common or locally common. Range expanding N in California. Tolerates moderate disturbance, and lives in parks and gardens, often in suburban areas.
Bibliography. Bendire (1895), Bent (1958), Cruden & Hermann-Parker (1977), Cruden & Toledo (1977), Ellison & Brush (2004), Gryj *et al.* (1990), Howell & Webb (1995), Jaramillo & Burke (1999), Lowther (1995), Miller & Stebbins (1964), Moore (1962), Pleasants & Albano (2001), Price *et al.* (2007), Rohwer, Hobson & Rohwer (2009), Sutton (1948).

45. Black-cowled Oriole

Icterus prosthemelas

French: Oriole monacal **German**: Gelbschultertrupial **Spanish**: Turpial Cabecinegro

Taxonomy. *Xanthornus prosthemelas* Strickland, 1850, Guatemala.
Closely related to *I. spurius*. Formerly regarded as conspecific with Greater Antillean group of species (*I. northropi*, *I. melanopsis*, *I. dominicensis* and *I. portoricensis*), but this treatment not supported by DNA data. Two subspecies recognized.
Subspecies and Distribution.
I. p. prosthemelas (Strickland, 1850) – SE Mexico (from Veracruz E to Yucatán and Quintana Roo) and Caribbean lowlands from Belize, N Guatemala and N Honduras S to C Costa Rica.
I. p. praecox A. R. Phillips & Dickerman, 1965 – SE Costa Rica (Limón) and W Panama (Bocas del Toro to Coclé).



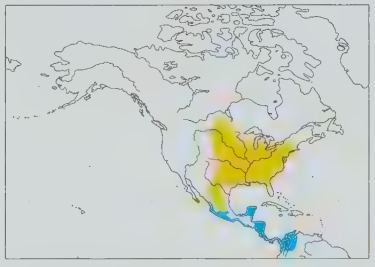
Descriptive notes. 18·5–21 cm; male average 32·5 g, female average 27·5 g. Male nominate race has head to breast and back black, rump and uppertail-coverts yellow; upperwing black, lesser and median coverts yellow (epaulet); tail solidly black; often variable chestnut tinge on lower breast separating black of breast from yellow of belly, flanks and undertail-coverts; iris brown; bill slender, black, bluish-grey base of lower mandible; legs dark grey. Female has forehead, lores, ear-coverts and throat to upper breast black, crown and upperparts olive, yellow wash on nape and rump and a few black spots on scapulars, upperwing and tail blackish, lesser and median coverts light yellow or blackish with yellow tips, underparts from lower breast yellow, bare parts as on male; variable, some females brighter and more like male, some (mainly in S of range) almost identical to male. Juvenile is like female, but duller, more olive, with less black on head (only lores and throat blackish), wing brownish, coverts tipped yellowish, tail plain olive; immature has blackish throat, wings and tail, olivaceous-yellow upperparts, and yellow underparts. Race *praecox* is virtually identical to nominate as adult, but juvenile has black of throat extending to lower breast. Voice. Song a rich warbling series of scratchy notes, rather quiet. Calls include a fast chatter, a variety of nasal notes e.g. "cheh", also soft "teeu".
Habitat. Occupies humid forest edges, riparian forest, old second-growth forest, banana plantations, and palm groves in open country. Nominate race mostly found in lowlands up to 700 m, rarely to 1000 m.
Food and Feeding. Insects and other arthropods, fruits and nectar. Feeds on fruits of *Cecropia*, *Ehretia tinifolia* and *Talisia olivaeformis*; takes nectar from flowers of *Erythrina* and *Inga* trees, also from the epiphyte *Columnea*. Finds animal prey by gleaning and probing in foliage, often hanging upside-down. Forages singly and in pairs, sometimes in small groups. Joins migratory orioles such as *I. spurius*; at roost also joins *I. galbula*.
Breeding. Season Mar–Jul in Costa Rica. Probably monogamous. Solitary breeder; in Yucatán Peninsula, single pairs may nest in or near colonies of *I. auratus*. Nest a short basket-shaped structure, external depth 8 cm, made from dark and light fibres, also rootlets, lined with brownish plant down, stitched to underside of palm leaf, or to leaves of banana plant or similar (e.g. once in a cultivated *Ravenala madagascariensis*); also, reported as nesting under eaves of houses, attaching nest to nails or wire. Clutch probably 3 eggs, based on brood size, mean dimensions of eggs attributed to this species 22·2 × 15·8 mm; both sexes feed chicks and both defend nest. No other information.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Fairly common to locally common in N of range; fairly abundant in Costa Rica; rarer in Panama. In Costa Rica, and possibly elsewhere, able to thrive in modified habitats. Found in several protected areas, such as Sian Ka'an Biosphere Reserve, in Mexico.
Bibliography. Alvarado *et al.* (2003), Howell & Webb (1995), Jaramillo & Burke (1999), Lack (1976), Lovette, Rickleffs & Bermingham (1999), Omland *et al.* (1999), Schönwetter & Meise (1981, 1982), Skutch (1954), Stiles & Skutch (1989), Wetmore *et al.* (1984).

46. Orchard Oriole

Icterus spurius

French: Oriole des vergers **German**: Gartentrupial **Spanish**: Turpial Castaño

Taxonomy. *O.[riolus] spurius* Linnaeus, 1766, South Carolina, USA.
Closely related to *I. prosthemelas*. Very closely related to, and often regarded as conspecific with, *I. fuertesi*; the two have discrete breeding ranges, but no evidence of intergradation where ranges approach one another, and songs apparently differ. Birds from C plateau of Mexico sometimes treated as a geographical race, *phillipsi*, on basis of larger size and slight differences in juvenile plumage, but such differences barely detectable. Treated as monotypic.
Distribution. Breeds in S Canada (S Saskatchewan, S Manitoba and extreme SE Ontario) and most of E USA (from Minnesota and Maine), S in Mexico to Jalisco, Michoacán and Hidalgo; winters from S Mexico (Colima and Veracruz) S throughout Central America to Colombia and extreme NW Venezuela.



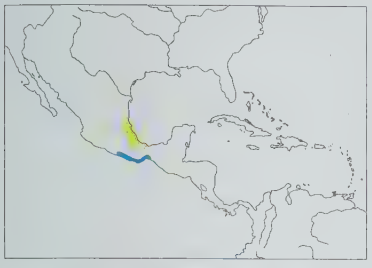
Descriptive notes. 15–17 cm; male average 22·1 g, female average 20·8 g. A small, slender, short-tailed oriole. Male has head to chest and back black, rump and uppertail-coverts deep chestnut; upperwing black, lesser and median coverts chestnut (epaulet), greater coverts edged and tipped white (narrow white wingbar), flight-feathers edged white; tail all black; underparts below chest deep chestnut; in fresh plumage (non-breeding), feathers above tipped olive or pale chestnut, feathers of underparts tipped yellowish; iris dark brown; bill black, base of lower mandible bluish-grey; legs bluish-grey. Female is olive-green above and bright greenish-yellow below, breast tinged with ochraceous; upperwing brownish, median and greater coverts tipped white (two narrow wingbars), edges of flight-feathers white; bare parts as for male. Juvenile resembles female, but duller overall, crown washed yellowish, nape and back browner, wingbars buffish; immature male like female, but with black face and bib. Voice. Song, often in flight, variable, basically a high-pitched series of warbles, whistles and slurs. Two song types, short and long, sometimes recognized; long song (3–5 seconds) has more whistles and usually ends with downslurred note, short one (c. 2 seconds) is less musical. Female may sing; both adult and immature males regularly sing in wintering areas. Contact call a sharp "chuck"; chattering alarm call.
Habitat. Open woodland, avoiding dense forest. Breeds in rural areas with mesquite (*Prosopis juliflora*), pastures with scattered trees, riparian habitat, edges of marshes, orchards, suburban areas, gardens and parks. On wintering grounds found in second growth, savanna, roadside trees, parks and gardens. Mostly lowlands, in non-breeding quarters to c. 1600 m.
Food and Feeding. Stomach contents from breeding grounds contained 91% animal food and 9% plant food. Insects taken include flies (Diptera), ants (Formicidae), beetles (Coleoptera), Lepidoptera, and others; other arthropods mainly spiders (Araneae). Feeds on wild berries and cultivated fruits, less commonly on nectar. In winter often takes mistletoe berries (Loranthaceae). Nectar important in winter, and is taken from *Erythrina* tree species, such as *Erythrina fusca* and *Erythrina breviflora*, also from flowers of *Gliricidia*, and *Eugenia*, and the vine *Combretum fruticosum*. Probably an important pollinator of those species. Forages singly, in pairs and in small flocks. Moving flocks visit a succession of flowering trees. In non-breeding season flocks regularly contain up to several hundred individuals; winter roosts, sometimes with other orioles, of up to 400 individuals reported in Panama.
Breeding. Season Apr–Jun in S USA, later in N, and egg-laying not until Jun in Canada (Manitoba); single-brooded, but recent evidence indicates that some N migrants breed again (Jul–Aug) in W Mexico (Sinaloa and S Baja California). Apparently monogamous. Solitary breeder; reports also of semi-colonial nesting. Possibly sometimes co-operative breeder, with helpers; immature males occasionally help to feed chicks. Nest built by female, taking c. 6 days, a semi-pensile shallow basket woven mostly from green grass (which dries to yellow), lined with fine grass, plant down, cotton or feathers, mean external diameter 9·5 cm, external depth 8·4 cm, attached to fork of twigs, less often to strands of epiphytic Spanish moss (*Tillandsia usneoides*); variety of trees used, in Louisiana (S USA) mostly oak (*Quercus*), magnolia (*Magnolia*), elm (*Ulmus*), willow (*Salix*) and pecan (*Carya*), in Manitoba (Canada) mostly maple (*Acer*), green ash (*Fraxinus*), cottonwood (*Populus*) and willow; conifers used locally, and sometimes emergent plant within marsh. Clutch usually 4–6 eggs, occasionally 3 or 7, pale blue with dark purplish-brown blotches, spots, dots or irregular lines, mean dimensions 20·7 × 14·5 mm; incubation by female, sometimes fed by male, period 12–14 days; chicks fed by both sexes, nestling period 11–14 days (Manitoba). Nests parasitized by *Molothrus ater* and *Molothrus aeneus*.
Movements. Long-distance migrant. Almost all migrate to area from S Mexico (Colima and Veracruz) S to N Colombia and NW Venezuela; numbers of wintering individuals decline from Honduras S; overwinters rarely in Florida and Cuba. Leaves breeding grounds from Jul, almost all having departed from N parts of range by middle to end Aug; many move through W USA and W Mexico, some apparently stopping off in W Mexico to breed for a second time before continuing S. Ringed individuals moved from S USA (Alabama and Louisiana) to Belize and Honduras, and vice versa. Within wintering range probable local movements related to blooming times of trees. Occurs in Panama from Aug to mid-Mar. Leaves winter quarters in Mar–Apr, arriving late Mar in S USA and later, May, in N of range. Some individuals are believed to cross Gulf of Mexico during migration. Rare passage migrant in Cuba and vagrant in Bahamas and Jamaica.
Status and Conservation. Not globally threatened. Fairly common to uncommon; rather local, especially in N of range. Adapts well to artificial habitats. US census data suggest a slow decline in numbers between 1966 and 1996, but populations expanding in Canada.
Bibliography. Baker *et al.* (2003), Bendire (1895), Bent (1958), Cruden & Toledo (1977), Enstrom (1992a, 1992b, 1993), Graber & Graber (1954), Hofmann *et al.* (2007), Howell & Webb (1995), Leck (1974), Lowther (1995), McCarthy (2006), Morton (1979b), Rogers *et al.* (1982), Rohwer, Hobson & Rohwer (2009), Schaefer (1976), Scharf & Kren (1997), Sealy (1980), Stiles & Skutch (1989), Thomas (1946), Wetmore *et al.* (1984).

47. Fuertes's Oriole

Icterus fuertesi

French: Oriole de Fuertes **German**: Ockerbauchtrupial **Spanish**: Turpial de Fuertes
Other common names: Ochre Oriole

Taxonomy. *Icterus fuertesi* Chapman, 1911, Paso del Haba, 35 miles [c. 56 km] north-west of Tampico, Tamaulipas, Mexico.
Very closely related to, and often regarded as conspecific with, *I. spurius*; the two have discrete breeding ranges, but no evidence of intergradation where ranges approach one another, and songs apparently differ. Monotypic.
Distribution. Breeds in coastal E Mexico from S Tamaulipas S to S Veracruz; winter range imperfectly known, but reported S Guerrero, coastal Oaxaca and W Chiapas (S Mexico).
Descriptive notes. c. 16 cm; male 20·3 g, female 21 g. A small, slender, short-tailed oriole. Male has head to chest and back, upperwing and tail black, rump and uppertail-coverts, lesser and median upperwing-coverts, and underparts below chest rich ochre; greater upperwing-coverts edged and tipped white (narrow white wingbar), flight-feathers edged white; iris dark brown; bill black, base of lower mandible bluish-grey; legs bluish-grey. Differs from *I. spurius* in having chestnut colour replaced with ochre. Female is olive-green above, greenish-yellow below, breast more ochraceous, upperwing brownish, median and greater coverts tipped white (two narrow wingbars), edges of flight-feathers white, bare parts as for male; closely resembles female of *I. spurius*, and often indistinguishable, but some have paler rump and underparts. Juvenile resembles female, but



duller overall, head and upperparts grey-buff, paler on rump, narrow whitish wingbars, pale yellow below, breast tinged buff; immature male like female, but with black face and bib. Voice. Song 1·5–2·5 seconds long, a fast mix of chatters, clicks, buzzes and a few whistles, all notes with several harmonics; resembles song of *I. spurius*, but said to be softer and less brilliant, with notes shorter and less musical, and reaching higher frequencies (overall effect suggesting a rather accelerated tempo).

Habitat. Breeds in dense shrubs, consisting mostly of clumps of majagua (*Hibiscus tiliaceus*) and mangle negro (*Conocarpus erecta*), on coastal sand dunes; also farther inland, where found in hedgerows in cultivated land, and in thickets of bull's-horn acacia (*Acacia*).

Food and Feeding. Insects and other arthropods, nectar and fruits. Takes nectar from brush-like inflorescences of the vine *Combretum fruticosum*. Generally seen in pairs.

Breeding. Season Mar–Jul; appears to be single-brooded. Presumably monogamous. Nests solitarily, perhaps semi-colonial breeder at times. Nest a bag made from plant fibres (mostly grass), little or no lining used, external diameter 5–6·3 cm, external depth 10–11·5 cm, 2·5–6 m above ground and attached with strands of nest material to fork or twigs of shrub or tree, or sometimes stitched to leaves; reported nesting plants *Hibiscus tiliaceus*, small trees of *Psidium goiava*, and a strangler fig (*Ficus*). Clutch 2 eggs, white with purplish-black markings, one egg c. 20·3 × 14 mm; both sexes feed chicks. Nests parasitized by *Molothrus aeneus*. No other information.

Movements. Scant information. Believed to be a short-distance migrant, e.g. a few reported during boreal winter along Pacific slope of Mexico, from Guerrero E to Chiapas; more research needed. Accidental in extreme S USA (S Texas).

Status and Conservation. Not assessed. Poorly known; uncommon to common. Reported as common in 1954, and perhaps increasing in numbers. Has small global distribution, and habitat probably at some risk.

Bibliography. Baker *et al.* (2003), Chapman (1911), Dickerman (1964), Graber & Graber (1954), Gryj *et al.* (1990), Hardy *et al.* (1998), Hofmann *et al.* (2007), Howell & Webb (1995), Jaramillo & Burke (1999), Kiere *et al.* (2007), McCarthy (2006), Wetmore (1943).

48. **Bahama Oriole**

Icterus northropi

French: Oriole des Bahamas **German**: Bahamatrupial **Spanish**: Turpial de las Bahamas
Other common names: Northrop's Oriole; Greater Antillean Oriole (when treated as conspecific with *I. melanopsis*, *I. dominicensis* and *I. portoricensis*)

Taxonomy. *Icterus northropi* J. A. Allen, 1890, Andros Island, Bahamas. Often treated as conspecific with *I. melanopsis*, *I. dominicensis* and *I. portoricensis*, but recent morphological and behavioural studies suggest that all of these merit full species rank. Present species is closely related to *I. melanopsis*, and sequence divergence in mitochondrial DNA between them slight (0·7%), but differs in plumage and is more clearly sexually dichromatic. Monotypic.

Distribution. Andros and Abaco Is, in Bahamas.



Descriptive notes. c. 20–22 cm. Male is mostly black, including head to upper breast and back, wing and tail; rump, lesser and median upperwing-coverts (epaulet), underparts below upper breast, and entire underwing-coverts yellow; small white tips on outer rectrices; iris brown; bill black, base of lower mandible bluish-grey; legs grey-blue. Female is like male, but duller, with black areas of plumage more dusky. Juvenile is olive above, rump and uppertail-coverts yellower, throat yellow, becoming dull olive on breast, rest of underparts dull yellow, upperwing blackish-brown, median and greater coverts tipped yellow (two wingbars); immature is olive-grey above, head washed yellowish, lower back to uppertail-coverts greenish-yellow (brightest on rump), greenish-yellow below (brightest on belly), with lesser upperwing-coverts greenish-yellow, median coverts pale yellow, greater coverts narrowly fringed whitish, young male with variable amount of black on throat. Voice. Song lasts c. 2·4 seconds, comprises 6–11 emphatic whistles.

Habitat. Pine (*Pinus*) and broadleaf woodlands, gardens; often found near palms. Favours mature coppice woodland, with thatch palms (*Thrinax*) and introduced coconut palms (*Cocos nucifera*).

Food and Feeding. No information. Probably feeds on arthropods, fruit and nectar.

Breeding. Season mainly Feb–Jul. Pensile nest bag of plant fibres, mostly palm fibres, often attached (stitched) to underside of palm frond, or to leaves in tree, typically high up. Clutch 3 eggs, pale greenish-white with brown to dark brown spots. Three of eight nests observed were parasitized by *Molothrus bonariensis*. No other information.

Movements. Resident.

Status and Conservation. CRITICALLY ENDANGERED. Rare and declining. Not seen on Abaco since early 1990s, and appears to be extinct on that island; reasons for decline and apparent extirpation not known. Formerly common on Andros, but now scarce to rare, with estimated total population in 2009 only 127–254 individuals, and declining; reproductive output in some years extremely low. One major problem is the plant pathogen "lethal yellowing" (a phytoplasma), which attacks and quickly kills a wide variety of palm species; thought to be spread by the planthopper *Haplaxius crudus*, the disease has already eradicated coconut palm in parts of N Andros; lethal yellowing not yet found elsewhere on Andros, where palm populations remain healthy and oriole densities higher. A further threat is brood parasitism by *Molothrus bonariensis*, recently arrived on Andros and capable of causing serious problems for this icterid.

Bibliography. Anon. (2011a), Baltz (1996), Garrido *et al.* (2005), Lee *et al.* (1999), Omland *et al.* (1999), Price & Hayes (2009), Raffaele *et al.* (1998), Sturge *et al.* (2009).

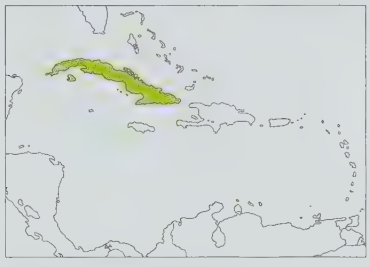
49. **Cuban Oriole**

Icterus melanopsis

French: Oriole de Cuba **German**: Kubatrupial **Spanish**: Turpial Cubano
Other common names: Greater Antillean Oriole (when treated as conspecific with *I. northropi*, *I. dominicensis* and *I. portoricensis*)

Taxonomy. *Ps.*[*arocolius*] *melanopsis* Wagler, 1829, near Havana, Cuba.
Often treated as conspecific with *I. northropi*, *I. dominicensis* and *I. portoricensis*, but recent morphological and behavioural studies suggest that all of these merit full species rank. Present species is closely related to *I. northropi*, and sequence divergence in mitochondrial DNA between them slight (0·7%), but differs in plumage and is less clearly sexually dichromatic. Monotypic.

Distribution. Cuba, including I of Pines and cays off N coast (Guillermo, Coco and Paredón Grande).



Descriptive notes. c. 20 cm; male 35–42 g, female 30–38·5 g. Male is almost entirely black, with yellow rump, yellow lesser and median upperwing-coverts (epaulet), yellow bend of wing; yellow in underparts confined to thigh and small spots on undertail-coverts; iris brown; bill black, posterior half of lower mandible bluish-grey; legs dark blue-grey. Female is similar to male, but slightly duller. Juvenile is olive above, olive-green below, becoming yellower on vent, wing blackish, most feathers with greenish-olive edges; immature similar, but with black lores, chin and throat. Voice. Song lasts c. 3 seconds, comprises up to 11–12 mostly descending whistles, with narrow pitch range; some song phrases may suggest species' Cuban vernacular name, "solibio". Common calls a sharp "kit" and a nasal "whep".

Habitat. Forest edge, woodland, parks and gardens, often near palms.

Food and Feeding. Takes insects and other arthropods, small vertebrates, fruits and nectar. Chicks fed mostly with insects and spiders (Araneae), also fruit pulp. Forages mostly in pairs or family groups.

Breeding. Season Feb–Jul, fledged chicks reported mostly in Jun; possibly two or three broods in a season, e.g. three nests (the first successful, the last abandoned) found between May and Jun at different fronds of one palm, presumably built by same pair. Presumably monogamous. Solitary breeder. Nest a pensile bag of plant fibres, mostly palm fibres, often stitched to underside of palm frond, less frequently suspended from leaves of other trees, five nests attached to fronds of Cuban royal palm (*Roystonea regia*) were 16–18 m above ground; other plants used include cultivated mango (*Mangifera indica*) and banana. Clutch 3–4 eggs, greenish-white with spots in brownish, olive and lilac-grey, mean dimensions 23·8 × 16·8 mm. No information on incubation and nestling periods. Nests parasitized by *Molothrus bonariensis*; in 1989, five pairs at National Botanical Garden (Havana) feeding total of nine cowbird chicks and one oriole chick. Immatures of unknown sex reported as breeding.

Movements. Resident.

Status and Conservation. Not globally threatened. Common to locally very common. Common even in modified environments. More recent data on cowbird parasitism needed.

Bibliography. Acosta & Mugica (1990), Balát & González (1982), Garrido & Kirkconnell (2000), Garrido *et al.* (2005), Gundlach (1876), Hardy *et al.* (1998), Jaramillo & Burke (1999), Omland *et al.* (1999), Price & Hayes (2009), Raffaele *et al.* (1998), Sturge *et al.* (2009).

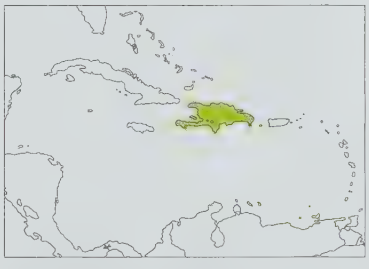
50. **Hispaniolan Oriole**

Icterus dominicensis

French: Oriole à capuchon **German**: Hispaniolatrupial **Spanish**: Turpial de la Española
Other common names: Greater Antillean Oriole (when treated as conspecific with *I. northropi*, *I. melanopsis* and *I. portoricensis*)

Taxonomy. *O.*[*riolus*] *dominicensis* Linnaeus, 1766, Santo Domingo, Hispaniola.
Often treated as conspecific with *I. northropi*, *I. melanopsis* and *I. portoricensis*, but molecular-genetic data indicate that they are better treated as separate species; sometimes *I. prosthemelas* included within this group. Monotypic.

Distribution. Hispaniola (Haiti and Dominican Republic) and outlying islands (Tortue, Gonâve, I à Vache and Saona).



Descriptive notes. 20–22 cm; male 35–38·3 g, female 33–40 g. Male has head to back and down to belly and upper flanks black, rump and uppertail-coverts yellow; upperwing and tail black, lesser and median uppercoverts yellow (epaulet), yellow patch at bend of wing; underparts rearwards from lower belly, thigh and rear flanks yellow; iris brown; bill black; legs dark blue-grey. Female is similar to male, but duller. Immature has dark olive-green head to breast and upperparts, including tail, chestnut tinge in forehead and breast, wing blackish, most feathers with greenish-olive edges, median upperwing-coverts broadly tipped yellow, underparts below breast greenish-yellow. Voice. Song a series of high-pitched whistles. Common calls a sharp "kt" and a harsh "chrr".

Habitat. Broadleaf forest with palms, shade coffee plantations with palms; rarer in xeric woodland and scrub, gardens. Reported at up to 1100 m.

Food and Feeding. Arthropods, nectar and fruit. Nectar taken from flowers of *Erythrina*, also those of cultivated plants such as oranges and agaves (*Agave*). Fruit eaten includes bananas and annonas (*Annona*). Chicks fed mostly with insects and spiders (Araneae), also some fruit pulp. Usually forages in family groups; at times found in flocks of up to 50 individuals.

Breeding. Season Mar–Jun. Nest a pensile bag of plant fibres (mostly palm fibres), lined with cotton-like material, attached to underside of palm frond or banana leaf, or to leaves in tree. Clutch 3–4 eggs, white or bluish-white, finely spotted in russet and other shades of brown, 21·7 × 16·1 mm. Parasitized by *Molothrus bonariensis*. No further information.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common and widespread throughout range. Population may suffer some decline owing to brood parasitism by recently arrived *Molothrus bonariensis*.

Bibliography. Brooks & Davalos (2001), Garrido *et al.* (2005), Keith *et al.* (2003), Lovette, Rickleffs & Bermingham (1999), Price & Hayes (2009), Raffaele *et al.* (1998), Sturge *et al.* (2009), Wetmore & Swales (1931).

51. Martinique Oriole

Icterus bonana

French: Oriole de Martinique **German**: Braunkopftrupial **Spanish**: Turpial de Martinica

Taxonomy. *O.*[*riolus*] *Bonana* Linnaeus, 1766, Martinique.
Relationships uncertain; analysis of mitochondrial DNA indicates that it is not closest relative of *I. laudabilis*, although the two are separated geographically by only 27 km. Monotypic.
Distribution. Martinique, in C Lesser Antilles.



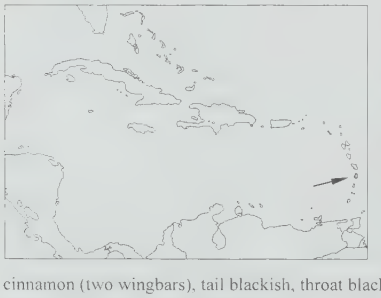
Descriptive notes. 18–21 cm; one bird 29 g. Male has head to nape and most of breast dark chestnut to orange-chestnut, mantle, upper back, upperwing and tail blackish; lower back and rump orange-tawny, uppertail-coverts chestnut; lesser and median upperwing-coverts orange-tawny (distinctive epaulet); underparts below breast orange-tawny, thigh yellower, rearmost undertail-coverts blackish; iris dark brown; bill black, base of lower mandible pale bluish-grey; legs grey. Female is very like male, but slightly duller. Juvenile and immature undescribed. Voice. Song, infrequently recorded, consists of soft warbles. Call a harsh, scolding "cheeu".
Habitat. Mangroves, dry forest on limestone soils, also humid forest, plantations and towns; seems to prefer dry forest and mangroves. Sea-level to 700 m.
Food and Feeding. Insects and other arthropods; fruits, nectar. Animal items include caterpillars, ants (Formicidae) and stick-insects (Phasmida); feeds on wild and cultivated fruits, e.g. Malabar almond (*Terminalia catappa*). Gleans arthropods from green foliage, dry leaves, spider webs and vine tangles; also finds prey by removing loose pieces of bark, and probes into hollow twigs. Usually found in pairs or in family groups.
Breeding. Season Dec–Jul, mostly from Feb. Presumably monogamous. Nest a shallow pendent basket woven from strong fibres, often palm fibres, usually 2–4 m above ground and attached or stitched to underside of large leaf of tree, e.g. *Coccoloba grandifolia* or *Cecropia*, or to palm frond, or to leaf of banana or *Heliconia*. Clutch 2–3 eggs, white to pale bluish with brown spots and blotches; incubation period a minimum of 14 days; chicks fed by both sexes, nestling period 15 days; both sexes defend the nest. About 75% of nests parasitized by *Molothrus bonariensis*.
Movements. Resident.
Status and Conservation. VULNERABLE. Restricted-range species: present in Lesser Antilles EBA. Common. Estimated total population at least 10,000 individuals; density 2·4 birds/ha in C Martinique. Recent decline in numbers, but apparently only slight. Considered to be at risk mainly because of its very small global range. Since 1970s has become less common, evidently owing to invasion of island by *Molothrus bonariensis*, which was able to spread as a result of deforestation and now parasitizes 75% of present species' nests each year; recent decrease in cowbird numbers, however, has enabled a slight recovery. Continued monitoring essential.
Bibliography. Anon. (2010d), Ascanio (2010), Babbs *et al.* (1987), Butchart & Stattersfield (2004), Collar *et al.* (1992), Evans (1990), Garrido *et al.* (2005), Lovette, Rickleffs & Bermingham (1999), Omland *et al.* (1999), Raffaele *et al.* (1998), Stattersfield & Capper (2000), Sturge *et al.* (2009).

52. St Lucia Oriole

Icterus laudabilis

French: Oriole de Sainte-Lucie **German**: Santa-Lucia-Trupial **Spanish**: Turpial de Santa Lucía

Taxonomy. *Icterus laudabilis* P. L. Sclater, 1871, St Lucia.
Formerly considered conspecific with *I. oberi*. Relationships uncertain; analysis of mitochondrial DNA indicates that it is not closest relative of *I. bonana*, although the two are separated geographically by only 27 km. Monotypic.
Distribution. St Lucia, in C Lesser Antilles.



Descriptive notes. 20–22 cm; male average 39·8 g, female average 34·9 g. Male has head to upper back, breast, upperwing and tail black, feathers on neck with yellow bases; lower back, rump and uppertail-coverts orange-yellow, tinged with tawny, lesser and median upperwing-coverts orange to tawny (epaulet); underparts below breast orange-yellow; iris dark brown; bill black, bluish-grey patch on lower mandible, legs bluish-grey. Female is similar to male, but rump and underparts yellow, rather than orange. Juvenile has face black, rest of head cinnamon, upperparts brown, upperwing blackish, median and greater coverts tipped cinnamon (two wingbars), tail blackish, throat black, underparts cinnamon, becoming more tawny posteriorly; immature male resembles female, but black and orange-yellow areas much duller, tinged brownish or olive, wing feathers with olive edges. Voice. Song pleasant, composed of up to 7 notes, mostly loud ascending whistles. Call a harsh "chwee".
Habitat. Found in all types of forest and woodland, including dry scrub, coastal scrub and mangroves; more abundant in humid highland forest. Also frequents plantation edges. Sea-level to 700 m.
Food and Feeding. Insects and other arthropods, fruits and nectar. Fruits taken include cultivated bananas and mangoes (*Mangifera indica*). Chicks fed mostly with insects and spiders (Araneae), also fruit pulp. Probes and removes pieces of bark to expose hidden prey. Forages in pairs and in groups of up to ten individuals.
Breeding. Season Apr–Jul. Probably monogamous. Solitary breeder. Nest a pendent basket of plant fibres, stitched to underside of palm, *Heliconia* or banana leaves; sometimes in coconut palm (*Cocos nucifera*). Clutch 2–3 eggs, white with dark brown spots. Parasitized by *Molothrus bonariensis*. No other information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Currently considered Near-threatened. Restricted-range species: present in Lesser Antilles EBA. Scarce. Has extremely small global range and very small population, thought to number 1000–2500 mature individuals and probably much closer to lower end of that range. Fairly widespread on the island in suitable habitat. Since 1930s has decreased and become more local, probably a consequence mainly of habitat loss combined with pesticide-spraying and brood parasitism by *Molothrus bonariensis*; rates of parasitism by latter sometimes very high, up to 75% of broods locally, but effects of this on present species' current populations not known. There is no evidence that this oriole is under any immediate significant threat, and its population appears stable at present; however, due to tiny range, any declines detected could rapidly lead to redlisting of the species.
Bibliography. Anon. (2010d), Babbs *et al.* (1988), Butchart & Stattersfield (2004), Danforth (1935), Diamond (1973), Evans (1990), Garrido *et al.* (2005), Hardy *et al.* (1998), Keith (1997), Lovette, Rickleffs & Bermingham (1999), Omland *et al.* (1999), Raffaele *et al.* (1998), Stattersfield & Capper (2000), Sturge *et al.* (2009), Toussaint (2007), Toussaint *et al.* (2009).

53. Montserrat Oriole

Icterus oberi

French: Oriole de Montserrat **German**: Montserrattrupial **Spanish**: Turpial de Montserrat

Taxonomy. *Icterus oberi* Lawrence, 1880, Montserrat.
Formerly considered conspecific with *I. laudabilis*. Monotypic.
Distribution. Montserrat, in NC Lesser Antilles.



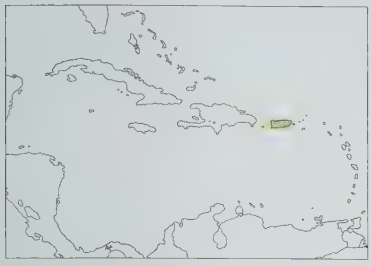
Descriptive notes. 21 cm; male 36–39 g, female 31·5–35·8 g. The only Caribbean oriole with marked sexual dichromatism. Male has head to back, breast, upperwing and tail black, neck feathers with yellow bases, lower back, rump and uppertail-coverts yellow, tinged tawny; underparts below breast tawny-yellow; iris dark brown; bill black, bluish-grey patch on lower mandible; legs bluish-grey. Female has crown, upperparts and tail olive, washed yellow on crown, uppertail-coverts and tail, lores dark olive; upperwing brownish-olive, median and greater coverts with slightly paler tips (two wingbars); throat and underparts olive-yellow; bare parts as for male. Juvenile resembles female; in captivity, adult male plumage acquired in about two years. Voice. Song, by both sexes, a loud series of well-spaced whistles. A common call is a harsh "chrr".
Habitat. Mesic to humid tropical forest, particularly in ravines ("ghauts") with stands of the plant *Heliconia caribaea*. Mostly between 400 m and 900 m.
Food and Feeding. Mostly insects and other arthropods, also fruits; wild individuals seen to take mangoes (*Mangifera indica*), and zoo captives ate kiwis (*Actinidia*) and papayas (*Carica*). Presumably also takes nectar. Gleans arthropods from foliage. Forages mostly in understorey, sometimes higher. Generally in pairs.
Breeding. Season Mar–Aug, depending on rainy season; sometimes two or, exceptionally, three broods. Presumably monogamous. Bag-shaped nest built by female, stitched to underside of *Heliconia caribaea* leaves, banana leaves, or palm fronds if available. Clutch 2–3 eggs, occasionally 4, creamy white to pale greenish, variably marked with reddish-brown and grey spots, two eggs laid at Jersey Zoo (UK) 23·9 × 18·3 mm and 25·1 × 17·7 mm; in captivity, incubation period 13–14 days and nestling period 14–16 days, chicks fed by both parents.
Movements. Resident.
Status and Conservation. CRITICALLY ENDANGERED. Restricted-range species: present in Lesser Antilles EBA. Rare. Estimated population perhaps 460–590 pairs within tiny global range. Has declined greatly owing to combination of human pressure, natural catastrophes and small size of its island range. Formerly present in all main montane forests, but increasing cultivation reduced these to a few suitable patches. Series of volcanic eruptions and ashfall in Soufrière during 1995–1997 destroyed most of remaining forest, and this species is now more or less restricted to area of c. 14 km² in Centre Hills, with small numbers in South Soufrière Hills, where some thought to have survived in patch of forest covering 1–2 km²; volcano has remained active, with intermittent eruptions, ever since then. In 2001 and 2003, reduction in laying frequency and clutch size thought to have been caused by drought; excessive rainfall can have adverse impact. Main current threats appear to be high rates of nest predation by Pearly-eyed Thrashers (*Margarops fuscatus*) and by introduced rats (*Rattus*); also habitat deterioration caused by feral livestock, which eat native plants, including *Heliconia caribaea* (the oriole's preferred nesting plant), and hinder forest regeneration, with feral pig (*Sus*) population particularly destructive and spreading rapidly. A captive-breeding programme started in 1999 has achieved some success; regarded as a precautionary measure, in case the species does become extinct in the wild. Other conservation measures taken include designation of Centre Hills as a protected area, within which no development permitted. A Species Action Plan was published in 2005, and experimental rat control in Centre Hills began in 2006. A pig-eradication programme is planned.
Bibliography. Anon. (2010d), Arendt *et al.* (1999), Atkinson & Gibbons (1998), Butchart & Stattersfield (2004), Dalsgaard *et al.* (2007), Evans (1990), Garrido *et al.* (2005), Gibbons *et al.* (1998), Hilton *et al.* (2003), Hofmann *et al.* (2008a), Lovette, Rickleffs & Bermingham (1999), Owen (2001, 2003), Raffaele *et al.* (1998), Stattersfield & Capper (2000), Sturge *et al.* (2009).

54. Puerto Rican Oriole

Icterus portoricensis

French: Oriole de Porto Rico **German**: Puerto-Rico-Trupial **Spanish**: Turpial Puertorriqueño
Other common names: Greater Antillean Oriole (when treated as conspecific with *I. northropi*, *I. melanopsis* and *I. dominicensis*)

Taxonomy. *Icterus dominicensis* var. *portoricensis* H. Bryant, 1866, Puerto Rico.
Often treated as conspecific with *I. northropi*, *I. melanopsis* and *I. dominicensis*, but recent morphological and behavioural studies suggest that all of these merit full species rank. Mitochondrial DNA indicates that present species is closely related to *I. bonana*, *I. laudabilis* and *I. oberi*. Monotypic.
Distribution. Puerto Rico.
Descriptive notes. 22 cm; male 37·2– 44·9 g, female 34–38·9 g. Plumage is mostly black, with yellow lower back and rump, yellow lesser and median upperwing-coverts (forming epaulet), yellow lower belly and thigh; uppertail-coverts and rear undertail-coverts black with yellow tips; iris dark brown; bill blackish; legs grey. Sexes similar. Juvenile is olive-green above, with reddish tinge on



head, mostly dull yellow below, with rufescent wash on breast. Voice. Song, lasting c. 2 seconds, a rather high-pitched series of ascending and descending whistles, mixed with buzzes and warbles. A common call is a harsh "chk".

Habitat. Edges of forest and woodland of many types, also palm groves, parks and gardens.

Food and Feeding. Insects and other arthropods, small vertebrates, fruits and nectar. Contents of 71 stomachs were mostly invertebrates, particularly beetles (Coleoptera), Orthoptera, earwigs (Dermaptera) and spiders (Araneae). Vertebrates taken include small *Anolis* lizards and frogs. Visits *Erythrina* flowers. Nestling diet includes some fruits. Forages mostly on trees, gleaning from leaves and epiphytes. Usually occurs in pairs or in family groups.

Breeding. Season Mar–Jun. Probably monogamous. Solitary breeder. Nest, apparently built by female alone, variable in size and complexity, usually attached or stitched to underside of palm frond or in *Heliconia* or banana leaves; one was large and elaborate, c. 4 m above ground, a hanging mat firmly attached to a coconut palm (*Cocos nucifera*) frond by four straps, each one looped around 20–24 palm pinnae (leaflets) on each side of midrib, entire oblong structure plus straps measured 77·5 × 71·2 cm, internal nest-chamber 10·2 cm in diameter and 6·3 cm deep, the whole made from fibres from same palm, internal cup sparsely lined with *Tillandsia* stems; another nest was simpler and smaller, a hanging basket stitched at three points to underside of fan-shaped frond of royal palm (*Roystonea*). Clutch 2–3 eggs, white to pale bluish-white with sparse spots in shades of grey and brown, mean dimensions 24·1 × 17·5 mm; incubation apparently by female only, no information on duration; both sexes feed chicks, nestling period c. 14 days; male guards and defends nest. Nests frequently parasitized by *Molothrus bonariensis*: studies in 1980s showed that almost all nests in coastal areas were parasitized, but of 28 nests inland 11 (39%) did not suffer parasitism; in parasitized nests, only 14% of host eggs produced fledglings. Individuals may breed in immature plumage.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. A fairly common to common species, found even in modified habitats.

Bibliography. Arendt *et al.* (1999), Garrido *et al.* (2005), Lovette, Rickleffs & Bermingham (1999), Omland *et al.* (1999), Pérez-Rivera (1986), Raffaele *et al.* (1998), Spaulding (1937), Sturge *et al.* (2009), Wetmore (1927), Wiley (1985).

55. Orange-crowned Oriole

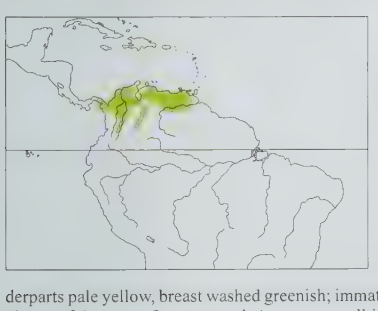
Icterus auricapillus

French: Oriole à tête d'or **German**: Orangekopftrupial **Spanish**: Turpial Coroninaranja

Taxonomy. *Icterus auricapillus* Cassin, 1848, Santa Marta, Colombia.

Recent DNA data indicate close relationship with *I. dominicensis*, *I. bonana*, *I. laudabilis*, *I. oberi* and *I. portoricensis*. Monotypic.

Distribution. E Panama (E from Panamá and Darién) E across N Colombia (S to Huila and N Meta) and Venezuela (E to Sucre and Monagas, S to N Bolívar).



Descriptive notes. 18 cm; male average 33·1 g, female average 32 g. Has forehead, area around eye, lores, throat and breast black, crown, nape and side of head orange-red; mantle and upper back black, lower back and rump yellow, rearmost uppertail-coverts black with narrow yellow terminal edge, tail black; upperwing black, lesser and median coverts yellow; underparts below breast yellow; iris brown; bill black; legs grey. Sexes similar. Juvenile is paler than adult, face orange-yellow, crown and upperparts olive, rump washed yellow, wings and tail dusky, greater upperwing-coverts tipped yellowish (pale wingbar), throat and underparts pale yellow, breast washed greenish; immature like adult, but duller. Voice. Song a whistled phrase of 4 notes, often repeated. A common call is a sharp "cheet". Possibly mimics other birds.

Habitat. Mesic to humid forest edges, riparian forest, cultivated land and pastures with trees; to 1900 m.

Food and Feeding. Insects and other arthropods, also fruits and nectar. Visits blooming trees of *Erythrina poepiggiana*, also flowers of *Bauhinia*. Forages in canopy. Usually in pairs or in small family groups; joins other orioles, e.g. *I. galbula* in Colombia.

Breeding. Season Apr–Jun in N Colombia (Santa Marta) and Sept in E Venezuela (N Bolívar). Three nests from N Colombia (Santa Marta) described as "of the usual *Icterus* type", woven mostly from palm fibres, uniform in appearance, all stitched to underside of and partially covered by palm frond, some loose fibres hanging from nest bottom like drapery; a nest from Venezuela was made from blackish fibres (possibly of *Marasmius* fungus), maximum external length 40 cm, stitched to underside of banana leaf (*Musa*) 2 m above ground. Clutch 2 eggs, whitish with brownish and pale purple spots, one measured c. 22·7 × 15 mm. Parasitized by *Molothrus bonariensis*. No further information.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Fairly common to uncommon. Common in Panama; rarer or local in Venezuela. Found in Cueva del Guácharo National Park, in Venezuela.

Bibliography. Boggs (1961), Darlington (1931), Hilty (2003), Jaramillo & Burke (1999), Miller (1947), Navarro *et al.* (2010), Restall *et al.* (2006), Ridgely & Tudor (1989), Sturge *et al.* (2009), Todd & Carriker (1922), Wetmore *et al.* (1984).

56. Moriche Oriole

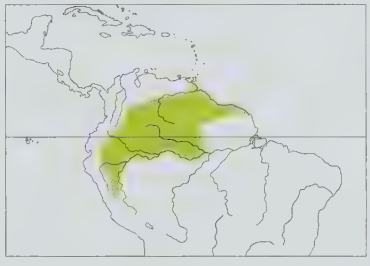
Icterus chrysocephalus

French: Oriole des moriches **German**: Goldkappentrupial **Spanish**: Turpial Moriche

Taxonomy. *O.*[*riolus*] *chrysocephalus* Linnaeus, 1766, Cayenne, French Guiana.

Closely related to *I. cayanensis*, and often treated as conspecific with it and with *I. pyrrhopterus*. Mitochondrial DNA data reveal small divergence (0·6%) between present species and *I. cayanensis*; intermediate or hybrid individuals reported mostly from Suriname, but the two do not hybridize in areas of range overlap in Guyana and Brazil, nor in Sipaliwini area of C Suriname; hybridization possibly occurs locally when conspecifics scarce, but further study needed. Monotypic.

Distribution. S & E Venezuela (S from E Apure, Sucre, Monagas and Delta Amacuro), Guyana, N & C Suriname and N French Guiana S in Amazonia to E Colombia, E Ecuador, N Peru (Loreto) and NW Brazil (Roraima and Amazonas).



Descriptive notes. 22 cm; male average 43·5 g, female average 42·1 g. Plumage is mostly black, with golden-yellow crown, nape, rump, lesser and median upperwing-coverts (epaulet) and thigh; underwing-coverts-lemon yellow, with inner webs of flight-feathers edged white; iris brown; bill blackish; legs leaden grey to blackish. Sexes similar. Juvenile resembles adult, but plumage blackish-brown, yellow areas duller yellow, greater upperwing-coverts narrowly tipped yellow (indistinct wingbar). Voice. Song a slow series of ascending and descending notes, usually grouped in phrases of 2–3 notes. Call a mewing sound. Mimics calls of other birds, e.g. alarm call of Smooth-billed Ani (*Crotophaga ani*).

Habitat. Found mostly in groves of moriche palm (*Mauritia flexuosa*) growing along marshes and channels (*caños*); also forest canopy and edges, gallery forest, trees in clearings, and sometimes in parks and gardens. Lowlands; to 1100 m in Colombia.

Food and Feeding. Insects, including beetles (Coleoptera), also other arthropods, mainly spiders (Araneae); also fruits and nectar. Nestling diet mostly insects. Forages in canopy and at edges of trees, often high up in forest. Gleans arthropods from palm fronds and other foliage. Often visits large forest flowers to obtain nectar. Usually singly or in pairs; sometimes joins mixed-species foraging flocks in canopy.

Breeding. Season Jul–Jan in Brazil (Amazonas) and Sept–Feb in Suriname; pair with fledgling in May in Guyana. Probably monogamous. Solitary breeder. Nest apparently built by both sexes, mostly in moriche palm, a shallow basket with external diameter 7–10 cm, external depth c. 9·5 cm, woven from plant fibres (mostly those of supporting palm) and often lined with fine fibres, in Brazil two nests stitched to underside of dead leaves of moriche palm, one c. 2·5 m above ground, and similar reports from Venezuela; in Guyana five successive basket-like nests built by a single pair under fronds of a royal palm (*Roystonea*), stitched to several supporting "leaflets", entrance facing palm trunk, one oblong nest measured 12 cm in external length and 6·5 cm in external depth. Clutch 2 eggs, creamy or bluish-white, spotted and blotched in brown, mean dimensions 26 × 17·7 mm; chicks fed by both sexes. Reported as host of *Molothrus bonariensis*. No further information available.

Movements. Apparently resident.

Status and Conservation. Not assessed. Locally fairly common to uncommon. Relatively scarce or localized in Venezuela. Reports from Trinidad believed to involve escaped cagebirds. Frequently trapped for exploitation as a cagebird, particularly around rural villages.

Bibliography. Areta (2009b), Beebe (1909), Belcher & Smooker (1937), D'Horta *et al.* (2008), Friedmann & Kiff (1985), Haverschmidt (1966a, 1968), Haverschmidt & Mees (1994), Herklots (1961), Hilty (2003), Hilty & Brown (1986), McCarthy (2006), Oniki & Willis (1983), Restall *et al.* (2006), Robbins *et al.* (2007), Schönwetter & Meise (1981, 1982).

57. Epaulet Oriole

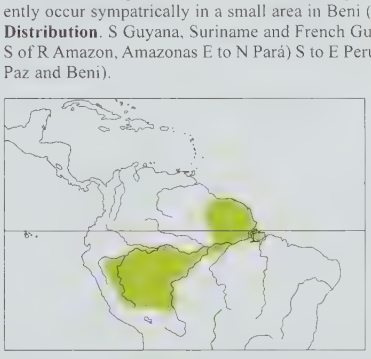
Icterus cayanensis

French: Oriole à épaulettes **German**: Epaulettentrupial **Spanish**: Turpial Boyerito

Taxonomy. *O.*[*riolus*] *cayanensis* Linnaeus, 1766, French Guiana.

Closely related to *I. chrysocephalus*, and often treated as conspecific with it; mitochondrial DNA data reveal small divergence (0·6%) between the two, and intermediate or hybrid individuals reported mostly from Suriname, but no known hybridization in areas of range overlap in Guyana and Brazil, nor in Sipaliwini area of C Suriname. Often treated as conspecific also with *I. pyrrhopterus*, but differs in larger size, more curved bill shape, habitat selection and behaviour; the two apparently occur sympatrically in a small area in Beni (Bolivia) without interbreeding. Monotypic.

Distribution. S Guyana, Suriname and French Guiana, and N Brazil (S Roraima E to Amapá and, S of R Amazon, Amazonas E to N Pará) S to E Peru (Loreto S to Madre de Dios) and N Bolivia (La Paz and Beni).



Descriptive notes. c. 22 cm; male average 46 g, one female 42 g. Plumage is entirely black, except for yellow patch (epaulet) at bend of wing (lesser and median upperwing-coverts); some individuals (mostly in Peru) show some yellow in otherwise black thigh; iris deep red-brown; bill blackish; legs leaden grey to blackish. Sexes similar. Juvenile is like adult, including yellowish epaulet, but plumage tinged brown. Voice. Song not very musical, a varied series of ascending and descending notes, also mixing clicks and buzzes, with main frequency range 1·5–7·5 kHz. A common call is a short nasal note.

Habitat. Canopy and edges of primary and tall secondary forest, clearings with large trees, gallery forest, swamp-forest; seems less palm-dependent than *I. chrysocephalus*. Lowlands up to 1200 m.

Food and Feeding. Little detailed information. Feeds on insects, other arthropods, also fruits and nectar. Visits flowering *Erythrina* trees to obtain nectar. Usually forages in canopy, but in open areas may descend to low bushes and even to ground in search of insects. Generally singly and in pairs; often in mixed-species foraging flocks.

Breeding. Season Aug–Oct in French Guiana. Monogamous. Solitary breeder. Few nests found; nest built by both sexes, a hammock-like basket c. 40 cm long, roughly oblong in shape and with entrance at each end, made from tough, wire-like black fungal rhizomorphs of *Marasmius* and *Marasmiellus*, internal cavity 20–25 cm long, stitched at four points to underside of banana leaf c. 6 m above ground or to underside of leaf of coconut palm (*Cocos nucifera*); structure resembles

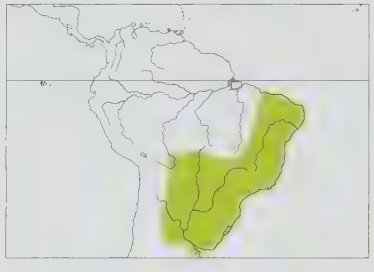
most elaborate nests built by *I. portoricensis*. Clutch probably 2–3 eggs; one nest contained three feathered chicks; both parents feed nestlings and both defend nest. No other information.
Movements. Apparently sedentary.
Status and Conservation. Not assessed. Not well known. Appears to be uncommon or local throughout its reasonably extensive range.
Bibliography. D'Horta *et al.* (2008), Fraga (1987a), Haverschmidt (1966a, 1968), Ingels *et al.* (2003), Jaramillo & Burke (1999), McCarthy (2006), Niethammer (1956), Restall *et al.* (2006), Robbins *et al.* (2007), Santos *et al.* (2010), Willis & Oniki (2007).

58. Variable Oriole

Icterus pyrrhopterus

French: Oriole variable **German**: Feuerflügeltrupial **Spanish**: Turpial Variable
Other common names: Yellow-shouldered Oriole

Taxonomy. *Agelaius pyrrhopterus* Vieillot, 1819, Paraguay.
Often treated as conspecific with *I. chrysocephalus* and/or *I. cayanensis*. Differs from latter in size and bill shape, broader habitat selection and more active behaviour; the two apparently occur sympatrically in a small area in Beni (Bolivia) without interbreeding. Races intergrade; *valenciobuenoi* a variable form, connecting *tibialis* and nominate race, and sometimes subsumed in one or the other of these (a few individuals with characters of *valenciobuenoi* can be found in nominate populations, e.g. in NE Argentina). Four subspecies recognized.
Subspecies and Distribution.
I. p. tibialis Swainson, 1838 – E Brazil from Maranhão and Ceará S to Río de Janeiro.
I. p. periporphyrus (Bonaparte, 1850) – EC Bolivia (Beni, Cochabamba and N Santa Cruz) and adjacent SC Brazil (Mato Grosso).
I. p. valenciobuenoi H. von Ihering, 1902 – SE Brazil (Goias, Minas Gerais, São Paulo, Paraná and Santa Catarina).
I. p. pyrrhopterus (Vieillot, 1819) – SE Bolivia (S Santa Cruz S to Tarija), Paraguay, S Brazil (Mato Grosso do Sul and Rio Grande do Sul), N & NE Argentina (S to San Juan, San Luis, La Pampa and Buenos Aires) and Uruguay.



Descriptive notes. c. 20 cm; male average 33·3 g, female average 30·4 g (nominate, Argentina). A small, long-tailed oriole with slender straight bill. Nominate race is entirely black, except for dark chestnut epaulet (lesser and median upperwing-coverts) and pale grey underwing (in flight, latter flashing when seen from below); iris reddish-tawmy to dark red-brown; bill blackish; legs leaden grey to blackish. Sexes similar. Juvenile has black colour more dusky, epaulet somewhat paler. Race *tibialis* has epaulet yellow, also yellow thighs; *periporphyrus* has epaulet paler chestnut and larger than that of nominate; *valenciobuenoi* resembles nominate, but epaulet tawny to yellow, but quite variable. Voice. Song rather fast, variable, pleasant, but not too musical; sings rather infrequently in Argentina. A common call is a sharp "keet". Imitates several other bird species, including Roadside Hawk (*Buteo magnirostris*) and alarm calls of several non-passerines, e.g. Guira Cuckoo (*Guira guira*) and Smooth-billed Ani (*Crotophaga ani*), and passerines, e.g. Great Kiskadee (*Pitangus sulphuratus*) and Rufous Hornero (*Furnarius rufus*). In captivity, may copy calls of nearby caged parrots (Psittacidae) and also canaries (*Serinus*).
Habitat. Forest edges and clearings, palm savannas, palm groves, sometimes in clumps of flowering *Thalia* in swamps, also mesic to dry *chaco* and *caatinga* woodlands; also parks and gardens, and street trees in small towns. Lowlands and hills, nominate race usually to 1700 m; rarely, to 2500 m in Bolivia.
Food and Feeding. Insects, other arthropods, nectar and fruits. Insects in stomach contents include stink-bugs (Pentatomidae), cockroaches (Blattodea), termites (Isoptera) and beetles (of families Curculionidae, Chrysomelidae and Scarabaeidae). Obtains nectar from flowers of *Erythrina cristagalli*, *Erythrina dominguezii*, *Inga uruguensis*, *Ceiba*, *Thalia*, and the vine *Combretum fruticosum*; usually tears or punctures tubular flowers (e.g. *Tabebuia* and other Bignoniaceae) to obtain nectar; in late austral winter (Aug), commonly visits blooming *Tabebuia* trees in Chaco region. Eats sweet, fleshy petals of the small myrtaceous tree *Myrrhinium atropurpureum*, and is a potential pollinator of this plant. Also eats fruits such as guava (*Psidium guajava*) and those of *Urera baccifera* and *Cordia curassavica*. Almost exclusively arboreal, often hanging upside-down while feeding. Forages in pairs and in family groups, also in flocks of up to 30 individuals. In non-breeding season frequently in mixed-species foraging flocks, particularly with tyrant-flycatchers, e.g. Suiriri Flycatcher (*Suiriri suiriri*), or with other icterids, e.g. *I. croconotus*, *Cassiculus melanicterus* and *Agelaioides badius*.
Breeding. Season Oct–Jan in Argentina. Probably monogamous. Solitary breeder. Nest a shallow basket woven from fine plant fibres, often palm fibres, sometimes also horsehair (fungal rhizomorphs of *Marasmius* not reported in Argentinian nests), external diameter 9–10 cm, external depth 8–9 cm, stitched to underside of palm frond, often fan-leaved palm, either wild (e.g. *Copernicia*, *Trithrinax*) or cultivated (*Washingtonia*, *Roystonea*), or of leaf of tree; many species used, especially banana (*Musa*), *Thalia*, and other wide-leaved monocotyledons, and found nesting in ornamental *Dracaena* and *Cordyline* plants growing in pots on veranda of rural house in Argentina; other nests built inside mistletoe (Loranthaceae) clumps or epiphytic *Tillandsia*, and one was stitched to inner wall of unfinished nest of *Cacicus haemorrhous*. Clutch 3–4 eggs, white to pale bluish-grey, marked with spots and lines in hues of brown, blackish and grey, mean dimensions (nominate race) 26 × 16·3 mm; incubation period 14 days; chicks fed by both parents, nestling period 14–15 days; both parents defend nest. Nests regularly parasitized by *Molothrus bonariensis*; in sample of 27 nests in Argentina (Formosa, Corrientes, Santa Fe), ten contained one or two eggs of this parasite.
Movements. Apparently resident. Short local movements to visit flowering or fruiting trees.
Status and Conservation. Not globally threatened. Locally common. Has extensive range in which numbers increasing. Found in modified environments, even in gardens and towns, and is expanding its range in C & W Argentina.
Bibliography. Allen (1891), Amaral & Ragusa-Netto (2008), Belton (1985), D'Horta *et al.* (2008), Di Giacomo (2005), Fraga (1987a), Guimaraes (1926), Hayes & Areco de Medina (1988), Herzog (2009), Jaramillo & Burke (1999), McCarthy (2006), de la Peña (1987), Pereyra (1938), Ragusa-Netto (2002a), Roitman *et al.* (1997), Serié (1917), Sick (1993), Zotta (1936).

PLATE 76 ➤


ssp warczewiczi
59
60
61
62
ssp kalinowskii
ssp quiscula
63
ssp versicolor
64
65
ssp lugubris
ssp guadeloupensis
ssp fortirostris
66
PLATE 76
inches 5
cm 13
ssp torreyi
ssp mexicanus
67
ssp nelsoni
ssp major
68

Genus *NESOPSAR* P. L. Sclater, 1859

59. **Jamaican Blackbird**

Nesopsar nigerrimus

French: Carouge de Jamaïque **German**: Bromelienstärling **Spanish**: Zanate Jamaicano

Taxonomy. [*Icterus*] *nigerrimus* Osburn, 1859, lower mountains of Jamaica.
One of the most specialized icterids; analyses of mitochondrial DNA indicate that it is close to ancestral stem of quiscaline group, but lacks close living relatives. Previous speculation had suggested possible affinity with *Icterus* or *Agelaius*. Monotypic.
Distribution. Jamaica.



Descriptive notes. 18 cm; average 39 g. All-dark icterid with slender sharp bill and relatively short tail and legs. Plumage is entirely black with slight blue gloss; iris brown; bill and legs black. Sexes similar. Juvenile resembles adult, but plumage is heavily tinged brown and lacks gloss. Voice. Rather noisy. Song, delivered by both sexes, is a quick warble followed by 3–5 nasal buzzes, covering a wide frequency range; song also typically uttered during aerial display. A common call is a sharp "chek".
Habitat. Wet mountain forest in areas with high rainfall and frequent mists, mostly above 570 m. Requires forest with abundant epiphytes, particularly bromeliads (of genera *Guzmania*, *Vriesia*, *Tillandsia*, *Hohenbergia* and *Tecophyllum*) and *Phyllogonium* mosses, and with tree-ferns. Found also in wet limestone forest in karst formations, particularly in Cockpit Country. Absent or rare in drier sclerophyll forest on windy slopes and ridges. To 2200 m; down to 210 m in non-breeding season.
Food and Feeding. Food mostly insects, including beetles (Coleoptera), orthopterans and lepidopteran caterpillars, and other invertebrates, e.g. snails (Gastropoda); also small vertebrates such as tree-frogs (*Hyla*) and small *Anolis* lizards, and reported as feeding on egg of a lizard; takes berries of *Alchornea latifolia*. Forages in trees, usually those covered with epiphytic bromeliads or *Phyllogonium* moss, usually 3–12 m above ground, rarely up to 18 m. Commonly alights and climbs up vertical trunks and main branches in manner of a woodcreeper (Dendrocolaptidae). Finds prey by inserting bill into bromeliads and moss and gaping, even tearing plant material. Spends c. 46–58% of foraging time in searching among epiphytes. Sometimes pecks into rotten wood. Also climbs up tree-ferns, searching in dead fronds (14–18% of foraging time in several studies). Rarely, reported as climbing roadside banks. Found in territorial pairs and in family groups.
Breeding. Season May–Jul. Monogamous. Territorial, solitary breeder; diameter of eleven territories 160–370 m, mean 281 m. Commonly performs aerial display, flying above canopy with slow wingstrokes while singing. Nest built by female, a bulky open cup made mostly from epiphytic orchids and rootlets, placed at medium height (mostly 6–11 m) usually on near-horizontal section of main trunk of forest tree, commonly beneath an epiphytic bromeliad. Clutch 2 eggs, white with few spots and scrawls; incubation by female, starting with second egg, period 13–15 days; chicks fed by both parents, no information on duration of nestling period; both parents defend nest; family group persists for at least two months after young fledge.
Movements. Resident; some individuals descend to 210 m in non-breeding season.
Status and Conservation. ENDANGERED. Restricted-range species: present in Jamaica EBA. Uncommon. Because of its small global range, its strict habitat requirements and its specialized foraging habits, this is a naturally scarce species. Total population thought to lie within range 2500–10,000 individuals. Formerly widespread; now locally distributed, and found mainly in Cockpit Country (in WC Jamaica), in hills in C Jamaica, and in Blue and John Crow Mts (in E Jamaica). Wet montane forest is a habitat seriously threatened by human activities, including bauxite-mining, commercial planting of exotic trees e.g. pines (*Pinus*) and coffee plantations, and fires; this icterid has probably suffered greatly from removal of mature native trees, as these support the large bromeliads in which it forages. Significant population remains in Blue and John Crow Mountains National Park (covering more than 800 km²), part of a network of protected areas with at least 40 forest reserves. Management of reserves, however, is poor and enforcement of regulations weak; habitat destruction continues, and long-term security of reserves by no means assured.
Bibliography. Anon. (2010d), Butchart & Stattersfield (2004), Cruz (1978), Hardy *et al.* (1998), Lack (1976), Raffaele *et al.* (1998), Stattersfield & Capper (2000), Wiley & Cruz (1980).

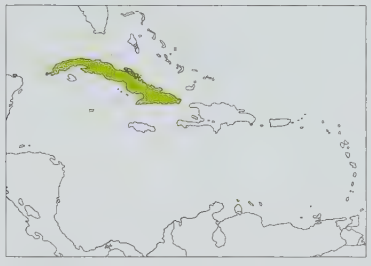
Genus *PTILOXENA* Chapman, 1892

60. **Cuban Blackbird**

Ptiloxena atroviolacea

French: Quiscale violet **German**: Kubastärling **Spanish**: Zanate Cubano

Taxonomy. *Quiscalus atroviolaceus* d'Orbigny, 1839, Cuba.
Genus often subsumed in *Dives*, but distinctive skeletal morphology, song and nest-site choice indicate that a separate, monotypic genus is appropriate. No DNA data available, but absence from I of Pines (old reports erroneous) suggests poor dispersal capabilities and presumably a high genetic distinctiveness. Monotypic.
Distribution. Cuba.
Descriptive notes. 25–28 cm; male 85–94 g, female 72–80 g. Medium-sized icterid with square-shaped tail and relatively short bill. Plumage is black overall, with strong blue and purple iridescence on body, and greenish-blue gloss on wing (plumage reflects ultraviolet in several patches); iris dark brown; bill and legs black. Distinguished from similar male *Molothrus bonariensis* mainly by much larger size. Sexes similar, female slightly duller than male. Juvenile is like adult but much duller, brownish-black without gloss. Voice. Song varied, probably by both sexes, a mix of musical notes and some nasal sounds. Musical "twee-o" and "twee-te-to" calls.



Habitat. Open woodlands, agricultural land, parks, gardens, urban parks, villages. Lowlands to medium elevations.
Food and Feeding. Almost omnivorous; feeds on arthropods, small vertebrates, seeds, fruits and nectar. Forages mostly on ground; sometimes follows grazing cattle. Found in pairs and in small flocks; sometimes joins other icterids, such as *Quiscalus niger* or *Agelaius humeralis*, particularly at roosts.
Breeding. Season Apr–Jul; fledglings reported May–Aug. Probably monogamous, but no details available. Solitary nester. Nest built by both sexes, cup-shaped, made variously from fig (*Ficus*) rootlets, hair and feathers, lined with finer material (e.g. fibres from a species of Araceae), one had external diameter 17·5 cm and internal diameter 8·5 cm, depth 3 cm, placed in enclosed space such as base of palm frond, often of Cuban royal palm (*Roystonea regia*), sometimes in coconut (*Cocos nucifera*) or other unidentified palm, or in clump of epiphytic bromeliads, or in open cavity in dead tree; sometimes in building, e.g. three nests built on beam below roof of a sentry box, and one nest found 2·8 m up inside building near Havana. Clutch 3–4 eggs, greyish-white with dark brown spots, mostly at large end, mean dimensions c. 29 × 19 mm; estimated incubation period 12 days; chicks fed by both parents, no information on duration of nestling period.
Movements. Resident.
Status and Conservation. Not globally threatened. Common, and widespread. A rather abundant species that tolerates habitat modification, living and breeding even in towns and cities. Confined to mainland Cuba, and absent from cays and outlying islands; reports of this species from I of Pines erroneous, apparently referable to misidentified *Quiscalus niger*. No known threats, and not reported as ¤ *Molothrus bonariensis* host.
Bibliography. Arendt *et al.* (2004), Balát & González (1982), Garrido & Kirkconnell (2000), Godínez & Blanco (1993), Gundlach (1876), Hardy *et al.* (1998), Raffaele *et al.* (1998), Valdés (1984), Webster (2003).

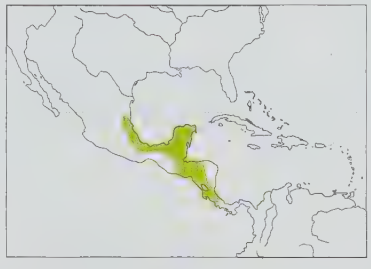
Genus *DIVES* Cassin, 1867

61. **Melodious Blackbird**

Dives dives

French: Quiscale chanteur **German**: Trauerstärling **Spanish**: Zanate Cantor
Other common names: Sumichrast's/Singing Blackbird

Taxonomy. *Icterus dives* W. Deppe, 1830, Mexico.
According to molecular data, genus is one of the more ancestral members of the quiscaline group. This species and *D. warczewiczi* may form a superspecies, and previously treated as conspecific. Monotypic.
Distribution. NE Mexico (S Tamaulipas) S in lowlands of Caribbean coast, and from Guatemala also along Pacific coast, to Costa Rica.



Descriptive notes. Male 25·5 cm, 98·3–102 g; female 23 cm, 83·4–95·9 g. Medium-sized all-dark icterid with long tail. Plumage is wholly black, with blue and purple iridescence; iris dark brown; bill and legs black. Sexes similar, female smaller than male. Juvenile is duller than adult, plumage brownish-black and lacking gloss. Voice. Song, by both sexes, often in duet, loud and musical, a mix of mellow whistles and warbles with sudden changes in pitch. Flight call a metallic "tink-tink-tink"; a common call is a loud "cheep".
Habitat. Open pine woodland (mostly of the native pines *Pinus caribaea* and *Pinus oocarpa*), clearings in forest, shrubby riverbanks, coffee plantations, pastures with scattered trees, also parks, gardens and towns. Lowlands to 2000 m.
Food and Feeding. Quite omnivorous: insects and other arthropods, small vertebrates, fruit, nectar of e.g. balsa trees (*Ochroma pyramidale*) and seeds, including seeds of cultivated maize (*Zea mays*). Picks ticks (Ixodoidea) and other arthropod parasites from cattle. Feeds on fruits of several native plant species, such as *Clidemia rubra*, *Miconia albicans*, *Stemmadenia*, *Ficus padifolia*, *Ehretia tinifolia* and *Talisia olivaeformis*. Forages mostly on ground, where it walks with head-bobbing movements; also in trees up to canopy level. Uses much gaping to extract prey from pine cones, bromeliads, rolled leaves and other substrates. Found mostly in pairs and in family groups, but flocks of at least 100 individuals reported. Associates with other icterids, such as *Quiscalus* and *Molothrus*, and with Groove-billed Anis (*Crotophaga sulcirostris*).
Breeding. Season Apr–May in Belize and Guatemala. Monogamous. Solitary, territorial breeder. Nest built by both sexes, an open cup of diverse plant material, such as strips of banana leaves or dead pine needles, often mixed or plastered with mud, and lined with finer plant fibres (rootlets, grass), the structure substantial (like nest of *Quiscalus*) or rather flimsy, placed 3–7 m above ground in tree, sometimes partially attached by fibres to branches or twigs. Clutch 3–4 eggs, pale blue with scattered dots and spots in brownish to black, mean dimensions 28·4 × 20·4 mm; incubation by female, chicks fed by both sexes, no information on duration of incubation and nestling periods.

On following pages: 62. Scrub Blackbird (*Dives warczewiczi*); 63. Common Grackle (*Quiscalus quiscula*); 64. Nicaraguan Grackle (*Quiscalus nicaraguensis*); 65. Carib Grackle (*Quiscalus lugubris*); 66. Greater Antillean Grackle (*Quiscalus niger*); 67. Great-tailed Grackle (*Quiscalus mexicanus*); 68. Boat-tailed Grackle (*Quiscalus major*).

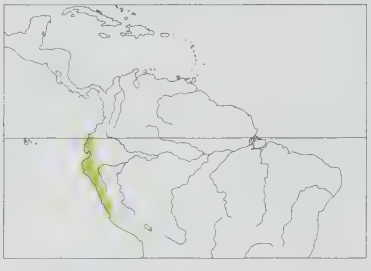
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Common to fairly common throughout range. Invades modified habitats. As a result of deforestation, has expanded range S, reaching Costa Rica in 1980s (first records 1988) and, more recently, Panama. No known threats; not reported as a host of sympatric *Molothrus aeneus*, which occupies same habitats as present species.
Bibliography. Dickerman (2007), Feduccia (1976), Howell & Webb (1995), Jaramillo & Burke (1999), Kantak (1979), Orians (1983, 1985a), Russell (1964), Sánchez *et al.* (1998), Schönwetter & Meise (1981, 1982), Skutch (1954, 1996), Stiles (1988), Stiles & Skutch (1989), Thurber *et al.* (1987).

62. Scrub Blackbird

Dives warczewiczi

French: Quiscale buissonnier **German**: Buschstärling **Spanish**: Zanate Matorralero
Other common names: Peruvian/Kalinowski's/Coastal Blackbird (*kalinowskii*)

Taxonomy. *Lampropsar Warczewiczi* Cabanis, 1861, Peru.
According to molecular data, genus is one of the more ancestral members of the quiscaline group. This species and *D. dives* may form a superspecies, and previously treated as conspecific. Races intergrade in NW Peru (Cajamarca and La Libertad). Two subspecies recognized.
Subspecies and Distribution.
D. w. warczewiczi (Cabanis, 1861) – W Ecuador (from S Esmeraldas and N Pichincha) S to NW Peru (Tumbes S to La Libertad).
D. w. kalinowskii Berlepsch & Stolzmann, 1892 – coastal plain and foothills of W Peru from La Libertad S, extending inland in Cajamarca (upper R Marañón) and Huancavelica, to Ica.



Descriptive notes. c. 21·5 cm (nominate); male average 85·5 g and female average 84 g (nominate), male 110 g (*kalinowskii*). Medium-sized all-dark icterid with long tail. Nominate race is wholly black, with a blue to green iridescence; iris dark brown; bill and legs black. Sexes similar. Juvenile is duller than adult, with plumage blackish-brown and mostly unglossed, blackest and with slight iridescence on head, mantle and breast. Race *kalinowskii* is much larger than nominate, with longer bill, and has violaceous iridescence. Voice. Song, usually by both sexes in duet, a rather pleasant mixture of warbles, trills and whistles, mixed with chattering and buzzing notes. Sharp "teeeew" call in flight.
Habitat. Xeric open woodland and scrub in lowlands and foothills, agricultural areas, clearings, fruit orchards, parks and gardens, and residential areas, even in large cities (e.g. Lima, in Peru). Along almost rainless coast of Peru, found mostly around oases, riparian areas or irrigated farmland. Nominate race to 2100 m, rarely at 2800 m; *kalinowskii* to 3000 m.
Food and Feeding. Few detailed data. Diet presumably insects and other arthropods, also small vertebrates, fruits and seeds; reported as catching a lizard. Stomach contents include insects, fruit pulp such as cultivated mangoes (*Mangifera indica*), and seeds. Forages mostly on the ground. Often in pairs.
Breeding. Season Feb–May; a food-begging juvenile in Jun in Lambayeque (Peru). Presumably monogamous. Apparently less territorial than *D. dives*. Nest in Ecuador a shallow cup made from sticks, weeds, grass and pieces of banana leaves, with some cementing mud, mean external diameter 14·3 cm and height 8·4 cm, internal diameter 9·3 cm and depth 5·1 cm, placed 5–6 m above ground in tree, including *Prosopis juliflora*, *Cordia lutea* and a lemon tree (of seven nests, five along dry riverbed and two in an orchard); two nests found high in eucalypt (*Eucalyptus*) trees in agricultural area in Peru. Clutch 2–3 eggs, mean 2·8, pale blue with scattered dots and spots in brownish to black, mean dimensions 27·5 × 19·2 mm; no information on incubation period; nestling period 12 days. Nests parasitized by *Molothrus bonariensis*s, and observed to feed fledgling of latter.
Movements. Presumably resident.
Status and Conservation. Not globally threatened. Common and numerous. Tolerates habitat modifications. Appears to be expanding its range in both Peru and Ecuador.
Bibliography. Friedmann & Kiff (1985), Jaramillo & Burke (1999), Knowlton (2010), Orians (1983), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schönwetter & Meise (1981, 1982), Schulenberg & Parker (1981), Schulenberg *et al.* (2010).

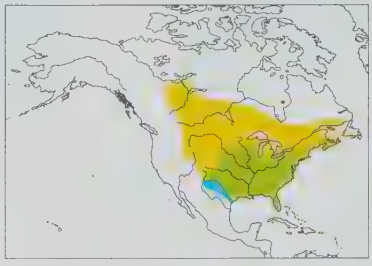
Genus *QUISCALUS* Vieillot, 1816

63. Common Grackle

Quiscalus quiscula

French: Quiscale bronzé **German**: Purpurgrackel **Spanish**: Zanate Común
Other common names: Florida Grackle (*quiscula*); Bronzed Grackle (*versicolor*); Purple Grackle (*stonei*)

Taxonomy. *G.[racula] Quiscula* Linnaeus, 1758, coast of South Carolina, USA.
According to DNA data, this species is ancestral to other members of genus. In the past, races *versicolor* and *stonei* were sometimes treated as two separate species. Further, these two races intergrade in E USA from Connecticut S to Louisiana; intermediate populations described as a distinct race, *ridgwayi*, but such treatment of this variable form unwarranted. Three subspecies recognized.
Subspecies and Distribution.
Q. q. versicolor Vieillot, 1819 – breeds in S Canada from E British Columbia E to S Quebec and Newfoundland, S in USA (E of Rocky Mts and W of Appalachians) to C Texas and W Mississippi; winters S to S Texas and E to South Carolina.
Q. q. stonei Chapman, 1935 – E USA from New Jersey and Pennsylvania S (mostly along Appalachians) to inland Louisiana, Alabama, Georgia and South Carolina.
Q. q. quiscula (Linnaeus, 1758) – SE USA on Atlantic and Gulf coasts from S North Carolina S to Louisiana and S Florida (including Florida Keys).



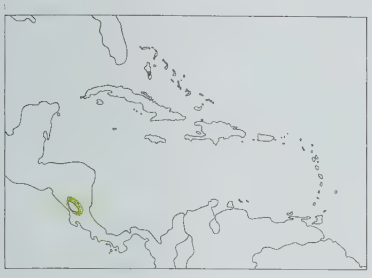
Descriptive notes. Male 27·2 cm, average 119·6 g; female 26 cm, average 92·2 g. Medium-sized icterid with long wedge-shaped tail; plumage entirely black and glossy. Male nominate race has strong purple gloss on head, dark green gloss on back, purple-blue iridescence on belly, and blue-green gloss on tail (held in keel-like shape); iris pale yellow; bill and legs black. Female resembles male, but smaller, less glossy, and with shorter tail (held in "normal-looking" position). Juvenile is like female, but plumage duller and distinctly browner, with dark eyes. Races differ mainly in colour of iridescence: *versicolor* has gloss on head blue-green (creating visible hood), greenish-bronze on back and belly, and purplish on tail; *stonei* is intermediate between previous and nominate, iridescence on head purple or green, on back and belly purple, on tail usually blue-green. Voice. Male song a rasping "tzu-dee", likened to sound made by a rusty gate; each male seems to have just one song type. Call a harsh, dry "kerrr", also a thin "zweeej"; low "kek" in flight.
Habitat. Original habitat probably groves of eastern cottonwoods (*Populus deltoides*), American sycamores (*Platanus occidentalis*), and other trees near swamps and watercourses. Nowadays found also in wide variety of open areas with scattered trees, particularly groves of coniferous trees, including rural areas, residential areas, city parks, and swamps with willows (*Salix*) and other trees. Mostly in lowlands and foothills.
Food and Feeding. Almost omnivorous, but rarely consumes fruits. Contents of 2346 stomachs were 30% animal food, 70% plant food, animal food peaking in spring and summer. Insects, mostly beetles (Coleoptera), grasshoppers (Orthoptera) and caterpillars (Lepidoptera) predominate in diet. Other animal food includes spiders (Araneae) and crayfish (Crustacea), and even picks parasitic leeches (Hirudinea) from legs of map turtles (*Graptemys*); takes many small vertebrates, particularly aquatic species such as fish and frogs; preys on adults, eggs and chicks of small birds, and even catches mice (Muridae). Plant food includes cultivated grains, mostly maize (*Zea mays*) and rice. In towns consumes household food scraps and garbage. Nestling diet mostly arthropods, with small percentage of fish and other vertebrates. Forages on ground and in trees and bushes; opportunistic, captures fish, tadpoles and adult frogs in shallow water by wading or during over-water flights. Often forages in flocks; winter roosts can contain thousands of individuals, often mixed with other icterids and Common Starlings (*Sturnus vulgaris*).
Breeding. Season Mar–Jul; usually single-brooded. Mostly monogamous, sometimes successively polygynous. Nests solitarily, also in loose colonies usually of 10–18 pairs, exceptionally up to 200 pairs; territorial defence limited to small area around nest-site. Male has perched courtship display in which it lowers head, erects body feathers, and spreads wings and tail while singing ("Song Spread" or "Ruff-out"); female chooses nest-site. Nest built mostly by female, a bulky cup with external diameter 16·5–22 cm, external depth 8–22 cm, made from stems, leaves and fine grasses, man-made materials such as paper, string and the like incorporated, cup cemented with mud and lined with fine grasses or horsehair, placed at variable height in tree or other vegetation, most nests (62·5% in various studies) in conifer (evergreen conifers offer better cover for earlier breeders), sometimes in deciduous tree or shrub; more rarely used sites include man-made structures, emergent aquatic plants, holes in trees and logs, and crevices in cliffs. Clutch 4–5 eggs, rarely 6 or 7, light blue to pearl-grey with blackish-brown scrawls, some resembling spots, mean dimensions 28·8 × 21·4 mm; incubation by female, period 13–14 days; some males desert nest after hatching, otherwise chicks fed by both sexes, nestling period 12–14 days. Rarely parasitized by *Molothrus ater* (no cases in 401 nests from Illinois, in N USA), in part because of present species' earlier breeding season, possibly also because it ejects parasite's eggs; in recent study, rejection behaviour recorded at c. 33% of experimentally parasitized nests.
Movements. Mostly resident in S of range (Gulf Coast states, Georgia and Florida). Elsewhere a medium-distance migrant or partial or short-distance migrant, present in winter as far N as S Ontario (Canada) and Maine (USA). N populations (race *versicolor*) migratory, leaving breeding grounds Aug–Sept; peak S movement in Oct–Nov, and generally complete by Dec. Return migration from late Feb, and all N breeding grounds reoccupied by mid-Apr; males reach nesting areas at least one week before females.
Status and Conservation. Not globally threatened. Common to very common throughout range. Global population in 1990 estimated at c. 90,000,000 individuals. Regarded as an agricultural pest in many areas, where it causes damage by taking much cereal grain; subject to control measures in some regions.
Bibliography. Baker & Fox (1978), Bent (1958), Bjorklund (1991), Bray *et al.* (1979), Davidson (1994), Erskine (1971), Ficken (1963), Gray & Hagelin (1996), Hamilton (1951), Hickman (1981), Homan *et al.* (1996), Howe (1976, 1979), Howell & Webb (1995), Jaramillo & Burke (1999), Lenington & Scola (1982), Maxwell (1970), Maxwell *et al.* (1976), Meanley (1971), Morrison & Caccamise (1990), Peck & James (1987), Peer & Bollinger (1997a, 1997b), Peer & Rothstein (2010), Peterson & Young (1950), Powell *et al.* (2008), Rich *et al.* (2004), Scott (1991), Wiley (1976a, 1976b), Willson *et al.* (1971), Yang & Selander (1968), Zink, Rootes & Dittmann (1991), Zottoli (1976).

64. Nicaraguan Grackle

Quiscalus nicaraguensis

French: Quiscale du Nicaragua **German**: Nicaraguagrackel **Spanish**: Zanate Nicaragüense

Taxonomy. *Quiscalus nicaraguensis* Salvin and Godman, 1891, Momotombo, Lake Managua, Nicaragua.
Analysis of mitochondrial DNA indicates closer relationship with *Q. lugubris* than with other members of genus. Monotypic.
Distribution. S Nicaragua (shores of L Managua and L Nicaragua) and adjacent N Costa Rica (L Caño Negro, on R Frío).
Descriptive notes. Male 29 cm, 94 g; female 24 cm, 58 g. Male is black with marked violet and green gloss, gloss more violaceous on underparts, tail-coverts and tail; tail long and strongly keeled; iris pale yellow; bill long and thin, black; legs black. Distinguished from sympatric *Q. mexicanus* mainly by obviously smaller size. Female is smaller than male, upperparts dull brown, darkest on wings and tail; side of head dull brown contrasting with long pale, dull buffy superciliary and with pale underparts; submoustachial area, chin and throat very pale, dull buffy, becoming buff on breast and most of belly, deeper and richer on breast, paler on belly, dark brown on thigh, rearmost flanks, vent and undertail-coverts. Juvenile is grey-brown, paler below, with darker mottling; immature male is similar to adult, but duller and more brownish, with little gloss. Voice. Song by male during display a series of accelerated ascending whistles, also a descending "kleeep" during "Song Spread"



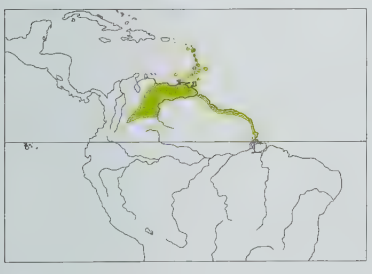
display; less varied and higher-pitched than song of *Q. mexicanus*. Calls include nasal "jep" and dry "jik"; also an ascending "wah-ee", like a call of *Q. mexicanus*.
Habitat. Open lakeshores, riverbanks, marshes and wet cattle pastures.
Food and Feeding. Feeds on wild seeds, also insects and other arthropods; probably also small vertebrates. Forages mostly on ground. Follows grazing cattle, and turns over small stones, debris and cow dung to find hidden prey; picks prey items from water surface. Commonly forages in small flocks, often with other icterids such as *Molothrus aeneus* and *Agelaius phoeniceus*; occupies peripheral positions when in mixed-species foraging flocks with *Q. mexicanus*.
Breeding. Season Mar–Sept (Costa Rica). Monogamous or polygynous. Breeds in small colonies, with up to ten nests together in trees and shrubs near water. In "Song Spread" display, male lowers head, erects body feathers, and spreads wings and tail while singing. Nest built by female, a coarsely constructed cup-shaped structure made from strips of marsh plants e.g. sedges and grasses, also with rootlets. Clutch 2–3 eggs, pale blue with dark to black spots and scrawls, mostly at large end, mean dimensions 26·5 × 18·7 mm; incubation by female alone, chicks fed by both sexes; no information on duration of incubation and nestling periods.
Movements. Apparently resident. Possibly some short seasonal movements.
Status and Conservation. Not globally threatened. Restricted-range species: present in Lake Nicaragua Marshes Secondary Area. Uncommon to locally common. Relatively poorly known. Estimated extent of distribution c. 7000 km²; fieldwork required in order more accurately to determine status. Adapts to moderate habitat disturbance.
Bibliography. Hellmayr (1937), Jaramillo & Burke (1999), Powell *et al.* (2008), Schönwetter & Meise (1982), Stiles & Skutch (1989).

65. Carib Grackle

Quiscalus lugubris

French: Quiscale merle **German**: Trauergrackel **Spanish**: Zanate Caribeño
Other common names: Lesser Antillean Grackle; Barbados Grackle ("*fortirostris* group")

Taxonomy. *Quiscalus lugubris* Swainson, 1838, Guyana.
Formerly placed with *Q. niger* in a separate genus, *Holoquiscalus*; thought to be closest to that species, but recent analysis of mitochondrial DNA indicates closer relationship with *Q. nicaraguensis* than with other members of genus. Races form two groups, "*fortirostris* group" (including *contrusus*), with blackish-brown females, and "*lugubris* group" (remaining six races), with paler brownish females; sometimes thought to represent two separate species, but darkness of females evidently variable. Further, a molecular-genetic (mtDNA) comparison of some mainland races with some island ones showed sequence divergence of 3·9%, indicating prolonged isolation, but many island races were not examined; mtDNA from two individuals from Barbados resembled that of distant Trinidad individuals, perhaps reflecting human introduction. More information on all races required. Proposed race *dispar* (described from Kingstown, on St Vincent) refers to occasional vagrants of *fortirostris*. Eight subspecies recognized.
Subspecies and Distribution.
Q. l. guadeloupensis Lawrence, 1879 – NC Lesser Antilles (Montserrat, Guadeloupe, Marie Galante, Dominica and Martinique).
Q. l. inflexirostris Swainson, 1838 – St Lucia, in C Lesser Antilles.
Q. l. contrusus (J. L. Peters, 1925) – St Vincent, in S Lesser Antilles.
Q. l. fortirostris Lawrence, 1868 – Barbados, in S Lesser Antilles.
Q. l. luminosus Lawrence, 1878 – the Grenadines and Grenada (S Lesser Antilles) and Los Testigos (off NE Venezuela).
Q. l. orquillensis (Cory, 1909) – Los Hermanos, off N Venezuela.
Q. l. insularis Richmond, 1896 – Margarita I and Los Frailes, off NE Venezuela.
Q. l. lugubris Swainson, 1838 – mainland Venezuela (S to middle and lower R Orinoco), NE Colombia (Orinoco basin in Arauca and Vichada), Trinidad and Tobago (possibly introduced), and E along coasts of Guyana, Suriname and French Guiana to N Brazil (Amapá).
Introduced (race *fortirostris*) in N Lesser Antilles (N of Montserrat); nominate race said to have been introduced on Tobago from Trinidad.



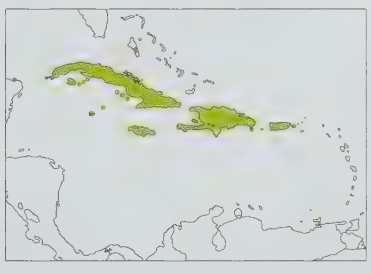
Descriptive notes. Male average 26 cm, 66–80 g; female average 21·7 cm, 49–58 g. Male nominate race is entirely black with strong violet gloss, slightly less glossy on underparts; gloss on wing-coverts more violet-blue, that on flight-feathers greener; tail medium-long and keel-shaped; iris pale yellow; bill and legs black. Female is dull dark brownish above, darker on wings and tail, somewhat paler below, throat paler and greyer; tail shorter than that of male, and with "normal" shape. Juvenile male is dark brown, sometimes faintly streaked below, with dark eyes, soon acquires black feathering in plumage and paler iris; juvenile female is similar to adult, but warmer brown, retains dark iris for longer than male. Races differ mainly in darkness of female (but individually variable), also in body and bill sizes, and nature of gloss on male: *guadeloupensis* has relatively short and thick bill, male gloss dull violet, greener on wing, female palest race, pale brown above, with pale buff lores and conspicuous buffy supercilium, light buffish below, with whitish chin and throat, streaked breast; *inflexirostris* is slightly larger than previous, bill marginally larger, female brown above with darker rump, indistinct lighter supercilium, wing and tail blackish with paler fringes, buff-brown below, slightly paler on throat and greyer on flanks; *contrusus* male is similar to last, female darkest race, blackish-brown above and below; *fortirostris* is smallest race, bill short and thick with gradually decurving culmen, female very dark, almost as dark as previous; *luminosus* has bill longer and more slender than others, male like *guadeloupensis* but violet gloss on head and body more extensive, female similar to preceding race but slightly paler, with paler throat and browner underparts, juvenile more obviously streaked below than those of other races; *insularis* is similar to nominate, but slightly smaller, both sexes have wing and tail longer, male less glossy; *orquillensis* male is like last, but central rectrices unglossed, rest of tail glossed green, female appears intermediate between the preceding two races in colour of underparts. Voice. Noisy. Male song varies considerably geographically, but generally a series of squeaky notes. In Martinique a descending, *Molothrus*-like whistle followed by a complex warble; in Trinidad a series of rhythmic rattles ending in metallic sound; in coastal Venezuela a frequent song is a series of 4–6 roughly similar ascending notes, "whep-whep-whep-whep-whep". Group singing frequent. Captive individuals reported as mimicking other bird species. Calls include "chk", loud whistles, and rattles.
Habitat. Open woodland and scrub, pastures, plantations, palm groves, parks and gardens, urban and suburban areas. Regularly found in large cities, such as Caracas (Venezuela).
Food and Feeding. Opportunistic and omnivorous, feeding on arthropods, small vertebrates, seeds and fruits. Vertebrates taken include *Anolis* lizards and eggs and chicks of small birds. In towns feeds on household food scraps (even entering restaurants), and garbage. Forages mostly in flocks or groups on ground. Associates with other icterids, such as *Molothrus bonariensis*.
Breeding. Breeds almost throughout year, mostly May–Sept in Trinidad and Jun–Jul in Venezuelan *llanos*. Monogamous, possibly sometimes polygynous. Nests solitarily or in small noisy colonies; up to 4–5 nests per palm in colonies in moriche palms (*Mauritia flexuosa*), and sometimes a dozen in single tree. Both sexes perform sexual and agonistic display involving the raising and spreading of tail and shaking of open wings. Nest built by female, a deep and bulky cup of grass and other plant material mixed with mud, lined with fine grass or similar fibres, external diameter 17 cm, external depth 10 cm, placed up to c. 15 m above ground in tree, palm or shrub, or in vine tangle; some colonies located over water in marsh or along channel, nests placed up to 2 m above water. Clutch 2–4 eggs, greenish-blue, spotted and scrawled with blackish-brown and grey, mean dimensions 27·3 × 19·8 mm (Trinidad); incubation by female, period 12 days; chicks fed by both parents, nestling period 14 days. Nests regularly parasitized by *Molothrus bonariensis* in *llanos* of Venezuela, where six of 13 nests in one colony had parasite eggs (a second colony with seven nests was not parasitized); none of 41 nests examined in Trinidad held *Molothrus* eggs (experiments in Trinidad showed that female ejected most parasitic eggs).
Movements. Resident. In highly seasonal environments such as Venezuelan *llanos*, some local movements probable. Race *fortirostris* apparently an occasional vagrant on St Vincent, but not reported there in recent decades.
Status and Conservation. Not globally threatened. Common to very common throughout range; locally abundant. Thrives in many modified environments. Race *fortirostris* was successfully introduced in early decades of 20th century in N Lesser Antilles, initially on Barbuda and Antigua, and evidently also St Kitts (then known as St Christopher); since then, has spread to other islands N to Anguilla. Nominate race said to have been introduced on Tobago (from Trinidad) in 1905, and now common on that island.
Bibliography. Belcher & Smooker (1937), Cherrie (1916), Friedmann & Kiff (1985), Friedmann & Smith (1955), Hilty (2003), Jaramillo & Burke (1999), Lefebvre *et al.* (1997), Lovette, Seutin *et al.* (1999), Manolis (1982), Morand-Ferron, Lefebvre *et al.* (2004), Morand-Ferron, Veillette & Lefebvre (2006), Powell *et al.* (2008), Raffaele *et al.* (1998), Ramo & Busto (1981), Selander (1971), Sick (1993), Wiley (1975).

66. Greater Antillean Grackle

Quiscalus niger

French: Quiscale noir **German**: Antillengrackel **Spanish**: Zanate Antillano
Other common names: Antillean Grackle

Taxonomy. *Oriolus niger* Boddaert, 1783, Port-au-Prince, Haiti.
Formerly placed with *Q. lugubris* in a separate genus, *Holoquiscalus*; thought to be closest to that species, but recent analysis of mitochondrial DNA indicates that *Q. lugubris* is closer to *Q. nicaraguensis*. The same DNA study revealed moderate sequence divergences among four populations of present species (Grand Cayman, Jamaica, Hispaniola and Puerto Rico). Existence of two races in Cuba possibly due to fact that *gundlachii* evolved later and is slowly replacing *caribaeus* on main island; the two intergrade in W Cuba (Pinar del Río). Seven subspecies recognized.
Subspecies and Distribution.
Q. n. caribaeus (Todd, 1916) – extreme W Cuba (Pinar del Río), and I of Pines and adjacent cayos.
Q. n. gundlachii Cassin, 1867 – Cuba (E from Pinar del Río), including N cayos and Jardines de la Reina Archipelago.
Q. n. caymanensis Cory, 1886 – Grand Cayman I.
Q. n. bangsi (J. L. Peters, 1921) – Little Cayman I.
Q. n. crassirostris Swainson, 1838 – Jamaica.
Q. n. niger (Boddaert, 1783) – Hispaniola.
Q. n. brachypterus Cassin, 1867 – Puerto Rico and I de Vieques.



Descriptive notes. 25–30 cm; male 86·6–100 g and female 60–72·5 g (Cuba), male 67·5–88 g and female 51–64 g (*caymanensis*), male mean 112 g and female 79·3 g (*crassirostris*), male mean 86·4 g and female 61·7 g (*brachypterus*). Male nominate race is entirely black, with strong purple gloss on head and upperparts, including upperwing-coverts, and greenish gloss on flight-feathers and tail; tail long and graduated, wedge-shaped; iris yellow; bill and legs black. Female resembles male, but smaller, less glossy, and with smaller tail not held in wedge-shape. Juvenile is brownish-black, without iridescence, and has dark brown eyes. Races differ mainly in size and colour, nominate smallest and with most extensive purplish gloss: *gundlachii* of both sexes has violaceous plumage gloss; *caribaeus* is smaller than previous, with gloss bluish; *caymanensis* resembles last, but is much smaller, with blue gloss tinged purplish, uppertail-coverts glossed greenish-blue, upperwing glossed bronze-green; *crassirostris* is similar to *gundlachii*, but with shorter and thicker bill, male with violet sheen, this becoming blue on tail-coverts (above and below) and belly, with upperwing-coverts glossed greenish-bronze, female somewhat duller; *bangsi* is smaller than previous, with longer bill, male bluer, female more brownish; *brachypterus* resembles *crassirostris*, but smaller, with uppertail-coverts glossed purplish (not blue). Voice. Song varies considerably among islands, but (for a grackle) is relatively musical, a metallic "cling-cling-cling" and flute-like whistles. Call "chuk" or "chuk-chuk", or "chin-chin-chilin"; also high "wee-si-si" and harsh notes.
Habitat. Mangroves, marshes, savanna, coconut (*Cocos nucifera*) plantations, open fields, agricultural land, light woodland, parks and gardens; often roosts in towns and cities. Nominate race mostly below 1000 m, sometimes up to 2200 m; *crassirostris* mostly in lowlands.

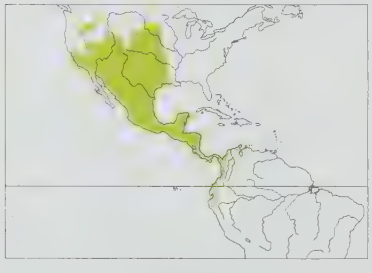
Food and Feeding. Omnivorous. Feeds on wild and cultivated seeds, including those of maize (*Zea mays*) and rice; takes insects and other arthropods; frequently preys on vertebrates such as *Anolis* lizards, even medium-sized Jamaican anole (*Anolis grahami*), and on eggs and chicks of small birds, including Banaquit (*Coereba flaveola*), grassquits (*Tiaris*) and Common Ground-dove (*Columbina passerina*); also eats fruits of *Bursera simaruba*. Often probes into ground and grass roots in search of arthropod prey. Commonly in flocks; sometimes several thousands at communal roosts.
Breeding. Season Feb–Sept, mainly Apr–Jul/Aug; Mar–Jul in Cuba. Mating system not well known. Colonial breeder, in trees; colonies in mangroves largest, up to c. 30 nests. Nest cup-shaped, made from plant materials including grass and Spanish moss (*Tillandsia*), reinforced with mud and lined with fine fibres, at variable height (in Cuba 5–16 m) above ground in tree, usually mangrove or palms (*Rostoynea*, *Cocos*, etc.); reported also as nesting in *Callophylum antillanum*. Clutch 3–4 eggs, pale olivaceous with brown to black spots and scrawls, mean dimensions 27·1 × 19·6 mm; no information on incubation period; male reported as feeding chicks, nestling period at least 23 days. Reported as host of *Molothrus bonariensis* in Puerto Rico, but experiments there showed that females eject most parasite eggs from nests.
Movements. Resident. Local movements to areas with fruiting trees reported from Jamaica.
Status and Conservation. Not globally threatened. Common to abundant throughout range, especially in lowlands. Often lives in towns and other modified habitats. Populations in smaller Cayman Is have suffered from hurricanes. Race *bangsi* formerly occurred also on Cayman Brac, but disappeared from there at some time between 1911 and 1970. Attempted introduced in Virgin Is (St Croix) c. 1917 was unsuccessful, and species soon died out there.
Bibliography. Balát & González (1982), Bradley (1995), Buden & Olson (1989), García Montaña (1998), Garrido (1973), Garrido & Kirkconnell (2000), Graves (2006), Jaramillo & Burke (1999), Keith *et al.* (2003), Lack (1976), Pérez-Rivera (1986, 2000), Post *et al.* (1990), Powell *et al.* (2008), Raffaele *et al.* (1998), Selander (1971), Wetmore & Swales (1931), Wiley (1985).

67. **Great-tailed Grackle**

Quiscalus mexicanus

French: Quiscale à longue queue **German**: Dohlengrackel **Spanish**: Zanate Mexicano

Taxonomy. *C.[orvus] mexicanus* J. F. Gmelin, 1788, area around Veracruz city, Veracruz, Mexico.
Closely related to, and may form a superspecies with, *Q. major*; occasional hybrids between the two reported along coast of S USA (in Texas and Louisiana). Related also to extinct *Q. palustris* of C Mexican plateau. Recent study of mitochondrial DNA revealed two clades with deep sequence divergence (3·1%), one formed by W races *nelsoni* and *graysoni*, the other including remaining races; despite DNA divergence, *nelsoni* hybridizes freely with *monsoni* in S USA (California and Arizona) following range expansions in 20th century. In Mexico, nominate race intergrades with *obscurus* in Guerrero (Balsas valley), with *prosopidicola* in S Tamaulipas, and with *loweryi* in extreme W Campeche. Eight subspecies recognized.
Subspecies and Distribution.
Q. m. nelsoni (Ridgway, 1901) – SW USA (from C California, Nevada and SW Arizona) S to NW Mexico (N Baja California and Sonora).
Q. m. monsoni (A. R. Phillips, 1950) – SW USA (SE California, C Arizona, Utah and Colorado S to New Mexico and W Texas) S to C Mexico (Zacatecas).
Q. m. prosopidicola (Lowery, 1938) – C & S USA (from Nebraska S to C Texas and Louisiana) and NE Mexico (Coahuila, Nuevo León and Tamaulipas).
Q. m. graysoni P. L. Sclater, 1884 – coast of Sinaloa, in W Mexico.
Q. m. obscurus Nelson, 1900 – W coast of Mexico from Nayarit S to Guerrero.
Q. m. mexicanus (J. F. Gmelin, 1788) – C Mexico (from E Jalisco, San Luis Potosí and S Tamaulipas) S to Nicaragua.
Q. m. loweryi (Dickerman & A. R. Phillips, 1966) – Yucatán Peninsula, including Cozumel I and other nearby islands, S to Belize.
Q. m. peruvianus Swainson, 1838 – Costa Rica, Panama, and Colombia E on Caribbean coast to NW Venezuela (Zulia) and S along Pacific coast to W Ecuador and extreme NW Peru (Tumbes).
Species is currently spreading N (& E) within USA, having now reached as far N as Oregon, South Dakota and Minnesota; this involves the three N races (*nelsoni* and *monsoni* in W, *prosopidicola* in E), but detailed information lacking as to exact range limits of each race, and situation complicated by extensive intergradation.



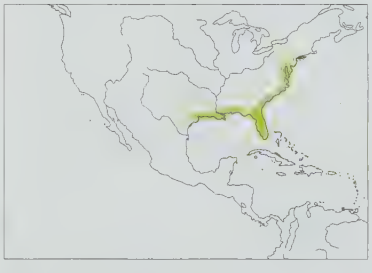
Descriptive notes. Male 43 cm, average 230 g; female 33 cm, average 125 g. Large icterid with large bill and long tail. Male nominate race is entirely black, with violet iridescence on head, back, throat and breast; more bluish gloss on rest of body, and greenish gloss on flight-feathers; tail long and graduated, keel-shaped, with greenish gloss; iris yellowish-white to pale yellow; bill and legs black. Female is much smaller than male, with shorter tail, plumage dark brown above, somewhat paler on head, with lighter supercilium, paler below, throat and breast lighter and warmer brown, contrasting with darker belly. Juvenile is similar to female, dark brown above and buffish-brown with dark streaks below, eyes dark. Races differ mainly in coloration (particularly of females), size and proportions, nominate largest and with relatively longest and deepest bill: *nelsoni* female is much paler than others, particularly on underparts (except belly) and supercilium; *graysoni* resembles previous in having pale females, both sexes slightly larger, and male has bluish (not violet) iridescence on back, breast and flanks; *monsoni* is similar to nominate, but somewhat smaller and not so heavy-billed, male with more prominent purplish gloss on back, female with slightly darker breast; *prosopidicola* is slightly smaller than nominate, female with paler head and paler buffy underparts; *obscurus* is smaller than nominate, female entirely dark brown, throat very slightly lighter, no visible supercilium; *loweryi* is like nominate, but distinctly smaller, female paler and warmer brown; *peruvianus* female is much paler than nominate, with clearly contrasting pale supercilium, light buff throat and underparts. Voice. Song of male variable within a colony, also among races. First part of song consists of hard notes, sound resembling cracking of twigs, this followed by "chewechewe" notes and a shorter sequence of twig-cracking notes, ending with loud "chawee" notes; song varies in pitch. Female produces a chatter, probably equivalent to male song. Calls include rising whistles (diagnostic call), rattles and guttural sounds; some male calls bugle-like, somewhat musical.
Habitat. Most types of habitat, except for unbroken forest. Found originally in marshes, coastal mudflats and lagoons, mangroves, and riparian habitat. Nowadays also in savannas, open fields, agricultural land, light woodland, and parks and gardens in towns and cities.
Food and Feeding. Omnivorous and opportunistic. Feeds on invertebrates, small vertebrates, carrion, berries and fruits, seeds, and discarded food scraps. Vertebrates taken include fish, frogs, lizards, small birds and mammals; preys on eggs and chicks of other birds, even of larger species such as herons (Ardeidae). Fruits consumed include cultivated bananas, those of Cuban royal palm (*Roystonea*) and wild berries of *Conostegia*. Forages on ground, sometimes with grazing livestock; also in bushes. Extracts insect larvae from soil, and turns stones to find hidden prey. May catch alates of termites (Isoptera) in air. Catches small fish and tadpoles by wading into shallow water, also while flying close to surface. Forages in small to large flocks.
Breeding. Season Mar–Jul in S USA (Texas) and Jan–Jul in Costa Rica; double-brooded in Guatemala and perhaps elsewhere in tropics. Colonial breeder, in compact colonies of up to c. 1000 nests, sometimes even more; often several nests in single tree, and inter-nest distance as small as 0·75 m. Polygynous, male defending small territory within colony in which one to several females nest; younger, short-tailed males aggressively excluded from colony; females in Texas engaged in frequent extra-pair copulations, which produced 37% of chicks. During sexual displays lowers head feathers, giving more slender look. Nest built by female, a bulky cup-shaped structure, outside diameter 18–20 cm, made from weed stems, coarse grass, sedges, vines or twigs, in towns may include scraps of paper or plastic, string, etc., material usually cemented with mud or cow dung, lining of fine fibres added, female often steals material from neighbouring nests; placed at good height in tree, sometimes suspended from branches with interlacing plant material, commonly in marsh vegetation over or near water, aquatic or riparian trees and shrubs selected including willows (*Salix*), buttonbush (*Cephalanthus*) and others, also in trees in farms and towns, and in Central America often in cultivated palm. Clutch usually 3 eggs in Guatemala and Costa Rica, 4 in S USA (Texas and Louisiana), means 3·5–3·7, bluish to bright blue with variable spots, blotches and scrawls in brown to black, mean dimensions 32·18 × 21·75 mm (Texas) and 33·6 × 23 mm (Guatemala); incubation by female, period 13–14 days; chicks fed by female, nestling period 20–23 days; male defends nests and chicks within its territory. Nests seldom parasitized by *Molothrus ater* and *Molothrus aeneus*, female almost invariably removing parasite eggs in experiments; has been suggested as being former host of *Molothrus oryzivorus* in areas S from Mexico until it evolved egg-ejection behaviour. In Louisiana, 36% of 183 eggs laid in 92 nests produced fledglings.
Movements. Apparently resident in most of range. A short-distance migrant in extreme N, though even these populations may not move during mild winters. Wintering ranges of the various races poorly known; race *prosopidicola* migrates along river valleys in Texas. Within USA, most birds resident nowadays, taking advantage of many sources of food associated with human settlements.
Status and Conservation. Not globally threatened. Common throughout range; abundant in man-made habitats. Has extended N since middle of 20th century, e.g. in Mexico colonized NW Sonora in 1940s–1950s and Baja California in 1960s; in USA has spread N & E since c. 1980, and has bred in Oregon and probably also in South Dakota; probably reached Louisiana in 1940s. Expansion in USA (at least) apparently continuing.
Bibliography. Arnold (1983), Avise & Zink (1988), Bent (1958), Bjorklund (1991), Christensen (2000), Coon *et al.* (1971), DaCosta *et al.* (2008), Davis & Arnold (1972), Dinsmore & Dinsmore (1993), Gotie & Kroll (1973), Guillory *et al.* (1981), Haemig (1978, 2010), Jaramillo & Burke (1999), Jennings (1984), Johnson & Peer (2001), Johnson *et al.* (2000), Kok (1971, 1972), Lowery (1974), McCarthy (2006), Peer & Sealy (2000, 2001, 2004), Peer *et al.* (2005), Powell *et al.* (2008), Pratt (1991), Pratt *et al.* (1977), Ruiz Gutiérrez (1981), Rutledge & Chandler (1979), Selander (1970), Selander & Giller (1961), Selander *et al.* (1969), Smith (1977), Swanson & Liknes (2001), Teather (1989), Wehtje (2003), Wetmore *et al.* (1984).

68. **Boat-tailed Grackle**

Quiscalus major

French: Quiscale des marais **German**: Bootschwanzgrackel **Spanish**: Zanate Marismeño

Taxonomy. *Quiscalus major* Vieillot, 1819, New Orleans, Louisiana, USA.
Closely related to, and may form a superspecies with, *Q. mexicanus*; occasional hybrids between the two reported along coast of S USA (in Texas and Louisiana). Four subspecies recognized.
Subspecies and Distribution.
Q. m. torreyi (Harper, 1934) – E USA from Long I (New York) S along coast to N Florida.
Q. m. westoni Sprunt, 1934 – most of peninsular Florida.
Q. m. major Vieillot, 1819 – SE Texas E along coast to extreme SW Mississippi.
Q. m. alabamensis Stevenson, 1978 – S Mississippi E along coast to NW Florida.



Descriptive notes. Male average 39·9 cm, 154–239 g; female average 27·5 cm, 93–147 g (*torreyi*). Male nominate race is entirely black, with violet gloss on head, blue-green gloss on body, and duller green gloss on wing and tail; tail long and graduated, wedge-shaped; iris brown; bill and legs black. Differs from similar *Q. mexicanus* in slightly smaller size, more slender bill, shorter and narrower tail, steeper forehead. Female is much smaller than male, dark brown above, with slight greenish gloss on wing and tail, ill-defined paler supercilium, cheek and often lores dusky, paler brown or buffy below, throat palest; bare parts as for male. Juvenile resembles female, but somewhat warmer brown, tinged cinnamon, above and below, no gloss, upperwing-coverts sometimes fringed rufous, breast sometimes indistinctly streaked. Races differ in size and iris colour: *torreyi* has longer wing than others, and pale yellow iris; *westoni* has longer and more slender bill, and yellow iris; *alabamensis* has thicker bill, yellow iris. Voice. Song, by both sexes (female more rarely) during display, a series of sharp "kip" notes followed by grating rattles, and ending with further "kip" notes. A common call is a harsh "jeeb-jeeb-jeeb"; also various whistles and harsher rattles.
Habitat. Brackish to freshwater marshes along coast, and bordering estuaries of main rivers. Nowadays also in man-made habitats, including cities (e.g. New Orleans) along coastal plain; also in inland marshes in Florida, rarely in inland locations elsewhere (such as Baton Rouge, in Louisiana).
Food and Feeding. Opportunistic and omnivorous. Feeds on small vertebrates, invertebrates, wild and cultivated seeds, tubers (e.g. potatoes), carrion, household scraps, even garbage. Vertebrates captured include fish, tadpoles, lizards, small birds, and small mammals; birds attacked or killed include Dunlin (*Calidris alpina*) and a perched swallow (Hirundinidae), and preys on eggs and chicks of many bird species; readily feeds on carrion, and said to pick pieces of flesh from trapped muskrats (*Ondatra zibethicus*). Invertebrates taken include molluscs (particularly mussels and freshwater *Pomacea* snails), crabs, shrimps and crayfish (Decapoda), spiders (Araneae), and insects (particularly of orders Orthoptera and Odonata). Wades into shallow water to pick crayfish, tad-

poles and fish; captures molluscs (snails, mussels) on shore or on floating vegetation. Often moistens bread, rice and dog food before eating it. Recorded as a kleptoparasite on Glossy Ibises (*Plegadis falcinellus*) feeding on crayfish. Forages in medium-sized to large flocks; in non-breeding season, usually in single-sex flocks.

Breeding. Season Mar–Jul, and egg-laying highly asynchronous; autumnal breeding (Nov) reported in Florida. Breeds in colonies of two to c. 200 nests, usually in zones free from most terrestrial predators; most colonies on small islands, and in man-made habitats sometimes in trees on traffic islands of main roads (where protected by automobile traffic); in area of range overlap with *Q. mexicanus* the two species may nest together, but with nests of present species in the minority and usually on the periphery. Mating system is harem polygyny, older dominant (or alpha) males defending a group of nesting females and performing more than 70% of copulations in colony, and siring more offspring than other males; males of lesser rank display outside colony; DNA fingerprinting revealed that 50% of females perform extra-pair copulations, particularly with males outside colony. During sexual displays, head feathers are raised or fluffed. Nest built by female, a bulky cup-shaped structure, outer walls usually of grass stems and leaves, cemented with mud and plant debris, lined with fine materials, including pine (*Pinus*) needles and thin grass stems, external diameter c. 19·7 cm, external depth the same; built 0·5–1 m above water in emergent aquatic plant or higher up in tree or shrub of various species. Clutch 1–5 eggs, mean 2·7, light blue, covered with brown and black scrawls, mean dimensions 31·9 × 21·8 mm; incubation by female, period 13 days; chicks fed by female alone, rarely assisted by male, nestling period 13 days; males in colony mob and attack potential nest predators.

Movements. Largely resident. Longer-winged N race *torreyi* a partial short-distance migrant, some moving S after breeding; one individual ringed as a chick in South Carolina was recovered 413 km S, in coastal E Florida, and others observed farther S in that state.

Status and Conservation. Not globally threatened. Common to locally abundant. Tolerates habitat modifications. Has expanded its range N & W.

Bibliography. Avise & Zink (1988), Bancroft (1984a, 1984b, 1985, 1987), Bent (1958), Bjorklund (1991), DaCosta *et al.* (2008), Dunham (1990), Hopkins *et al.* (2004), Jackson (1985), Jaramillo & Burke (1999), Kok (1972), Lowery (1974), McCarthy (2006), McIlhenny (1937), Melman & Searcy (1999), Post (1992, 1994a, 1994b, 1995, 1998a), Post & Seals (1993), Post *et al.* (1996), Poston (1997a, 1997b), Poston *et al.* (1999), Powell *et al.* (2008), Pratt (1991), Selander (1960), Selander & Giller (1961), Selander *et al.* (1969), Snyder & Snyder (1969), Sprunt (1931), Stevenson (1978).



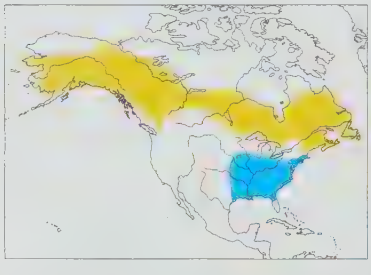
Genus *EUPHAGUS* Cassin, 1867

69. **Rusty Blackbird**

Euphagus carolinus

French: Quiscale rouilleux **German**: Roststärling **Spanish**: Zanate Canadiense

Taxonomy. *Turdus Carolinus* Statius Müller, 1776, Carolina, USA.
Closely related to *E. cyanocephalus*. Two subspecies recognized.
Subspecies and Distribution.
E. c. carolinus (Statius Müller, 1776) – breeds S of tundra from NW Alaska (Kotzebue Sound) E across Canada from Northern Territories (Mackenzie Delta) to Labrador, and S to extreme NE USA (New York state E to C Maine); migrates to E USA.
E. c. nigrans Burleigh & J. L. Peters, 1948 – breeds SE Canada (Newfoundland, Nova Scotia and New Brunswick); migrates to E USA.



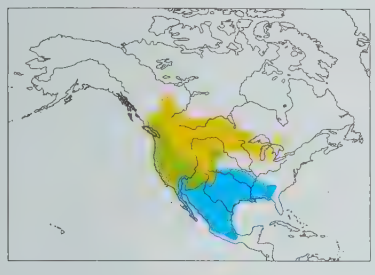
Descriptive notes. Male 23 cm, 45·9–80·4 g; female 21 cm, 47–76·5 g. Male nominate race breeding is uniformly black with rather slight greenish or bluish gloss; iris yellow; bill and legs black. Differs from very similar *E. cyanocephalus* in being rather less glossy, and in having less heavy-looking bill. Female is slate-grey, usually darker above and with bluish-green gloss (more uniform slate-grey in worn plumage, with gloss often limited to upperwing-coverts); bare parts as for male. Male non-breeding is black with broad paler feather fringes, rusty brown on crown, nape and auriculars, with marked buff-brown supercilium, buff-brown on underparts (looking black-barred), and with wing, rump and tail black, tertials edged rufous; non-breeding female is similar to male, but fringes more cinnamon, and rump and underpart barring slate-grey. Juvenile is dull greyish, back and throat washed brown, wing feathers narrowly edged light brown; eyes dark, soon becoming paler. Race *nigrans* is very like nominate, but male has bluish (not greenish) gloss, and female is darker grey. VOICE. Male song described as a quiet gurgling sound followed by a shrill "kushaléé" and ending in a trill at 4 kHz; also a series of 2–3 musical notes and then a longer harsh note. Female song, sometimes delivered from nest, said to be different from male's, but few details. Common call, including in flight, a low "chuk"; alarm call "chip".
Habitat. Breeds in clearings within conifer forest and conifer–deciduous forest, usually near water in marshes and lakes; often nests around North American beaver (*Castor canadensis*) ponds; also favours openings and stands of young trees in boreal forest. In non-breeding range found mostly near water in wooded swamps, e.g. with bald cypress (*Taxodium distichum*), in riparian vegetation along creeks, also in open fields near swamps and wetlands. Usually roosts in trees, rarely on low vegetation near ground.
Food and Feeding. Has a rather broad-based diet, feeding on insects and other invertebrates, small vertebrates, carrion, seeds and some fruit. In summer consumes many aquatic insects and larvae, often of beetles (Coleoptera), also grasshoppers (Orthoptera); chicks commonly fed with dragonflies (Odonata). Other invertebrates taken include snails (Gastropoda), spiders (Araneae) and crawfish (Astacoidea). Preys on small vertebrates such as frogs and salamanders (Caudata); also attacks small birds, and known to kill, among others, longspurs and New World sparrows (Emberizidae) and goldfinches (*Carduelis*), and even *Molothrus ater*, attacks occurring mostly during severe cold weather. Feeds on tree seeds, i.e. acorns (*Quercus*) and pine seeds (*Pinus*), grass seeds (*Setaria*, *Panicum*), and some fruits, including elderberries (*Sambucus*) and blackberries (*Rubus*). Sometimes eats maize (*Zea mays*) and oat (*Avena*) seeds. Forages mostly on ground, in winter quarters frequently in ploughed fields. Often wades in shallow water to catch prey. Usually occurs in small groups, but in non-breeding season can also be encountered in flocks of up to c. 1000 individuals. In winter sometimes roosts with grackles and other icterids, and also with Common Starlings (*Sturnus vulgaris*).
Breeding. Season Apr/May–Jul; single-brooded. Apparently monogamous. Nests solitarily, in E of range also in small loose colonies. Nest built by female, often escorted by male, a bulky and strong cup 14–20 cm in external diameter, outer walls of twigs, grass and *Usnea* lichen, cemented with humid rotten vegetation (which dries up), lined mostly with grass, placed 0·5–6 m above ground in stump, tree or shrub growing in or close to water, often concealed in dense vegetation; trees used include conifers, i.e. spruce (*Picea*) and larch (*Larix*), and broadleaf species, i.e. willow (*Salix*), birch (*Betula*) and alder (*Alnus*); sometimes in dense vegetation on ground; old nests often used by Solitary Sandpiper (*Tringa solitaria*). Clutch 3–5 eggs, pale grey to blue-green, variably marked in brown, mean dimensions 25·8 × 18·6 mm; incubation by female, often fed by male (usually not on nest), period 14 days; chicks fed by both parents, nestling period 14 days. Rarely parasitized by *Molothrus ater*.
Movements. Strongly migratory, with no overlap between breeding and non-breeding ranges. Post-breeding movement to winter quarters in E USA, from Nebraska E to Massachusetts and S to E Texas and C Florida. Diurnal migrant. Leaves breeding grounds in Aug–Sept, arriving in S of non-breeding range Oct–Nov; remains in winter quarters until Feb. Return migration from mid-Feb, reaching S edge of breeding range in Mar (mean spring arrival date in Nova Scotia c. 24th Mar); many do not arrive until May/Jun in N of range. During migration occurs irregularly in Colorado, mostly E of Rocky Mts, and even farther W, some reaching extreme NW Mexico (Baja California). Lost migrants have landed on ships up to 400 km off E coast of USA. Recorded as accidental in Russian Far East, islands in Bering Sea and Greenland.
Status and Conservation. VULNERABLE. Classified as "Declining" in the USA (Yellow WatchList priority species for conservation). Estimated total population 2,000,000 individuals in period 1980–1990, but since then has declined steeply to probably no more than a few hundred thousand. Destruction of habitat may be one of main causes of decline. Has suffered serious long-term population decline that appears to have accelerated since end of last century. Historical accounts indicate that numbers have been falling steadily for more than a century, and recent surveys have revealed annual rates of decline of c. 5% to 12% since 1970s. Possible reasons for this include loss and degradation of wooded wetlands, habitat on which this species is dependent throughout year; this has been a particular problem in non-breeding range. In recent decades, habitat disturbance and environmental pollution, as well as global climate warming, may have had adverse effects on breeding. In 2005, the International Rusty Blackbird Working Group was set up with aim of developing research that would shed light on causes of decline; some early findings were that methylmercury levels in tissues were higher in breeding area than in wintering range, and that, in winter, individuals are vulnerable to parasite and microbial infections (possibly a result of stress induced by degradation of wintering habitat). In addition, when the species nested in small stunted conifers in undisturbed wetlands in Alaska and New England, it achieved relatively high success; in contrast, when those in New England nested in young spruces or balsam firs (*Abies balsamea*) that had regrown after recent logging of wetlands or adjacent uplands, they suffered far greater nest predation, leading to huge reduction (almost 70%) in nest survival; researchers suggested that establishment of unlogged buffer zones around wetlands should be considered as a conservation measure for this icterid. Sometimes consumes maize (*Zea mays*) and oat (*Avena*) seeds, but causes only minor crop damage; nevertheless, it suffers some mortality from poisoning at winter roosts, where it mixes with other icterids (grackles, *Agelaius phoeniceus*, etc.) and Common Starlings that are subject to pest control.
Bibliography. Anon. (2010d), Avery (1995), Barnard *et al.* (2010), Bent (1958), Butcher & Rowher (1988), Edmonds *et al.* (2010), Gabrielson & Lincoln (1959), Godfrey (1986), Greenberg & Droege (1999), Greenberg & Matsuoka (2010), Hobson *et al.* (2010), Hoffman & Hoffman (1982), Jaramillo & Burke (1999), Kennard (1920), Kenyon & Phillips (1965), Lebbin *et al.* (2010), Lewis (1931), Luscier *et al.* (2010), Matsuoka, Shaw & Johnson (2010), Matsuoka, Shaw, Sinclair *et al.* (2010), McCaskie (1971), Meanley (1995), Mettke-Hofmann *et al.* (2010), Orians (1985a), Powell, Hodgman & Glanz (2010), Powell, Hodgman, Glanz, Osenton & Fisher (2010), Rich *et al.* (2004), Taylor (1987), Woodruff & Woodruff (1991).

70. **Brewer's Blackbird**

Euphagus cyanocephalus

French: Quiscale de Brewer **German**: Purpurstärling **Spanish**: Zanate de Brewer

Taxonomy. *P.*[*sarocolius*] *cyanocephalus* Wagler, 1829, Temascáltepec, Mexico.
Closely related to *E. carolinus*. Monotypic.
Distribution. Breeds in S Canada from N British Columbia E across Alberta and Saskatchewan to S Ontario, throughout W USA S to California and New Mexico and E to N Nebraska and Michigan, and in NW Mexico (including N Baja California). N breeders migrate to SW parts of breeding range and S to S USA and S Mexico.



Descriptive notes. Male 23 cm, 60–73 g; female 21 cm, 50·6–67 g. Male is glossy black, with purple iridescence on head and neck, greenish to bluish iridescence on rest of plumage; iris yellow; bill and legs black. Some non-breeding males (possibly yearlings) may have buff-edged feathers. Female is dark greyish-brown, with slightly paler supercilium, slightly paler below, darker on belly, has slight violaceous gloss on head, greenish gloss on back; iris dark brown, occasionally paler; bill and legs as on male. Juvenile is like female, but more uniformly coloured, browner and without gloss. Voice. Song, by both sexes, a brief but varied "skwéé" or a "schrlup". Common call "chuk"; scolding "tschup".
Habitat. Original inhabited clearings and edges of several forest types, ranging from chaparral to montane conifer woodland. Nowadays common in modified habitats, such as pastures, agricultural land, farms, towns and suburban areas. Lowlands and mountains; to 3000 m.
Food and Feeding. Diet consists of invertebrates, small vertebrates, seeds; more rarely, fruits. Stomach contents of 285 birds from California mostly insects and seeds; insects chiefly beetles (Coleoptera, of 13 families), flies (Diptera), bugs (Hemiptera), Orthoptera and Lepidoptera. Seeds taken from both cultivated plants (wheat, oats) and wild plants. Reported as killing and eating other birds, also as taking nestlings. During breeding, food for chicks obtained up to 800 m from colony. Forages on ground. Commonly forages in flocks, which in winter can contain a few thousand individuals.
Breeding. Season Apr–Jul; in resident populations (coastal California) courtship and pair-forming starts in Jan and takes 5–12 weeks, but elsewhere this period shorter; second broods frequent in W USA (coastal Oregon and California). Nests solitarily or in colonies of mostly 3–20 nests, rarely up to 100 nests; up to seven nests per tree in California colonies. Monogamous to moderately polygynous, number of polygynous males in California dependent on sex ratio at colonies, varying from year to year, and males had maximum of three mates; nests of polygynous males often not adjacent, but scattered within colony; territorial defence limited to small area around nest-site. Nest built by female, a bulky cup of diverse plant materials, reinforced with mud and cow dung, lined with horsehair and rootlets, external diameter c. 15 cm, external depth c. 7·5 cm, built on ground, or in shrub or marsh vegetation, or up to 50 m above ground in dense foliage of tree, rarely in hole in broken top of dead tree or old woodpecker (Picidae) hole; both native trees and shrubs, e.g. Monterey pine (*Pinus radiata*) and sagebrush (*Artemisia*), and exotic ones, e.g. eucalypts (*Eucalyptus*), used; female may change nest location between seasons. Clutch 3–7 eggs, pale blue or greenish-blue, variably marked with spots, blotches and lines in shades of brown, purplish-brown and black, mean dimensions 25·5 × 18·6 mm; incubation by female, sometimes fed by male, period 12–13 days; polygynous male deserts primary female during incubation; hatching asynchronous, chicks fed usually by both sexes, polygynous males divide their efforts, nestling period 13 days. Nests parasitized by *Molothrus ater*.
Movements. Resident along Pacific coastal region, from SW British Columbia (Canada) S to N Baja California (Mexico); individuals ringed in C coastal California observed no farther than c. 10 km from capture site. Elsewhere, a short-distance to medium-distance migrant, moving S after breeding to S parts of breeding range and to S half of USA (E to NW Florida) and Mexico (S to Michoacán, Oaxaca and Veracruz); recorded rarely as far S as Guatemala. In addition, altitudinal movements occur in W of range (in Rockies and Sierra Nevada).
Status and Conservation. Not globally threatened. Common to locally abundant. Since early decades of 20th century has expanded into E parts of North America, most of this spread 1920s–1940s, but continuing thereafter; formerly bred no farther E in USA than W Minnesota, but by early 1970s range had extended to S Ontario (Canada), with concomitant E expansion of non-breeding range in C & S USA. Quite tolerant of human modifications of habitats; prefers relatively open habitats. Range extension aided by forest clearance.

Bibliography. Balph (1975), Bent (1958), Butcher & Rowher (1988), Butler (1981), Furrer (1975), Grinnell (1920), Harms *et al.* (1991), Horn (1968, 1970), Howell, S.N.G. & Webb (1995), Howell, T.R. & Bartholomew (1952, 1954), Jaramillo & Burke (1999), Koenig (1985), La Rivers (1944), Martin (2002), McCarthy (2006), Orians & Horn (1969), Power (1971a, 1971b), Ritter (1983), Soriano (1931), Stepney (1975), Stepney & Power (1973), Verbeek (1964), Westmoreland & Kiltie (1996), Wiggins (1990), Williams (1952).



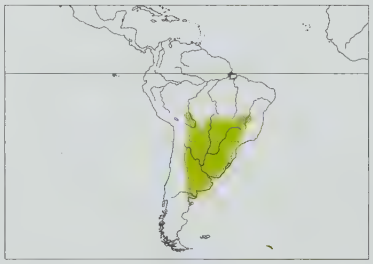
Genus *MOLOTHRUS* Swainson, 1832

71. Screaming Cowbird

Molothrus rufoaxillaris

French: Vacher criard **German**: Rotachsel-Kuhstärling **Spanish**: Tordo Chillón
Other common names: Short-billed Cowbird

Taxonomy. *Molothrus rufo-axillaris* Cassin, 1866, Buenos Aires, Argentina.
Analyses of mitochondrial DNA indicate closest relationship with *M. oryzivorus* and *M. aeneus*. Monotypic.
Distribution. SE Bolivia and C Brazil (S from Mato Grosso, S Tocantins, Goiás, and W Minas Gerais), S throughout Paraguay and Uruguay to NE & C Argentina (S to Río Negro and NE Chubut).
Descriptive notes. Male 20·3 cm, average 58 g; female 19·2 cm, average 48·8 g. Male is entirely black with bluish iridescence (ultraviolet reflectance slight), except for rufescent lesser underwing-coverts (rarely seen in the field); iris reddish-brown; bill and legs black. Differs from very similar male *M. bonariensis* in lacking strong purplish-blue and green gloss, and in having thicker bill. Female is very like male, but slightly smaller and duller, with smaller rufescent patch on underwing. Juvenile out of nest is very similar to host chick (*Agelaioides badius*), slowly acquires black adult plumage in patches, usually starting moult at c. 30 days; in last stage, black with chestnut flight-feathers. Voice. Rather noisy, commonly vocalizing throughout year. Song, by perched male, a brief, piercing and explosive "klúish!" (often preceded by low "grrr", audible only at close range); female may answer with loud rasping rattle, in a kind of duet. Male also produces rasping calls. Fledgling mimics calls of host's chick.
Habitat. Original habitat probably grassland near woodland edge, and open woodlands of many types, particularly *chaco* woodland with mesquite (*Prosopis*) and acacias (*Acacia*), also savannas, including palm savannas with *Butia yatay* and *Copernicia alba*. Nowadays common in pastures, agricultural land, farms, parks, towns and suburbs. Avoids dense unbroken woodland. Roosts in dense vegetation, rarely in marshes. Lowlands to 1800 m.



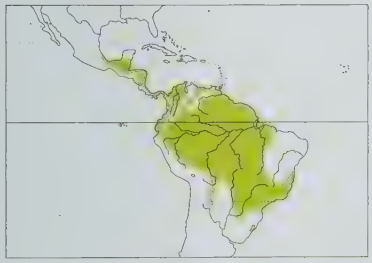
Food and Feeding. Insects and other arthropods, and seeds. Insects in stomach contents include beetles (of families Chrysomelidae and Scarabaeidae) and ants (Formicidae). Rarely, takes flower nectar from introduced trees, such as *Grevillea robusta*. Forages mostly on ground, commonly around grazing domestic mammals. May flock with *Agelaioides badius* and *Gnorimopsar chopi*, even when not breeding, or with *M. bonariensis* and *M. oryzivorus*. Roosts with hosts or with other icterids.
Breeding. Season Oct–Mar in C Argentina. Apparently monogamous; male accompanies female constantly, pair-bond lasts a minimum of one or two seasons. Male displays by puffing body feathers and bowing while singing. A brood parasite with three main hosts, all icterids with co-operative breeding habits, i.e. *Agelaioides badius*, *Gnorimopsar chopi* and, to lesser extent, *Pseudoleistes virescens*; recently found to parasitize also non-co-operative *Procacicus solitarius* and Cattle Tyrant (*Machetornis rixosa*) in NE Argentina, these cases believed possibly a result of recognition errors by female of present species. Pair visits host nests at least twice per hour, sometimes displaying around them; often punctures or pecks host eggs. May lay more than 1 egg per host nest, and sometimes a single nest parasitized by many females; up to 19 parasitic eggs recorded in one nest, but such large numbers abandoned by host; eggs harder-shelled and more rounded than host eggs, and bluish, greyish or pinkish, variously marked with spots, scrawls and blotches in shades of brown, mean dimensions 23·1 × 17·9 mm; incubation of single egg 12 days; nestling resembles that of *Agelaioides badius*, differing in small details (bill colour, feathering of head, etc.); nestling period usually 12–13 days. Successful chicks of present species, particularly males, are larger and heavier than those of *Agelaioides badius*, larger even than adults of latter; once fledged, may remain with host parents or helpers for up to 6 weeks; after independence may form temporary groups of their own, which eventually join adult population of own species. In one study, *Agelaioides badius* fledged on average one chick of present species for every three of its own chicks. Female may pair when still in immature (heavily worn) plumage.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Locally uncommon to common. Has more than doubled the extent of its range in the last 50 years, probably assisted by conversion of natural vegetation (*campos*, *cerrados* and Atlantic Forest) into agricultural fields. In Brazil, has spread N as far as Tocantins–Maranhão–Bahia border, following its principal host in Brazil, *Gnorimopsar chopi*; reported in Bolivia from Beni, Santa Cruz and Tarija, but range there not well known. Its known main hosts, so far, are rather abundant icterid species that are not seriously declining. Range expansion appears to be continuing.
Bibliography. D'Angelo Neto (2000), De Mársico & Reboreda (2008), Di Giacomo, A.G. *et al.* (2010), Fraga (1979, 1983b, 1996, 1998, 2006, 2008c), Friedmann (1929), Herrera & Vidoz (2009), Hoy & Ottow (1964), Hudson (1920), Jaramillo & Burke (1999), Kirwan (2009), Lichtenstein (2001), Llambías *et al.* (2006), Mason (1980, 1987), Mermoz & Fernández (2003), Mermoz & Reboreda (1996), Pacheco & Olmos (2006), Sick (1993), Zotta (1936).

72. Giant Cowbird

Molothrus oryzivorus

French: Vacher géant **German**: Riesenkuhstärling **Spanish**: Tordo Gigante
Other common names: Rice Grackle

Taxonomy. *O.*[*riolus*] *oryzivorus* J. F. Gmelin, 1788, Cayenne, French Guiana.
Formerly placed in genus *Psomocolax* or *Scaphidura*, but such treatment not supported by molecular-genetic findings. Analyses of mitochondrial DNA indicate closest relationship with *M. rufoaxillaris* and *M. aeneus*. Geographical variation weak; further study desirable. Race *impacifus* commonly emended to "*impacificus*" but, in absence of any internal evidence in original description (where same original spelling appears three times), there is no justification for such a change under the International Code of Zoological Nomenclature. Two subspecies tentatively recognized.
Subspecies and Distribution.
M. o. impacifus (J. L. Peters, 1929) – E Mexico (Veracruz) S to W Panama.
M. o. oryzivorus (J. F. Gmelin, 1788) – C Panama E to Colombia, S on Pacific coast to NW Peru (Tumbes), and from Venezuela, Trinidad and Tobago and the Guianas S to E Peru, Bolivia, N & NE Argentina (Jujuy, Salta and N Corrientes) and most of Brazil (S to Santa Catarina; absent in NE).



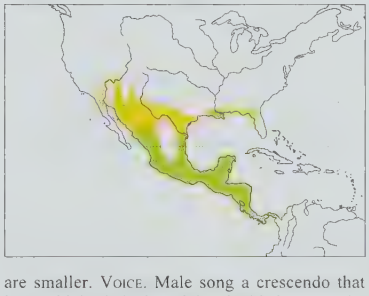
Descriptive notes. Male 34 cm, 174–242 g; female 29 cm, 144–167 g. A large, long-winged and long-tailed black interid, erectile feathers around neck forming ruff; in its undulating flight resembles a corvid, e.g. Purplish Jay (*Cyanocorax cyanomelas*), more than it does an icterid. Male nominate race is entirely black, with bronze to bluish iridescence; ultraviolet reflectance present in patches; inconspicuous black frontal casque covered by feathers; conspicuous neck ruff (making head appear small); iris variable, yellow to orange-yellow; bill and legs black. Female is smaller and duller than male, with smaller ruff. Fledged chick has blackish plumage, and pale yellow bill that eventually becomes black. Race *impacifus* differs from nominate only in having violaceous (not bluish to bronze) iridescence. Voice. Rather silent. Song usually a high-pitched, shrill whistle followed by a warble "psee-pseerere-pic-pic". Female produces harsh rattle. A "chuk" call given by both sexes. Audible wingbeats in flight.
Habitat. In breeding season often near colonies of *Psarocolius* and *Cacicus* at forest edge, in large clearings and savannas, and around pastures and lawns, even in small towns. During rest of year frequents open habitats along main rivers and channels, particularly exposed stony beaches and riverbeds; found also around livestock pastures. Lowlands up to c. 1500 m (nominate race); *impacifus* to 1700 m in Costa Rica.
Food and Feeding. Insects and other invertebrates, and seeds; sometimes takes nectar from brush-shaped inflorescences of *Combretum* vines. In NE Argentina (near Iguazú), early in morning, seen to peck, dismember and eat large insects attracted by artificial lights (building or street lights), including scarab beetles (Scarabaeidae) and giant water bugs (Belostomatidae) up to 7 cm long. Forages mostly on ground, often around domestic livestock (cattle, horses), also around some wild grazing mammals such as capybaras (*Hydrochoerus hydrochaeris*) and tapirs (*Tapirus*); catches tabanid flies around grazing mammals. In French Guiana one seen to pick insects from skin of brown-throated sloth (*Bradypus variegatus*). Often turns stones and cow dung, debris and garbage in search of concealed prey. Usually in small flocks, rarely of more than 20 individuals; may associate with other gregarious, ground-feeding icterids, including congeners and *Quiscalus*. Roosts in larger groups, reaching 2000 individuals on river islands of Amazonian Peru, often with other icterids.
Breeding. Season Apr–Nov in Panama, Dec–Apr in Suriname and Sept–Dec in NE Argentina. Brood parasite mostly on colonial species of cacique (*Cacicus haemorrhous* and *Cacicus cela*) and oropendolas (reported so far for *Psarocolius decumanus*, *Psarocolius wagleri*, *Psarocolius angustifrons*, *Psarocolius viridis* and *Psarocolius montezuma*; observed also to visit nesting colonies of *Psarocolius yuracares*); Green Jay (*Cyanocorax yncas*) confirmed as a host in a Venezuelan valley without oropendolas or caciques, also one chick in Colombia was fed by Green Jays and two chicks in Ecuador fed by Turquoise Jays (*Cyanolyca turcosa*), the last two possibly rare cases of fledgling adoption; also, fledglings fed by *Icterus pectoralis* and *Icterus pustulatus* in Nicaragua. Usually deposits 1 or 2 eggs per host nest, but some nests contain up to 6 parasite eggs (possibly laid by more than one female); eggshell particularly thick and rough, colour variable, plain white, pale blue with some brown or blackish spots and lines, or pale buffish-white with brownish spots and lines (this variation found in Panama, Venezuela, Trinidad, Suriname and Argentina, and probably elsewhere, and different egg types found in single host colony), mean dimensions 34·2 × 25·1 mm; some eggs resemble those of particular hosts, but so far no conclusive evidence for regular mimicry of host eggs; some hosts (*Psarocolius montezuma*) regularly remove cowbird eggs, also present species possibly removes or pecks host eggs; incubation period 12–13 days; nestling has pale bill and ivory-coloured casque, resembling some *Psarocolius* oropendolas (possibly a case of mimicry); nestling period relatively long, 16–20 days; post-fledging period of dependence on host mostly unknown. Host nests sometimes severely infested by ectoparasitic flies of genus *Philornis*, often leading to death of host chicks; in Panama, chicks of present species reported to remove the fly larvae from both host chicks and themselves, but elsewhere in range this seems not to occur.
Movements. Apparently resident. Probably some short-distance movements between breeding and non-breeding habitats. Nominate race recorded as an accidental visitor in Barbados (West Indies).
Status and Conservation. Not globally threatened. Uncommon to fairly common or locally common; widespread. Rare or absent from several states of NE Brazil; scarce and local in *llanos* of R Orinoco in Venezuela and in Trinidad and Tobago. Well adapted to human-modified and artificial environments, provided that sufficient supply of host nests exists; has possibly increased. Found in many protected areas throughout its large range, such as Manu National Park (Peru), Amboró National Park (Bolivia), Pantanal Mato-grossense National Park (Brazil) and Iguazú National Park (Argentina), among others.
Bibliography. Belcher & Smooker (1937), Chebez & Heinonen Fortabat (1987), Crandall (1914), Fleischer & Smith (1992), Fraga (2007, 2011), Fraga & Clark (1999), Friedmann (1929, 1963), Goeldi (1894), Haverschmidt (1966b, 1967), Ingels *et al.* (2003), Jaramillo & Burke (1999), Lanyon (1992), McCrary & Gates (2007), de la Peña (1987), Ramoni-Perazzi *et al.* (2010), Robinson, S.K. (1988a, 1997), Schäfer (1957), da Silva & Colombo Rubio (2007), Skutch (1954), Smith (1968, 1980), Webster (1994b), Welford *et al.* (2007), Wetmore *et al.* (1984).

73. Bronzed Cowbird

Molothrus aeneus

French: Vacher bronzé **German**: Rotaugen-Kuhstärling **Spanish**: Tordo Ojirrojo
Other common names: Red-eyed Cowbird

Taxonomy. *P.*[*sarocolius*] *aeneus* Wagler, 1829, Veracruz, Mexico.
Formerly placed in genus *Tangavius*, but such treatment not supported by molecular-genetic findings. Analyses of mitochondrial DNA indicate closest relationship with *M. rufoaxillaris* and *M. oryzivorus*. Often considered conspecific with *M. armenti*, but shows more marked sexual dichromatism and also differs vocally. Three subspecies recognized.
Subspecies and Distribution.
M. a. loyei Parkes & Blake, 1965 – breeds from SW USA (S California, Arizona, New Mexico and W Texas) S in W Mexico to Nayarit and N Baja California.
M. a. aeneus (Wagler, 1829) – breeds in S USA (S Texas, Louisiana and Florida) and from E & C Mexico S, including nearby islands (e.g. Cozumel I), to C Panama.
M. a. assimilis (Nelson, 1900) – SW Mexico from Jalisco S to Chiapas.



Descriptive notes. Male 20 cm, average 68·9 g; female 18 cm, average 56·9 g. Male nominate race is mostly black with bronze gloss, including erectile neck ruff, but iridescence on wing and tail mostly blue to blue-green, rump with violaceous iridescence; iris bright red; bill and legs black. Female is blackish overall, with minimum of iridescence, and lacks neck ruff. Juvenile resembles female, but paler and browner, with dark eyes and horn-coloured bill. Races differ mainly in female plumage and in size: *loyei* is larger than others, female paler, mostly greyish-brown, with vaguely streaked underparts; *assimilis* is very like previous, but both sexes are smaller. Voice. Male song a crescendo that includes short introductory notes followed by longer high-pitched modulated whistles, or a single descending whistle followed by rasping warble. Both sexes utter harsh "chuck" call; female has rattle.
Habitat. Open country in areas with xeric to humid vegetation, usually avoiding dense forest or woodland. Usually in grasslands, pastures, plantations, farms, roadsides, and even urban and suburban habitats. Lowlands to 3000 m.
Food and Feeding. Mostly seeds and arthropods. Stomach contents of fully adult males more than 90% seeds (including of cultivated *Sorghum vulgare*), the rest being insects, spiders (Araneae) and snails (Gastropoda). Reported as feeding on rice. In Texas forages in winter near grain-elevators, feeding on spilt seed. Forages mostly on ground; locates hidden prey by turning small stones. Often follows grazing livestock, and picks ticks (Ixodoidea) from their skin. Usually in flocks, sometimes of up to 600 individuals; may associate with *M. bonariensis*, *M. oryzivorus* and *Quiscalus mexicanus*.
Breeding. Season Apr–Jul. Apparently polygynous or promiscuous. Male displays expanded ruff while singing from perch; sings also during "Helicopter Display", hovering for up to 15 seconds 0·5–1 m above perched female, during which he fluffs his body feathers, resembling a ball. A generalist brood parasite, with c. 100 reported hosts, mostly passerines; frequent hosts include tyrant-fly-

On following pages: 74. Bronze-brown Cowbird (*Molothrus armenti*); 75. Brown-headed Cowbird (*Molothrus ater*); 76. Shiny Cowbird (*Molothrus bonariensis*).

catchers (Tyrannidae), wrens (Troglodytidae), mockingbirds (Mimidae), vireos (Vireonidae), tanagers (Thraupidae), New World sparrows and buntings (Emberizidae), and other icterids (about ten species of *Icterus* are known hosts of present species); in parts of Arizona where sympatric with *M. ater*, little overlap between the two in host selection. Sometimes small groups visit a host nest, eggs laid mostly at dawn; often punctures or removes host eggs. Most host nests contain 1 cowbird egg, but multiple parasitism occurs; eggs bluish-white to bluish-green, unmarked, mean dimensions 23·6 × 18·3 mm (nominate race), 24·5 × 17·1 mm (*loyei*); incubation period for single eggs 10–12 days; hatchling has orange-pink skin, dusky-yellow bill and legs, white to cream rictal flanges and red mouth, nestling period 10–12 days; post-fledging period of dependence on host up to 14 days.
Movements. Populations in most of USA range (California, Arizona, New Mexico, Texas and Louisiana) and in CN Mexico (particularly Coahuila) short-distance migrants; no information available on distances travelled. Elsewhere in Mexico and in Central America apparently resident; altitudinal movements in highlands.
Status and Conservation. Not globally threatened. Common to fairly common in most of range, less common in interior Mexico; less numerous than *M. ater*. Somewhat more local in non-breeding season. Nominate race has extended its range in N following agricultural expansion, and populations in Louisiana and Florida are result of a recent expansion; in contrast, *loyei* has declined locally because of habitat loss. This cowbird is not subject to control measures in USA.
Bibliography. Carter (1986), Chace (2005), Clotfelter (1995), Clotfelter & Brush (1995), Dickerman (1960), Eisenmann (1957), Ellison *et al.* (2006), Friedmann (1929, 1963), Friedmann & Kiff (1985), Friedmann *et al.* (1977), González-García (2007), Howell & Webb (1995), Jaramillo & Burke (1999), Kostecke *et al.* (2004), Lowther (1995), Parkes & Blake (1965), Peer & Sealy (1999a, 1999b), Robbins & Easterla (1981), Rowley (1984), Sealy *et al.* (1997), Stiles & Skutch (1989), Thurber & Villeda (1980), Warren (2002, 2003), Wetmore *et al.* (1984).

74. Bronze-brown Cowbird

Molothrus armenti

French: Vacher brun **German**: Zwergkuhstärling **Spanish**: Tordo Chico
Other common names: Colombian/Arment's Cowbird

Taxonomy. *M.[olothrus] armenti* Cabanis, 1851, Cartagena, Colombia.
Often considered conspecific with *M. aeneus*, but shows reduced sexual dichromatism and also differs vocally. Monotypic.
Distribution. Caribbean coast of N Colombia (N Bolívar, Atlántico and Magdalena).



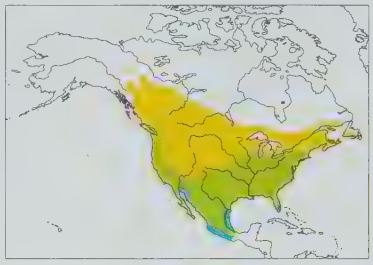
Descriptive notes. Male 18·6 cm, average 40·8 g; female 16 cm, average 30·7 g. A small cowbird with neck ruff. Male has head, back and underparts dark sepia with strong coppery iridescence, wing and tail blackish with blue to purple gloss; iris brick-red to red; bill and legs black. Differs from *M. aeneus* mainly in smaller size and in dark brown (rather than black) plumage coloration. Female is similar to male, but less glossy and duskier in colour, with smaller ruff. Juvenile is duller than female, uniformly brown to dusky brown, unglossed, head with slightly paler supercilium and dark eyestripe, no visible streaks or stripes below, iris coffee-brown, bill and legs dark horn-coloured. Voice. Male song during display an ascending, high-pitched "eez-eez-dzleeee", with rasping or glassy tone, reaching 9500 Hz. Also produces a high-pitched metallic whistle.
Habitat. Occupies dry woodland with *Prosopis juliflora*, *Acacia farnesiana* and arborescent cacti, also second-growth scrub, agropastoral land, roadsides; also mangroves. Arid tropical lowlands up to 50 m.
Food and Feeding. Little information. Diet probably mostly arthropods and seeds; frequents farms and barnyards, and feeds on chicken food. Forages mostly on ground, in small flocks of up to c. 30 individuals; may associate with *M. bonariensis* and *Quiscalus mexicanus*.
Breeding. Season May–Jul; fledged chicks seen in Jul. In "Song Spread" display, male lowers head, raises body feathers and spreads wings and tail while singing. Brood parasite; hosts remain unknown, presumably small passerines. No other information.
Movements. Apparently resident.
Status and Conservation. Not assessed. Classified as "endangered" in Colombia. Little known. Extremely local, and total population must be small. An old report from Leticia (Amazonian Colombia) is erroneous. Reasons for this species' restricted range not clear, as its dry woodland habitat extends well into Venezuela. Found in at least one protected area, Isla de Salamanca National Park.
Bibliography. Borja *et al.* (2001), Dugand & Eisenmann (1983), Friedmann (1933, 1957), Hilty & Brown (1986), Jaramillo & Burke (1999), López-Lanús (2005b), Núñez-Santamaría & Rodríguez-Berrocal (2002), Rada Quintero (2002).

75. Brown-headed Cowbird

Molothrus ater

French: Vacher à tête brune **German**: Braunkopf-Kuhstärling **Spanish**: Tordo Cabecipardo
Other common names: Common Cowbird

Taxonomy. *Oriolus ater* Boddaert, 1783, Carolina, USA.
Closely related to *M. bonariensis*, and much resembling it in habits, general behaviour and voice. Race *obscurus* intergrades with *artemisiae* in Sierra Nevada (California). Proposed race *californicus*, described from L Buena Vista (Kern County), in SC California, is subsumed in *obscurus*. Three subspecies recognized.
Subspecies and Distribution.
M. a. obscurus (J. F. Gmelin, 1789) – breeds along Pacific seaboard from S Alaska S (E to the Cascades and Sierra Nevada) to NW & N Mexico (N Baja California, also on mainland S to Oaxaca); N populations migrate to S parts of breeding range, in Mexico extending to S Baja California.
M. a. artemisiae Grinnell, 1909 – breeds from W Canada (interior British Columbia E to SC Manitoba) S in W USA (E from the Cascades and Sierra Nevada) to California, Nevada and New Mexico; migrates S to Mexico (S to Michoacán).
M. a. ater (Boddaert, 1783) – breeds from SE Canada (S Ontario E to Newfoundland) S throughout E USA to C Texas, Gulf Coast and C Florida, and in E Mexico S to Tamaulipas; winters in Florida and in Mexico S to Oaxaca.
Also breeds in Yukon (NW Canada); race undetermined, possibly *artemisiae*.



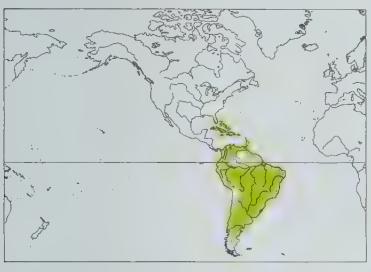
Descriptive notes. Male 18–20 cm, female 16–18 cm; male 43·1–57·3 g and female 32·3–42·3 g (nominate), male average 47·5 g and female average 37·6 g (*artemisiae*), male average 40·2 g and female average 32 g (*obscurus*). Male nominate race has dark brown hood down to upper mantle and central chest, followed by a band of blackish feathers with purple iridescence, rest of plumage black with greenish iridescence; iris deep brown; bill and legs blackish. Female is brownish overall, darker on upperparts, and with indistinctly paler superciliary line; a shade lighter below, palest on throat; bare parts as for male. Juvenile is brownish like female, but feathers of upperparts edged buff, throat greyish-white to buff-white, and underparts streaked dusky brown. Races differ mostly in size and in female plumage: *artemisiae* is larger and longer-billed than nominate, female paler, some juveniles much paler and with prominent pale edgings above (looking scaly) and bold streaking below; *obscurus* is smallest, female slightly paler than previous (despite scientific name), some juveniles very pale and scaly like those of previous. Voice. Male song, from perch, consists of two low-pitched warbles (or a series of clicks) followed by thin descending whistle, often transcribed as "glug-glug-gliii"; in W (race *obscurus*), whistle preceded by somewhat longer series of low notes. Males also produces high-pitched flight call of 2–5 whistles, varying geographically, in W (*artemisiae*) consists of several whistles. Female call a dry chattery warble or rattle.
Habitat. Found in almost all open habitats, such as grasslands, pastures, woodland edge, agricultural fields, orchards, suburban areas and in towns. Lowlands to mountains; race *artemisiae* up to c. 3000 m.
Food and Feeding. Feeds on insects and other arthropods; also on seeds of both wild and cultivated plants. Forages on ground, often around grazing mammals, originally mostly American bison (*Bos bison*) herds and wapiti (*Cervus canadensis*) when available, nowadays exploiting domestic livestock for same purposes. Foraging sites often distant (up to 15 km) from breeding sites. Forages in small to large flocks; in non-breeding season commonly mixes with other icterids, and roosts in huge numbers (hundreds of thousands) with them and Common Starlings (*Sturnus vulgaris*).
Breeding. Season mid-Apr to mid-Jul, with some local variations. Mating system variable, from monogamy to promiscuity. A generalized brood parasite, c. 220 host species reported, of which 144 known to rear cowbird chicks; hosts mostly passerines in size range 10–150 g, frequently tyrant-flycatchers (Tyrannidae), vireos (Vireonidae), New World warblers (Parulidae), American sparrows (Emberizidae), and other icterids; certain hosts, particularly large species with long bill, recognize and remove parasite eggs; in study during 2002–2007 breeding seasons, at Konza Prairie Biological Station, in NE Kansas (C USA), 54·4% of 2621 nests of 22 passerine species that typically accept parasite eggs were parasitized by present species, and parasitized nests contained average of 1·9 parasite eggs, nestlings or both (55·7% of such nests received two or more eggs), with Bell's Vireo (*Vireo bellii*) and Dickcissel (*Spiza americana*) parasitized at much greater rate (respectively, 70·5% and 69·6%) than *Agelaius phoeniceus* (21·9%), these three species combined accounting for 85·8% of potential host nests found in all years. Female reported as producing up to 40 eggs per season (up to 77 in captivity); female regularly damages (punctures) or removes host eggs from nest; eggs usually do not resemble those of host, and have thicker shell, white to greyish-white with brown and grey spots, mean dimensions 21·45 × 16·42 mm (nominate race), 21·8 × 16·8 mm (*artemisiae*) and 19·3 × 14·99 mm (*obscurus*); incubation period for single egg 10–11 days, shorter than that of most host eggs; chick of present species does not particularly resemble those of most hosts in appearance or voice, but commonly solicits more food, leaves nest at 8–13 days.
Movements. Short-distance to medium-distance migrant. W race *obscurus* migrates S into Baja California; *artemisia* and nominate migrate mostly to S USA and Mexico (S to Michoacán and Oaxaca). Diurnal migrant. N populations leave breeding grounds in Sept–Oct; individuals ringed in NE USA travelled up to 850 km S. Returns late Mar to mid-May; males arrive back on breeding grounds a few days before females. Altitudinal movements occur in Rocky Mts and in SW USA (Sierra Nevada). Nominate race has occurred as a vagrant on many Caribbean islands, in Belize, and exceptionally in W Europe (Scotland, England, Wales, Norway).
Status and Conservation. Not globally threatened. Common to locally abundant in most of range. At end of 20th century, estimated global population was 20,000,000–40,000,000 individuals. Before European settlement was found mostly in Great Plains of C North America, and still particularly abundant there. Populations of this species usually increase and expand with human-made disturbances and forest clearance. Increases can adversely affect survival of some host species. Host nests may produce fewer (or even none) of their own chicks when parasitized, and present species can therefore threaten survival of rare and sensitive hosts. For example, Kirtland's Warbler (*Dendroica kirtlandii*), a Near-threatened species breeding just S of Great Lakes in Michigan, was considered globally threatened until, in 1970s, trapping of present species in the region reduced parasitism of the warbler's nests from 70% to only 3%; similarly, population control practised in critical areas has aided conservation efforts, e.g. control of present species within Texas range of Vulnerable Black-capped Vireo (*Vireo atricapilla*) helped the vireo to survive.
Bibliography. Airola (1986), Alderson *et al.* (1999), Ankney & Scott (1980, 1982), Bent (1958), Blankespoor *et al.* (1982), Briskie & Sealy (1990), Briskie *et al.* (1992), Broughton *et al.* (1987), Burnell & Rothstein (1994), Clotfelter & Yasukawa (1999a, 1999b), Darley (1978, 1982, 1983), Dearborn (1999), Dearborn *et al.* (1998), Dufty (1982, 1983), Dufty & Hanson (1999), Dufty & McChrystal (1992), Dufty *et al.* (1987), Elliot (1978, 1980), Ellison, Sealy & Gibbs (2006), Ellison, Sealy & McGaha (2007), Fleischer (1985), Fleischer & Rothstein (1988), Fleischer *et al.* (1987), Freeberg (1998), Friedmann (1929, 1963), Friedmann & Kiff (1985), Friedmann *et al.* (1977), Gibbs *et al.* (1997), Gill *et al.* (1997), Goguen & Mathews (1999), Goguen *et al.* (2005), Graham & Middleton (1989), Hahn & Fleischer (1995), Howell & Webb (1995), Jackson & Roby (1992), Jaramillo & Burke (1999), King & West (1983), King *et al.* (1986), Klein & Rosenberg (1986), Lorenzana & Sealy (1996), Lowther (1977, 1993), Mayfield (1965), McMaster & Sealy (1997), Morrison *et al.* (1999), O'Loghlen (1995), O'Loghlen & Rothstein (2002), Ortega, C.P. *et al.* (2005), Ortega, J.C. & Ortega (2009), Payne (1973), Peer & Sealy (1999b), Rivers *et al.* (2010), Robinson *et al.* (1999), Rogers (1994), Rothstein (1975, 1978a, 1994, 2004), Rothstein *et al.* (1986, 1988), Scott (1991), Scott & Ankney (1983), Sealy *et al.* (1995), Selander & Kuich (1963), Smith (1999), Smith & Arcese (1994), Smith *et al.* (2000), Spaw & Rohwer (1987), Teather & Robertson (1986), West & King (1988), West *et al.* (1981), Woodward (1983), Wright (1999), Yokel (1986, 1989), Yokel & Rothstein (1991).

76. Shiny Cowbird

Molothrus bonariensis

French: Vacher luisant **German**: Seidenkuhstärling **Spanish**: Tordo Renegrido
Other common names: Glossy Cowbird

Taxonomy. *Tanagra bonariensis* J. F. Gmelin, 1789, Buenos Aires, Argentina.
Closely related to *M. ater*, and much resembling it in habits, general behaviour and voice. Proposed race *melanogyna* (Paraná, Brazil), with females blackish (almost as black as males), now considered a dark colour morph of nominate, as also is proposed race *milleri* (Mato Grosso, Brazil). Origin of isolated Chilean population of nominate race uncertain; analysis of mitochondrial DNA desirable. Seven subspecies recognized.
Subspecies and Distribution.
M. b. minimus de Dalmas, 1900 – SE USA (Florida), West Indies, Trinidad and Tobago, the Guianas and extreme N Brazil (R Branco).
M. b. cabanisii Cassin, 1866 – E Costa Rica, Panama and W Colombia.
M. b. venezuelensis Stone, 1891 – N Venezuela and E Colombia.
M. b. aequatorialis Chapman, 1915 – SW Colombia and W Ecuador.
M. b. occidentalis Berlepsch & Stolzmann, 1892 – extreme SW Ecuador (Loja) and W Peru.
M. b. riparius Griscom & Greenway, 1937 – E Ecuador, E Peru, and Amazon Valley in Brazil (E to Obidos).
M. b. bonariensis (J. F. Gmelin, 1789) – C & E Brazil (S of R Amazon) S to E Bolivia, Paraguay, Uruguay and Argentina (S to C Santa Cruz); also Chile (Coquimbo Region S to Aysén).



Descriptive notes. 17–21·5 cm; male average 55·7 g and female 44·9 g (nominate, E Argentina), male average 63·7 g and female 55·6 g (*cabanisii*, Colombia), male average 38·7 g and female 31·9 g (*minimus*, Puerto Rico). Male nominate race is glossy blue-black to violet-black, with wing and tail glossed bluish and greenish; ultraviolet reflectance considerable; iris brown; bill and legs blackish-grey. Differs from similar *M. rufoaxillaris* in having stronger gloss, shorter wing, longer and less deep-based bill, also diagnostic voice. Female is dusky brownish-grey above, sometimes with slight bluish gloss, and with indistinct pale supercilium, paler below, palest on throat, with faint streaking on breast, bare parts as for male; some individuals almost as black as male, but less glossy ("*melanogyna*"). Juvenile resembles female. Races differ mainly in size and in plumage gloss: *minimus* is smallest, male with more developed purple gloss than nominate, female plumage similar to nominate; *venezuelensis* resembles previous, but is noticeably larger; *cabanisii* is largest race, plumage similar to last, but male more purple, female a little paler; *aequatorialis* male has violaceous iridescence, females dark brown above and below and lacks pale supercilium; *occidentalis* is slightly smaller than previous, male with strong purplish gloss, female much paler than other races, with more developed supercilium, streaked underparts, contrastingly pale belly; *riparius* male is like nominate, but smaller, female darker above and paler below (more contrasty) than nominate. Voice. Male has "gurgling" song with 2–6 low-pitched gurgles followed by thin whistles or warbles; another song (often used in flight) is a fast, high-pitched warbling and twittering, introduced by thin descending whistle (probably homologous with flight whistles of *M. aeneus* and *M. ater*). Female song a rattle. Common call "chuck", by both sexes. Chicks beg with high-pitched, hissing whistles.
Habitat. Found in almost all open habitats, avoiding unbroken forest and dense woodland. Habitats include savannas, pastures, wetlands, farms, agricultural land, parks and gardens, including in towns and large cities. Well adapted to man-made environments, and commonly seen at roadsides. Lowlands to 3500 m.
Food and Feeding. Diet mostly insects and seeds. Feeds on both wild and cultivated seeds. Reported as taking nectar from flowers of the vine *Combretum lanceolatum*, also from cultivated plants such as eucalypts (*Eucalyptus*), *Grevillea* and *Phormium*. Forages for insects around grazing mammals, originally using native deer, capybaras (*Hydrochoerus hydrochaeris*) and other species; nowadays exploits domestic livestock for same purposes. In SE Brazil (E São Paulo), this was one of ten species attracted to activities of a mechanical lawnmower; it foraged for seeds in drying grass. Forages in small to large groups; often collects in large roosts, especially outside breeding season.
Breeding. Season Mar–Oct in Puerto Rico, May–Sept in Venezuela and Sept–Feb in N half of Argentina. Mating system apparently variable, partners sometimes temporarily monogamous, sometimes exhibit considerable amount of promiscuity. Male puffs body feathers and bows while singing. A generalist brood parasite with 240 recorded host species, most of them passerines; passerine families more frequently parasitized include tyrant-flycatchers (Tyrannidae), mockingbirds (Mimidae), thrushes (Turdidae), New World warblers (Parulidae) and New World sparrows (Emberizidae), as well as other icterids; in some host populations more than 70% of nests parasitized; several host species, particularly those having large body size or long bill, selectively remove present species' eggs from nest, and others may desert parasitized nests or bury parasite eggs beneath new lining material; host nests receive 1–20 or more eggs, often from several females, and female regularly damages (punctures) or removes host eggs (and also other parasite eggs), having major effect on host's reproduction rate. Some eggs may resemble host eggs, but no regular mimicry; eggs usually more rounded and harder-shelled than host eggs, highly variable within and among populations, from plain white (particularly in E Argentina) to pale grey or pale blue with heavy spotting and blotching in dark brown, bluish-grey and violaceous, also unspotted bluish eggs reported for race *occidentalis*, mean dimensions 22·6 × 18·1 mm in nominate form (C Argentina), 24·3 × 19·5 mm (*cabanisii*) and 20·6 × 16·5 mm (*minimus*); incubation period for single egg 11–12 days; nestling period usually 12–14 days. Although present species' nestlings and fledglings do not mimic host chicks in plumage or voice, there is little evidence of discrimination by foster-parents; survival of cowbird chicks as opposed to host chicks is strongly linked to relative sizes.
Movements. Chiefly resident. In Argentina a partial short-distance migrant, with extensive overlap of breeding and non-breeding ranges; one ringed individual recaptured c. 500 km from ringing site. Scarce during winter in extreme S of range (Argentinian Lake District). Altitudinal movements probable in S Andes of Argentina and Chile. Many records in USA N of breeding area, most along E coast N to New Brunswick (Canada); presumed due to prospecting individuals.
Status and Conservation. Not globally threatened. Common to very common throughout most of range; uncommon and local in Amazonian lowlands. Rather an aggressively spreading species, thriving in modified environments. Throughout 20th century, extended its range N from N South America, ultimately colonizing all Caribbean islands N to Bahamas and Cuba, and reaching S USA (Florida) in mid-1980s; probably expanding into other S states. Origin of isolated Chilean population of nominate race uncertain, and has been suggested that it derived from escaped Argentinian cagebirds; analysis of mitochondrial DNA may shed some light on this. Present species' parasitic habits may be causing population declines in rare host species, such as *Agelaius xanthomus* in Puerto Rico; it is now trapped on that island in an effort to control its numbers.
Bibliography. Arendt & Vargas Mora (1984), Astié & Reboreda (2006), Blanco (1995), Cavalcanti & Pimentel (1988), Christie *et al.* (2004), Cruz, López-Ortiz *et al.* (2005), Cruz, Manolis & Andrews (1990, 1995), Cruz, Manolis & Wiley (1985), Cruz, Wiley *et al.* (1989), Fiorini & Reboreda (2006), Fiorini *et al.* (2005), Fraga (1978, 1982, 1983a, 1985, 2002), Friedmann (1929, 1963), Friedmann & Kiff (1985), Friedmann *et al.* (1977), Hoy & Ottow (1964), Jaramillo & Burke (1999), Kattan (1995, 1996, 1997), King (1973a), Lichtenstein (1998), Lowther & Post (1999), Lucero (1982), Manolis (1982), Marín (2000), Mason (1986a, 1986b, 1987), Mason & Rothstein (1986, 1987), Massoni & Reboreda (1999), Mermoz & Fernández (1999), Mermoz & Reboreda (1994, 1998, 2003), Miller (1963), Pérez-Rivera (1986), Porto & Piratelli (2005), Post & Wiley (1977), Post, Cruz & McNair (1993), Post, Nakamura & Cruz (1990), Ramo & Busto (1981), Reboreda *et al.* (2003), Salvador (1983, 1984), Sandoval *et al.* (2010), Selander (1964), Sick (1958), da Silva & Colombo Rubio (2007), Wiley (1985, 1986).



PLATE 79

inches 4

cm 10

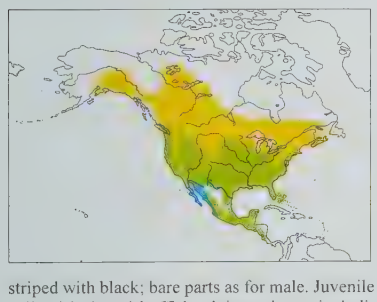
Genus *AGELAIUS* Vieillot, 1816

77. Red-winged Blackbird

Agelaius phoeniceus

French: Carouge à épaulettes **German**: Rotflügelstärling **Spanish**: Sargento Alirrojo
Other common names: Bicolored Blackbird ("*gubernator* group")

Taxonomy. *O.*[*riolus*] *phoeniceus* Linnaeus, 1766, Charleston, South Carolina, USA.
Formerly treated as conspecific with *A. assimilis*, but the two differ markedly in sexual dimorphism, in mating and nesting behaviour and in size; molecular data support treatment as separate species. Subspecific taxonomy complex. Distinctive race *gubernator* has been suggested as being a separate species (sometimes including *californicus* and *mailliardorum* as races); was possibly isolated in the past, but now intergrades with *nelsoni*. Over most of E USA and Canada geographical variation runs along smooth clines, and delimitation of races is rather arbitrary; several independent studies indicate minimal differences in mitochondrial DNA between most races in E North America. Some authors suggest that *arctolegus* and *fortis* are better synonymized with nominate. Additional proposed races are, in USA, *stereus* (described from Barr, Colorado), *zastereus* (from Boise, Idaho) and *heterurus* (from Fort Wingate, New Mexico), all tentatively included in *fortis*; and *matudae* (from Palizada, in Campeche, in Mexico) and *brevirostris* (from W Honduras), all treated as synonyms of *richmondi*. Twenty-two subspecies currently recognized.
Subspecies and Distribution.
A. p. arctolegus Oberholser, 1907 – breeds from SE Alaska and W Canada (SE Yukon, C Mackenzie, NW Saskatchewan and NC Manitoba S to C British Columbia, S Alberta and W & NE Ontario) S in USA to E Montana, S South Dakota and Iowa; migrates to S USA.
A. p. caurinus Ridgway, 1901 – SW Canada (British Columbia) S along US coast to N California.
A. p. nevadensis Grinnell, 1914 – breeds from SC & SE British Columbia S in W USA (from C Washington, N Idaho and WC Oregon) to SC California and S Nevada.
A. p. mailliardorum van Rossem, 1926 – C coastal California, in SW USA.
A. p. californicus Nelson, 1897 – C California (Central Valley).
A. p. aciculatus Mailliard, 1915 – Kern County, in S California.
A. p. neutralis Ridgway, 1901 – S coastal California and extreme NW Mexico (N Baja California).
A. p. sonoriensis Ridgway, 1887 – SW USA (extreme S Nevada, SE California and Arizona) and NW Mexico (N Sonora).
A. p. fortis Ridgway, 1901 – breeds in USA E of Rocky Mts (in W Montana and SE Idaho E to W Nebraska and W Kansas, S to C & EC Arizona, C & SE New Mexico and N & W Texas); N populations migrate S to Gulf Coast.
A. p. phoeniceus (Linnaeus, 1766) – breeds from SE Canada (S Quebec E to W Newfoundland and Nova Scotia) and E USA (E from Wisconsin, Iowa and E Nebraska, S to NE Texas, NE Louisiana and C Florida); N populations migrate S to at least Gulf Coast.
A. p. littoralis A. H. Howell & van Rossem, 1928 – coast of Gulf of Mexico from Texas E to Florida.
A. p. mearnsi A. H. Howell & van Rossem, 1928 – SC Florida.
A. p. floridanus Maynard, 1895 – S Florida (including Florida Keys).
A. p. bryanti Ridgway, 1887 – NW Bahamas.
A. p. nyaritensis Dickey & van Rossem, 1925 – Pacific coast from W Mexico (S from Nayarit) S to W El Salvador.
A. p. gubernator (Wagler, 1832) – C Mexico, from Durango S to Jalisco and Puebla.
A. p. nelsoni Dickerman, 1965 – Morelos and Puebla, in SC Mexico.
A. p. grinnelli A. B. Howell, 1917 – El Salvador to NW Costa Rica (Guanacaste).
A. p. megapotamus Oberholser, 1919 – S Texas (extreme S USA) and E Mexico (S to N Veracruz).
A. p. richmondi Nelson, 1897 – S Veracruz S to N Costa Rica (Limón).
A. p. pallidulus Van Tyne & Trautman, 1946 – N Yucatán Peninsula, in SE Mexico.
A. p. arthuralleni Dickerman, 1974 – L Petén Itzá, in N Guatemala.



Descriptive notes. Male average 22·7 cm, 63·6 g; female average 18·5 cm, 41·5 g. Male nominate race is almost entirely dull black, with lesser upperwing-coverts red, median coverts yellowish-buff; in non-breeding season black feathers strongly tipped pale buff to chestnut, especially on upperparts, and red epaulet feathers largely obscured by buffish tips; iris dark brown; bill and legs black. Female is dark brownish above, with conspicuous pale supercilium, upperparts streaked buff and reddish-brown; pale pinkish-buff submoustachial stripe and chin, contrasting dark malar stripe; underparts pale buff, boldly striped with black; bare parts as for male. Juvenile resembles female, but pale areas generally more yellowish, broad buffish edgings above, including wing feathers, pale base of lower mandible; immature male streaked like female, but blackish overall, and showing small epaulet. Races differ mainly in size and in female plumage tones: *fortis* is largest in size; *arctolegus* is almost as large as previous, but female darker below; *mearnsi* is similar to nominate, but smaller, with longer and more slender bill; *floridanus* is similar to last, but female paler; *bryanti* resembles previous, but female still paler; *littoralis* female is darker than nominate (and other E races), with shorter wing and tail, thinner bill; *megapotamus* has longer wing and shorter bill than nominate, female much paler and greyer than previous; *richmondi* female has more reddish plumage, more ochraceous in underparts, streaking narrower; *pallidulus* female is paler and more heavily streaked below than last; *arthuralleni* female is darker and more richly coloured than preceding race, also streaking below is heavier and blacker; *caurinus* male has median upperwing-coverts darker buff-ochre than other races, female is very richly coloured, with rusty fringes on upperparts, buffy and well streaked below; *nevadensis* has stouter bill than last, female less richly coloured; *sonoriensis* female is paler and less buffy than *caurinus*, bill relatively slender; *neutralis* is smaller and thicker-billed than last, female darker and with more streaked underparts; *aciculatus* resembles previous, but larger and with bill longer and more slender, female intermediate in colour between previous and *nevadensis*; *nyaritensis* female is paler than *sonoriensis*, and less richly coloured than *richmondi*; *nelsoni* is very like last, but with longer bill and tail; *grinnelli* female is intermediate in dorsal coloration between *nyaritensis* and *richmondi*, ventrally resembling latter; *gubernator* male has lesser upperwing-coverts orange-red (a few paler feathers on lower edge), median coverts black (not buff), female uniformly sooty grey to dull black (similar to male) with streaked paler chin and throat, reddish tinge on lesser coverts; *californicus* is like previous but smaller, with thinner bill, female more visibly streaked; *mailliardorum* has smaller bill than last, female darker. Voice. Male song variable, consists of a few short notes followed by a long and loud nasal trill, sometimes (e.g. Florida) ending in shorter trill, can be transliterated as "kon-ka-rééé" or "ko-kla-rééé-a". Songs of male *gubernator* simpler and less musical. Female has two song types: one, a chatter or "rattle", addressed to males, particularly territory-owner, and can be combined with male song in a duet; "growl", a series of harsher notes, is mostly aggressive and addressed to nearby females. Calls include low "chek" or "kek"; alarm a buzzing "zeer" or whistled "cheet", also descending "teeew".
Habitat. Marshes, ponds, roadside ditches, wet meadows, rice fields and other agricultural land, and suburban parks. Sea-level to c. 3000 m.
Food and Feeding. Seeds, also insects and other arthropods. Takes seeds of both wild plants, e.g. water grasses (*Echinochloa*) and filarees (*Erodium*), and cultivated ones, including rice, maize (*Zea mays*), sorghum and sunflower (*Helianthus*). Chicks in North American wetlands provisioned mostly with emerging damselflies and dragonflies (Odonata). Forages on ground and low in vegetation. Often turns over stones and dry dung to find hidden prey. Forages in huge flocks, sometimes of hundreds of thousands of individuals; in non-breeding season commonly in single-sex flocks. Roosts gregariously, often with other icterids and Common Starlings (*Sturnus vulgaris*).
Breeding. Season Mar–Jul in most of North America and Apr–Aug (sometimes to Nov) in Costa Rica. Mostly polygynous, ranging from sequential polygyny (in upland habitats with poorer food supplies) to harem polygyny (in highly productive marshes); highest level of polygyny (ten or more nesting females per territorial male, with record of 33) in very productive wetlands of W North America, elsewhere normally 2–4 females per male; female regularly indulges in extra-pair copulations, and 23–48% of nestlings sired by males other than partner (usually territorial neighbours). Dominant male defends territories where females build nests; females may defend smaller areas within male's territory, but defence often weak. Nest built by female, usually taking 3 days, an open cup of diverse plant materials, mixed with some mud or peat, lined with finer material, often dry grass, external diameter c. 12 cm, external depth 11–12 cm, placed from 25 cm to c. 3 m above ground in emergent marsh vegetation, often in cat-tails (*Typha*) or sedges (Cyperaceae), sometimes on dry soil in diverse herbaceous plants, or in shrub e.g. *Baccharis* or poison oak (*Rhus*), or in low tree such as alder (*Alnus*) or willow (*Salix*). Clutch 3–5 eggs in North America, 2–3 in Costa Rica, pale greenish-blue with dark blotches, spots and lines, mean dimensions 24·8 × 17·6 mm (USA); incubation by female, period 12–14 days; chicks provisioned mostly or exclusively by female, male may contribute in some situations (related to brood size and nestling age), nestling period 10–12 days; fledglings fed for about two weeks, male helping far more frequently. Nests parasitized by *Molothrus ater*, less frequently by *Molothrus aeneus*, and in SE USA (Florida) possibly also by *Molothrus bonariensis*.
Movements. Populations in W USA, Mexico and farther S are mostly resident. Those in N & E North America (races *arctolegus*, *fortis* and nominate) migratory, during boreal winter reaching Gulf states from extreme S Texas E to Florida. Departure from breeding grounds in Aug–Sept in extreme N of range, in Oct farther S, reaching non-breeding quarters from about Nov; return begins in Feb–Mar, arrival in far N of breeding range in May. Some races (e.g. *nevadensis*) partially migratory, some moving relatively short distances. US ringing data show that not all movements are on a N–S axis, as some also E to W or vice versa; ringed individuals moved distances of 600–1000 km, females moving 200–300 km farther than males; individual may change their wintering locations from one year to another.
Status and Conservation. Not globally threatened. Common to very common, and locally abundant. Global populations estimated at minimum of 200,000,000 individuals. Found in many modified environments. Commonly regarded as an agricultural pest, particularly of maize and sunflower, in Canada and USA; diverse control measures employed, ranging from direct shooting to poisoning and sterilization, while "environmentally friendly" methods include the creation of damage-resistant cultivars of the plants attacked. On the other hand, this species is beneficial to humans as it also feeds on insects that attack cultivated plants. Some distinctive races in Mexico and Central America may be of local conservation concern; further study required.
Bibliography. Albers (1978), Alcock (1973), Armstrong (1995), Ball *et al.* (1988), Beletsky (1983, 1996), Beletsky & Orians (1987a, 1987b, 1989, 1996), Bendell *et al.* (1981), Bird & Smith (1964), Blakely (1975), Blankespoor *et al.* (1982), Bollinger (1985), Bollinger & Caslick (1985), Bray *et al.* (1975), Brenowitz (1982), Brugger & Dolbeer (1990), Buford *et al.* (1998), Caccamise (1977), Clark *et al.* (1986), Clotfelter & Yasukawa (1999a, 1999b), Cox & James (1984), Dickerman (1974), Dickinson & Lein (1987), Dolbeer (1976, 1978), Dyer (1975), Eckert & Weatherhead (1987), Fiala (1981), Gibbs *et al.* (1990), Gray (1997a, 1997b), Hardy (1967), Hardy & Dickerman (1965), Holcomb & Twiest (1970), Howell & Webb (1995), Hurly & Robertson (1984, 1985), James (1983), Jaramillo & Burke (1999), Knight & Temple (1988), Kroodsma & James (1994), Lacombe & Bergeron (1986), Mah & Neuchterlein (1991), Marchant (1960), McCarthy (2006), McGuire (1986), Nero (1984), Orians (1973), Orians & Beletsky (1989), Orians & Christman (1968), Patterson (1991), Payne (1969), Peek *et al.* (1972), Picman (1981, 1983), Power (1970), Rohwer *et al.* (1996), Scott (1991), Searcy (1979, 1986), Searcy & Yasukawa (1981, 1995), Searcy *et al.* (1999), Smith (1972), Stevenson & Anderson (1994), Stowers *et al.* (1968), Strehl & White (1986), Teather (1993), Weatherhead & Clark (1994), Weatherhead & Robertson (1977), Weatherhead *et al.* (1982), Webster (1999), Westneat (1993, 1995), Whittingham *et al.* (1992), Yasukawa & Searcy (1981, 1995), Yasukawa, Blank & Patterson (1980), Yasukawa, Boley & Simon (1987), Yasukawa, McClure *et al.* (1990).

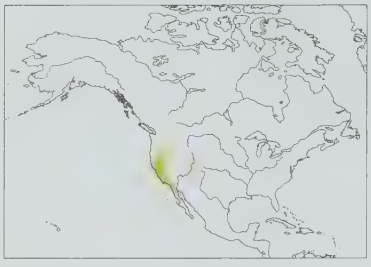
78. Tricolored Blackbird

Agelaius tricolor

French: Carouge de Californie **German**: Dreifarbenstärling **Spanish**: Sargento Tricolor

Taxonomy. *Icterus tricolor* Audubon, 1837, no locality = Santa Barbara, California, USA.
Closely related to *A. phoeniceus*. Monotypic.
Distribution. W USA (S Washington, Oregon, California W of Sierra Nevada, also extreme SW Nevada) and extreme NW Mexico (extreme N Baja California).
Descriptive notes. Male average 22·3 cm, 60–79 g; female average 18·5 cm, 46–54·5 g. Male is black with slight bluish gloss, lesser upperwing-coverts crimson-red, median coverts contrastingly white;

On following pages: 79. Red-shouldered Blackbird (*Agelaius assimilis*); 80. Tawny-shouldered Blackbird (*Agelaius humeralis*); 81. Yellow-shouldered Blackbird (*Agelaius xanthomus*); 82. Colombian Mountain Grackle (*Macroagelaius subalaris*); 83. Tepui Mountain Grackle (*Macroagelaius imthurni*); 84. Velvet-fronted Grackle (*Lampropsar tanagrinus*); 85. Oriole Blackbird (*Gymnomystax mexicanus*); 86. Red-bellied Grackle (*Hypopyrrhus pyrohypogaster*); 87. Austral Blackbird (*Curaeus curaeus*); 88. Forbes's Blackbird (*Curaeus forbesi*); 89. Scarlet-headed Blackbird (*Amblyramphus holosericeus*); 90. Chopi Blackbird (*Gnorimopsar chopi*).



in non-breeding season black body feathers tipped light grey-brown, especially on back, epaulet less striking; iris brown; legs and bill black. Differs from very similar *A. phoeniceus* mainly in having white (not buff) median coverts, also glossier plumage, somewhat longer, thinner bill. Female is dusky brown overall, streaked with blackish; chin and throat whitish, sometimes a pale supercilium; more uniformly dark than female *A. phoeniceus*. Juvenile resembles female, but plumage somewhat duller and more buffish-looking. Voice. Song of male is a harsh, unmusical growl, "grroowak", which lasts 1–1·5 seconds, lower-pitched than song of *A. phoeniceus*. Female song a hollow chatter or rattle. Common calls "churr" and "chwuk".

Habitat. Natural habitat probably marshes and ponds with cat-tails (*Typha*) and bulrush (*Scirpus*), and nearby grassland. Nowadays found also in pastures, feedlots, rice fields and other irrigated agricultural land. Lowlands to 1300 m.

Food and Feeding. Insects and other arthropods, and seeds (including rice and other cereals). Insects include beetles (Coleoptera), larval moths and butterflies (Lepidoptera) and grasshoppers (Orthoptera), also larvae of caddis flies (Trichoptera), dragonflies (Odonata) and midges (Diptera); opportunistic, attracted to insect swarms, and probable that swarms of migratory locusts (now gone) provided much food in the past. Gregarious throughout year. Forages on ground, in huge flocks of tens of thousands, the two sexes moving together; sometimes in mixed-species foraging flocks with *A. phoeniceus*. Gathers almost all of the food for young outside the colony.

Breeding. Season Mar/Apr–Jul, starting first in foothills and latest in rice fields, also some autumnal breeding Oct–Nov; egg-laying often highly synchronized, even in colonies of 50,000 or more nests all females may lay within period of one week; some suggestive evidence of itinerant breeding, i.e. individuals nest more than once in a season, but at different localities (an entire nesting cycle may take only 42 days). Monogamous to moderately polygynous, with 1–4 nesting females per territorial male. Breeding territory quite small, 2–3 m². Nests in huge, densely packed colonies (largest reported for any icterid), usually of 1000–50,000 nests, and reported maximum of 200,000 nests (numbers of breeders at particular site can change dramatically between years); a colony of 100,000 nests occupied only 4 ha; colonies located in three main habitats, i.e. non-irrigated uplands or foothills, irrigated agricultural areas without rice, and rice fields. Through sheer numbers may easily displace *A. phoeniceus* from a Californian marsh. Nest built by female, an open cup of diverse plant materials, mixed with some mud, lining usually of green grass, placed low in marsh vegetation (often in cat-tails), or on dry soil in herbaceous plants (even weeds such as thistles, or cultivated alfalfa), sometimes on ground, or up to 3 m above it in willow (*Salix*); a favourite nesting plant in uplands is introduced Himalayan blackberry (*Rubus discolor*). Clutch 3–6 eggs, usually 4, pale greenish-blue with brown to black spots and lines, mean dimensions 24·4 × 17·7 mm; incubation by female, period 11–12 days; chicks fed by female, nestling period 12–13 days; males commonly feed fledged chicks, which collect in groups. Nests parasitized rarely by *Molothrus ater*. Usually 1–3 fledglings produced per nest; reproductive success much higher in non-native upland vegetation (mainly Himalayan blackberry) than in native wetland vegetation (cat-tail and bulrush stands); often extremely low in silage fields (which hold significant proportion of breeding population), where harvesting can result in loss of entire colonies; some colonies in non-irrigated land may be entirely abandoned during unusual droughts.

Movements. Resident to nomadic; populations move within the species' range in response to weather conditions and food supply. Possibly followed migratory locust in the past. In coastal California, appears to be more abundant in winter than at other times.

Status and Conservation. ENDANGERED. Restricted-range species: present in California EBA. Classified as "Highest Concern" in the USA (Red WatchList priority species for conservation). Rare to locally common; more than 95% of the population breeds in the state of California, where found mostly in Central Valley. Global population in 2010 estimated at 395,000 individuals; earlier, minimum of 700,000 adults estimated in 1934 in just eight counties in California. In later surveys covering whole of California, 370,000 estimated in 1994, 233,000 in 1997 and 162,000 in 2000, representing a decline of 56% in period of only six years; in 2005, however, as many as 257,000 individuals found at total of 21 colonies, suggesting that caution required in assessing and comparing survey figures. Formerly bred in colonies containing hundreds of thousands of individuals, but since c. 1900 numbers drastically reduced as a result of human activities; populations have declined steadily because of massive loss of nesting habitat in California, also because of agricultural practices, such as harvesting and pesticide-spraying, that disrupt or destroy colonies. During Christmas Bird Count, this species has been recorded regularly at 120 sites for almost 40 years, suggesting that population may be relatively stable. Considerable variation in population estimates indicates that it is a very difficult species to survey, and a thorough and constant, reliable methodology is required in the future. Few details available on the species' status away from California. Formerly regarded as a pest, and until 1960s was killed by poisoning.

Bibliography. Anon. (2010d), Beedy & Hamilton (1999), Bent (1958), Churchwell *et al.* (2005), Cook & Toft (2005), Crase & DeHaven (1977), DeHaven *et al.* (1975a, 1975b), Emlen (1941, 1985), Hamilton (1998), Howell & Webb (1995), Jaramillo & Burke (1999), Lack & Emlen (1939), Lebbin *et al.* (2010), Neff (1937, 1942), Orians (1960, 1961), Orians & Christman (1968), Orians & Collier (1963), Payne (1969), Payne & Landolt (1970), Rich *et al.* (2004), Richardson (1961), Skorupa *et al.* (1980).

79. Red-shouldered Blackbird

Agelaius assimilis

French: Carouge de Cuba **German**: Rotschulterstärling **Spanish**: Sargento Cubano

Taxonomy. *Agelaius assimilis* Lembeye, 1850, Cuba.

Formerly treated as conspecific with *A. phoeniceus*, but the two differ markedly in sexual dimorphism, in mating and nesting behaviour and in size; molecular data support treatment as separate species. Birds from I of Pines formerly separated as a geographical race, *subniger*, but description was based on immature specimens. Monotypic.

Distribution. W Cuba, including I of Pines.

Descriptive notes. Male average 22 cm, 54·4 g, female average 20 cm, 41·8 g. Male is black with slight bluish gloss; lesser upperwing-coverts red, median coverts yellow-buff; iris dark brown; bill and legs black. Differs from extremely similar *A. phoeniceus* in smaller size and longer legs. Female is entirely black, like male, but less iridescent, and lacking coloured epaulets. Immature male has epaulet reduced in size and paler; immature female more brownish. Voice. Song described as a repeated rather shrill creaking "o-wi-hiii", similar to that of *A. phoeniceus* but higher-pitched and shorter, and produced by both sexes, sometimes in duet. Call "chuk" or "chek", sometimes in short series.



Habitat. Breeds in swamps and marshes, generally in sites with cat-tails (*Typha*), bulrushes (*Scirpus*) and similar tall emergent vegetation. In non-breeding season forages also in nearby uplands, including pastures and agricultural fields.

Food and Feeding. Insects and other arthropods, small vertebrates, fruits and seeds; also discarded food scraps. Forages mostly on ground. Forms flocks, sometimes quite large ones; often associates with *A. humeralis* and *Ptiloxena atroviolacea*.

Breeding. Season Apr/May–Aug. Monogamous. Territorial, territories c. 700–900 m² in extent. Nest built by female, cup-shaped, made from dry grass, feathers, hair, etc., external diameter 9–10 cm, internal depth 5–6·6 cm, placed low down in aquatic vegetation such as beak-sedge (*Rhynchospora*), cat-tails, reeds (*Phragmites*) or arrowhead (*Saggitaria*) in swamp or marsh. Clutch 2–3 eggs, bluish-white with brown and pale purple spots, mean dimensions 24·6 × 17·5 mm; incubation by female, chicks fed by both sexes (at similar frequencies); no information on duration of incubation and nestling periods.

Movements. Apparently resident.

Status and Conservation. Not globally threatened. Locally common. Has restricted and fragmented distribution. Very numerous at Ciénaga de Zapata. Recently reported from region of Ciego de Ávila, in SC Cuba; further study needed. Fragmented range a reflection of very patchily distributed habitat.

Bibliography. Balát & González (1982), Barbour (1943), Barker *et al.* (2008a), Beletsky (1996), Davis, M. (1953), Garrido (1970), Garrido & Kirkconnell (1996), Jaramillo & Burke (1999), Raffaele *et al.* (1998), Whittingham *et al.* (1992, 1996, 1997).

80. Tawny-shouldered Blackbird

Agelaius humeralis

French: Petit Carouge **German**: Braunschulterstärling **Spanish**: Sargento Humeral

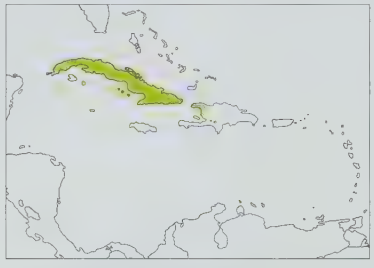
Taxonomy. *Leistes humeralis* Vigors, 1827, Havana area, Cuba.

Closely related to and possibly forming a superspecies with *A. xanthomus*. Two subspecies recognized.

Subspecies and Distribution.

A. h. humeralis (Vigors, 1827) – Cuba, including larger cays on N coast, and some outlying islands (e.g. Jardines de la Reina Archipelago); also W Hispaniola (W Haiti).

A. h. scopulus Garrido, 1970 – Cayo Cantiles (E of I of Pines), off SW Cuba.



Descriptive notes. 19–22 cm; male average 38·3 g, female average 34·5 g. Male nominate race is black, slightly glossed bluish; lesser and median upperwing-coverts tawny, median coverts tipped yellowish-cream; iris dark brown; bill and legs black. Female is like male, but duskier and without gloss; tawny shoulder patch smaller, median coverts partly black. Juvenile is dusky black, with little or no tawny in wing. Race *scopolus* is smaller and thinner-billed than nominate, and with reduced shoulder patch. Voice. Song, by both sexes, 1–2 protracted buzzing notes, sometimes introduced with shorter buzz at higher pitch; partners sometimes duet. Calls include "chuk" or "cheek", also nasal and metallic notes.

Habitat. Open woodland and woodland edge, farmland and rice fields; in Haiti occurs along sloughs and channels in dry open woodland.

Food and Feeding. Insects and other arthropods, small lizards, seeds; also fruits and nectar. Insects taken include bees (Apoidea). Forages on ground, also in bushes and trees. Forms large flocks, mainly in non-breeding season; often associates with other icterids.

Breeding. Season Apr–Aug in Cuba; fledged chicks reported May–Jul. Monogamous. Breeds solitarily, sometimes in small loose colonies; reported inter-nest distances 8–25 m, large trees may hold several active nests. Non-territorial, defends only a small area around nest. Nest built mostly by female, cup-shaped, made from dried grass, moss, twigs, hair and feathers, placed in tree or palm, usually near water, sometimes in emergent water plants in marsh; commonly builds among basal portion of frond of Cuban royal palm (*Roystonea regia*), occasionally in introduced eucalypt tree (*Eucalyptus*), and even on outdoor lamp. Clutch 3–4 eggs, bluish to greenish with brown spots, mostly at large end, mean dimensions 22·6 × 16·7 mm; incubation by female, chicks fed by both sexes (at similar rates); no information on duration of incubation and nestling periods. Nests possibly parasitized by *Molothrus bonariensis*; further study needed.

Movements. Largely resident. Some limited movement apparently; nominate race recorded as an accidental in SE USA (Florida).

Status and Conservation. Not globally threatened. Common in Cuba; uncommon and local in Haiti. In Haiti found only in W, mostly at mouth of R Artibonite, also in area of Port-de-Paix; rarely or formerly around Port-au-Prince. Haitian population first discovered in 1927, and sometimes believed the result of recent colonization from Cuba; no DNA data available to verify this idea. Adapts well to man-modified environments.

Bibliography. Balát & González (1982), Barbour (1943), Buden & Olson (1989), Demeritt (1936), Garrido (1970), Garrido & Kirkconnell (2000), Jaramillo & Burke (1999), Raffaele *et al.* (1998), Wetmore & Swales (1931), Whittingham *et al.* (1996).

81. Yellow-shouldered Blackbird

Agelaius xanthomus

French: Carouge de Porto Rico **Spanish**: Sargento Puertorriqueño
German: Gelbschulterstärling

Taxonomy. *Icterus xanthomus* P. L. Sclater, 1862, Mexico; error = Puerto Rico.

Closely related to and possibly forming a superspecies with *A. humeralis*. Two subspecies recognized.

Subspecies and Distribution.
A. x. xanthomus (P. L. Sclater, 1862) – Puerto Rico.
A. x. monensis Barnés, 1945 – Mona I, off W Puerto Rico.



Descriptive notes. 20–23 cm; male average 41 g, female average 35 g. Male nominate race is black with bluish gloss; lesser and median upperwing-coverts yellow (tips of medians sometimes paler); iris dark brown; bill and legs black. Female is similar to male, but a little smaller. Juvenile is duller than adult, more brownish-grey than blackish, with much smaller and paler shoulder patch. Race *monensis* differs from nominate in having shoulder patch paler, at times yellowish-white. Voice. Song a rasping nasal "nyaaaaaa", by both sexes, sometimes by several individuals in chorus. Common call "chuk"; alarm "ct-zeee".
Habitat. Restricted to mangroves (*Avicennia nitida*, *Rhizopora mangle*, *Laguncularia racemosa*) along coast and in small mangrove islands (cayos), pastures near mangroves, and palm plantations, including stands of Puerto Rico royal palm (*Roystonea borinquena*) and coconut (*Cocos nucifera*). On Mona I (race *monensis*) frequents coastal cliffs.
Food and Feeding. Diet mainly insects, particularly moths (Lepidoptera) and crickets (Gryllidae); takes nectar from flowers of *Erythrina*, *Inga*, *Aloe* and *Yucca*, and feeds also on cactus fruits. Forages in trees, probing and gaping among bark and epiphytes; also on ground. In small groups; larger flocks in non-breeding season.
Breeding. Season Apr–Aug; on Mona I (race *monensis*) more protracted, Feb–Nov. Monogamous. Nests in small colonies (often 4–6 nests), average inter-nest distance 16 m, in abandoned salt ponds, on small offshore islands, stands of red mangrove (*Avicennia*), trees in pastures, and palm groves, also on sea cliffs on Mona. Non-territorial. Nest built by female, cup-shaped, made from local materials as variable as grass, roots, seaweed, feathers, string, scraps of paper and plastic, lined with fine grass, placed in tree hole, in cavity or crevice in sea cliff, or in branches of red mangrove, other tree, or palm; accepts nestboxes. Clutch 1–4 eggs, usually 3, blue-green with brown spots; incubation by female, often fed by male, period 12–13 days; chicks fed by both sexes, nestling period 13–16 days. Nests often parasitized by *Molothrus bonariensis*, and rears latter's chicks.
Movements. Apparently resident.
Status and Conservation. ENDANGERED. Restricted-range species: present in Puerto Rico and the Virgin Islands EBA. Uncommon to rare, and local. Nominate race formerly occurred throughout Puerto Rico, where population estimated at 2400 individuals in 1975; following huge contraction of range, now confined mostly to SW coastal area; small remnant population that persisted in E coastal areas appears to have disappeared, with no breeding records since 1986. In SW Puerto Rico, declined by c. 80% between 1975 and 1981, and in 1982 numbered 300 individuals at most, but roost counts prior to breeding season during 1985–1995 revealed average annual increase of 14%. Estimated global population in early 1998 c. 1250 individuals. Population on Mona I (race *monensis*) c. 700 individuals and believed stable. Seems always to have been most numerous near coast, and many of surviving population in Puerto Rico now breed on offshore cays. One of main reasons for decline was brood parasitism by *Molothrus bonariensis*, which invaded Puerto Rico around mid-1950s or before, and may have been largely responsible for shift to cays; habitat disturbance enabled the parasite to increase and spread rapidly. Other factors include habitat clearance for agriculture, nest predation by Pearly-eyed Thrashers (*Margarops fuscatus*) and increased mortality caused by introduced carnivores; also, invasion of nesting areas by Caribbean Martins (*Progne dominicensis*). Since 1982, following installation of artificial nests, monitoring of breeding, and control of numbers of *Molothrus*, rats (*Rattus*) and nest mites (Acarina), as well as habitat management, improvement in nesting success recorded, and in SW Puerto Rico, where Boquerón Commonwealth Forest is a stronghold for this icterid, its numbers have continued to recover slowly. *Molothrus* not known to occur on Mona I.
Bibliography. Anon. (2010d), Butchart & Stattersfield (2004), Cruz *et al.* (2005), Jaramillo & Burke (1999), López-Ortiz *et al.* (2002), McKenzie & Noble (1989), Ortega *et al.* (2005), Post (1981a, 1981b), Post & Post (1987), Post & Wiley (1976, 1977), Raffaele *et al.* (1998), Stattersfield & Capper (2000), Wetmore (1927), Wiley (1985), Wiley *et al.* (1991).

Genus *MACROAGELAIUS* Cassin, 1866

82. Colombian Mountain Grackle

Macroagelaius subalaris

French: Carouge montagnard **German**: Braunachselstärling **Spanish**: Chango Colombiano
Other common names: Mountain Grackle

Taxonomy. *Quiscalus sub-alaris* Boissonneau, 1840, Bogotá, Colombia.
Closely related to and forming a superspecies with *M. imthurni*. The two have sometimes been regarded as conspecific, but differ appreciably in body and bill proportions, plumage and vocalizations. Monotypic.
Distribution. E Andes of Colombia from Norte de Santander and Santander S on W slope to Cundinamarca.



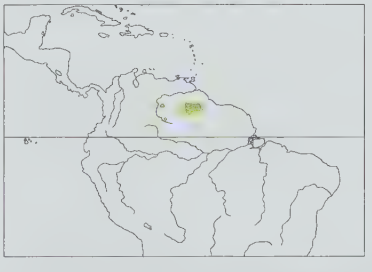
Descriptive notes. Male 29–30 cm, female 27–28 cm. Slender and long-tailed icterid. Plumage is almost entirely black with blue gloss; axillaries and most of underwing-coverts dark chestnut (almost invisible in field); iris dark brown; bill and legs black. Differs from similar *M. imthurni* mainly in having chestnut in wing, no yellow pectoral tufts, slightly thicker bill, slimmer body. Sexes similar. Juvenile is less glossy and more dusky brown, particularly in flight-feathers, than adult, and with reduced chestnut in wing. Voice. Song variable, sometimes starting with low clicks and buzzing notes, followed by series of different warbled or whistled motifs, each one usually repeated 2–4 times; repetitive pattern makes song somewhat reminiscent of that of a mockingbird (*Mimus*). Calls include sharp "check" and "chuip" notes for contact.
Habitat. Humid upper montane forest rich in epiphytes, particularly oak forest (*Quercus humboldtii*), up to *páramo*; 1900–3100 m.
Food and Feeding. Feeds on insects and other arthropods, particularly weevils (Curculionidae), Orthoptera, bugs (Hemiptera), hymenopterans and spiders (Araneae); takes berries of *Oreopanax floribundum* (Araliaceae) and *Hedyosmum bonplandianum* (Chloranthaceae). Forages mostly at height of 15–30 m, searching for food items among leaves, inflorescences and epiphytes. Drinks from water stored in tank bromeliads. Found in groups of up to 40 individuals; sometimes in mixed-species foraging flocks with Acorn Woodpecker (*Melanerpes formicivorus*), Green Jay (*Cyanocorax yncas*), Great Thrush (*Turdus fuscater*), Hooded Mountain-tanager (*Buthraupis montana*), *Icterus nigrogularis* and *Cacicus leucoramphus*.
Breeding. Season May–Sept. Nests solitarily. Co-operative breeder, groups of 4–5 individuals attending nest or fledglings; also one adult, perhaps a breeding female, was fed by other adults from a nesting group. Nest built by several members of group, described as an open cup made from diverse plant material, two built mostly with dry leaves and branchlets of *Chusquea tesellata* bamboo, stems of *Pennisetum clandestinum* grass and dry branchlets of *Miconia*, external walls may include *Usnea* lichens, lining materials included thin fern stems and palm or bromeliad fibres, external nest diameter 25–30 cm, depth 16·5 cm, internal diameter 10–11 cm; placed mostly in oak, sometimes in *Escallonia paniculata* or *Clethra*, usually 5–10 m above ground, often on inaccessible external branch or above steep slope, some nests more or less camouflaged by arboreal leaf litter. No information on clutch size, eggshell fragments were pale blue with reddish-brown marks; no information on incubation and nestling periods; chicks fed by several group-members.
Movements. Apparently resident.
Status and Conservation. ENDANGERED. Restricted-range species: present in Colombian East Andes EBA. Rare and extremely local. Estimates of global population range from 1000 to 3000 individuals. Range formerly much wider, probably extending also to E slope. During 20th century this species was extirpated from many areas, and now has a patchy distribution. Habitat loss the main threat, as at least 80% of montane oak forests have been logged or converted to pasture. In recent surveys recorded at 22 localities, from Suratá (in Santander) S to La Aguadita (Cundinamarca), but follow-up surveys revealed that many of these were suffering rapid deforestation. During surveys in 2003–2006 in Serranía de los Yariguíes (a spur extending from main E Andean range in Santander) found at three sites, at one of which considered abundant. Yariguíes massif, a steep, forested range c. 100 km in length, still retains considerable amount of forest at elevations suitable for this icterid, and in Jan 2011 new population discovered at Reserva Páramo La Floresta (privately owned reserve administered by municipality of Zapatoca); this site, at elevation of c. 2600 m, includes second growth, sub-*páramo*, fragments of oak forest and, importantly, a *humedal* (marshy wetland), around which this icterid was the most conspicuous (and possibly most numerous) bird species. Very similar habitats exist elsewhere in Yariguíes range, but on isolated plateaux of steep forested mountains, and thus very difficult to reach; likely that these, too, support significant populations of this species. In rest of this species' range, population small and severely fragmented, and prospects for survival uncertain. Conservation efforts and ecological studies at Guanentá–Alto Río Fonce Fauna and Flora Sanctuary, in Santander, and at Soatá and Tipacoque, in Boyacá, appear to have had some success and are continuing. In addition to Reserva Páramo La Floresta, reported from Las Orquídeas, Cueva de los Guácharos and Tatamá National Park, and from Ucumarí Regional Park.
Bibliography. Amaya-Espinel & Renjifo (2002), Anon. (2010d), Butchart & Stattersfield (2004), Cadena *et al.* (2002), Cortés-Herrera, Chaves-Portilla *et al.* (2006), Cortés-Herrera, Hernández-Jaramillo *et al.* (2006), Cortés-Herrera, Ruiz-Ovalle & Hernández-Jaramillo (2011), Fierro-Calderón *et al.* (2006), Hilty & Brown (1986), Jaramillo & Burke (1999), López-Lanús (2005a), Meyer de Schauensee (1951), Renjifo *et al.* (2002), Restall *et al.* (2006), Stattersfield & Capper (2000).

83. Tepui Mountain Grackle

Macroagelaius imthurni

French: Carouge des tépuis **German**: Goldachselstärling **Spanish**: Chango de Tepuí
Other common names: Golden-tufted (Mountain) Grackle

Taxonomy. *Agelaeus imthurni*, P. L. Sclater, 1881, Kaieteur Falls, Potaro River, Guyana.
Closely related to and forming a superspecies with *M. subalaris*. The two have sometimes been regarded as conspecific, but differ appreciably in body and bill proportions, plumage and vocalizations. Monotypic.
Distribution. Mountains (tepuis) in S Venezuela (W & C Amazonas and SE Bolívar), extreme N Brazil (Roraima) and W Guyana.



Descriptive notes. Male 28 cm, average 87·3 g; female 25 cm, average 71·7 g. Rather slender and long-tailed icterid. Plumage is almost entirely black with blue gloss, becoming dusky or duller black on belly, rump and inner webs of flight-feathers; underwing-coverts black, axillaries yellow to tawny-yellow with variable chestnut feather bases (showing as pectoral tuft); iris hazel to dark brown; bill and legs black. Sexes similar. Juvenile is less glossy and more dusky brown, particularly in flight-feathers, than adult. Differs from similar *M. subalaris* in having yellow pectoral tufts, little or no chestnut in wing, thinner bill, somewhat less slim body. Voice. Rather noisy. Presumed song complex and variable, mixing shrill and rasping warbles with more pleasant metallic notes; one of shorter variants is "sh-glack-chak-shweo-shwéé"; longer songs may sound like series of rising and falling, dissonant chords, with glassy tone. Commonly sings in flight. Apparently both sexes sing (and duet), and group singing frequent. A common call, perhaps as alarm, is a repeated "chak". May produce audible wing noise in flight.
Habitat. Lower to upper montane humid forest with high diversity of evergreen trees such as *Eschweilera odorata*, *Guarea silvatica*, *Euterpe* palms, among others, covered with abundant bromeliads and other epiphytic plants; above 1200 m occurs in stunted forests (up to 15 m tall) on poor sandy soils, dominated by *Miconia* and other trees in family Melastomataceae, with abundance of epiphytic and terrestrial bromeliads. At 700–2000 m, occasionally down to 500 m.
Food and Feeding. Scant information. Probably eats arthropods, small vertebrates and fruit. In Sierra de Lema (Venezuela) feeds on moths (particularly of family Noctuidae) attracted to night lights; in same area a flock seen to inspect or feed on racemes of red-coloured berries produced by an abundant shrub (species not identified). Finds insect prey in foliage and in epiphytes; not reported as feeding in forest undergrowth or on ground. Occurs mostly in monospecific flocks of 10–30 individuals.

Breeding. Breeds in Mar in Venezuela. Co-operative breeder. Few nests described: one was a bulky cup 30 cm in diameter, loosely built from grasses and other plant fibres, placed 12 m up in crown of tree in group of four trees growing on a peninsula in a large river; in a similar nest found at Sierra de Lema, five adults brought food to three chicks. No further information.
Movements. Sedentary.
Status and Conservation. Not globally threatened. Restricted-range species: present in Tepuis EBA. Locally abundant in appropriate habitat. Found in several protected areas in its range: Canaima and Duida-Marahuaca National Parks, in Venezuela, Monte Roraima National Park, in Brazil, and Kaieteur National Park, in Guyana.
Bibliography. Barnett *et al.* (2002), Fraga (2009), Hilty (2003), Jaramillo & Burke (1999), Johnson & Lanyon (1999), Meyer de Schauensee (1951), Restall *et al.* (2006), Ridgely & Tudor (1989).

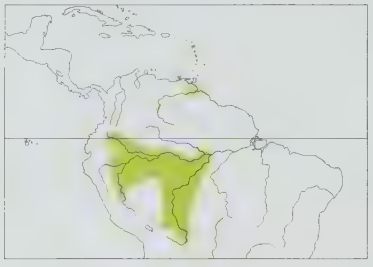
Genus *LAMPROPSAR* Cabanis, 1847

84. **Velvet-fronted Grackle**

Lampropsar tanagrinus

French: Carouge velouté **German**: Samtstirnstärling **Spanish**: Chango Terciopelo
Other common names: Bolivian Grackle (*boliviensis*); Violaceous Grackle (*violaceus*)

Taxonomy. *Icterus tanagrinus* Spix, 1824, Itacoatiara, north-east Amazonas, Brazil.
Analysis of mitochondrial DNA suggests relationship with morphologically very different *Gymnomystax mexicanus*. Some races, especially *boliviensis*, may merit full species status. Five subspecies recognized.
Subspecies and Distribution.
L. t. guianensis Cabanis, 1848 – Venezuela (Sucre and NE Monagas S to NE Bolívar; NW Amazonas) and NW Guyana, NE Colombia (NE Vichada), and extreme N Brazil (Roraima).
L. t. tanagrinus (Spix, 1824) – Amazon Basin in E Ecuador, S Colombia (Amazonas), NE Peru (Loreto and Ucayali) and W Brazil (Amazonas E to lower R Negro and R Madeira).
L. t. macropterus Gyldenstolpe, 1945 – W Brazil (upper R Juruá in Acre and W Amazonas).
L. t. violaceus Hellmayr, 1906 – WC Brazil (NW Mato Grosso).
L. t. boliviensis Gyldenstolpe, 1941 – E Bolivia (Beni and Santa Cruz).



Descriptive notes. Male average 20·3 cm, 59·4 g; female average 19 cm, 55·2 g. All-dark icterid with short, conical bill and rather long and fan-shaped tail; feathers on forehead and lores stiff and plush-like. Male nominate race is entirely black, with bluish to purple gloss on upperparts; iris dark brown; bill and legs black. Differs from *Quiscalus lugubris* in smaller size, smaller bill, eye colour, tail shape, drabber coloration, and voice. Female is similar to male, but slightly duller. Juvenile resembles adult. Race *guianensis* is smaller than nominate, has blue gloss on underparts and brownish underwing-coverts; *macropterus* is larger than nominate, tail glossed green; *violaceus* has distinctive violet iridescence; *boliviensis* is smaller than others. Voice. Rather vocal. Songs in Venezuela (nominate race) pleasant, but with slight glassy tone. Song repertoires include trills and repeated warbled phrases, mixed with calls; some themes consist of paired question-and-answer phrases, e.g. "he-you-sweet...krr-chew". Contact or alarm calls include "chuk" notes and a harsh "gk", also scolds with "trr-rrrt" mixed with soft "peet" notes; *bolivianus* also "chu-chu-chu".
Habitat. Usually near water (rivers, channels, oxbow lakes, marshes) in primary forest and secondary forest, riparian woodland and shady plantations. Also in mangroves in Venezuela and Guyana. In Amazonia occurs in *várzea* or *igapó* vegetation; in E Bolivia in seasonally flooded savanna with motacú palms (*Scheelea princeps*). Nominate race and *guianensis* up to 400 m; *boliviensis* to 500 m.
Food and Feeding. Few data on diet; stomach contents beetles (Coleoptera) and alate ants (Formicidae). Forages in lower and middle levels of vegetation, also on emergent and floating aquatic plants. Found mostly in groups of 3–10 individuals, sometimes up to 30 and exceptionally up to 100.
Breeding. Season Mar in Guyana, Sept in Ecuador, and Oct and Feb in Bolivia. Seems to be a co-operative breeder, but scant available information. A nest in Guyana was made mostly from roots, and placed in a shrub over water; in Ecuador, three individuals helped in nest-building (at least one other also visited during building stage, and five individuals reported one week later), nest was a cup 28 cm tall and with external diameter 14 cm, made from long fibrous roots, loose fibres up to 80 cm long dangling below nest, placed on drooping branch of small *Inga* tree over channel 5 m wide in flooded area; in Bolivia, one nest a rather thick, deep cup 29 cm in height, external diameter 12 cm, built from roots, slender stems and dark fungal rhizomorphs (presumably of *Marasmius*), sited 2 m above ground in orange tree in plantation. Clutch 3 eggs (Bolivia), elongated, pale bluish-green with brown and blackish dots, blotches and scrawls, dimensions 24·6–25·3 × 16·2–16·3 mm; no information on incubation and nestling periods.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Rather uncommon to fairly common and locally common. Tolerates moderate habitat modification.
Bibliography. Fraga (2009), Greeney & Gelis (2008), Gyldenstolpe (1941b, 1945a), Hilty (2003), Jaramillo & Burke (1999), Maillard & Herrera (2007), Remsen *et al.* (1988), Restall *et al.* (2006), Ridgely & Tudor (1989), Schubart *et al.* (1965), Snyder (1966).

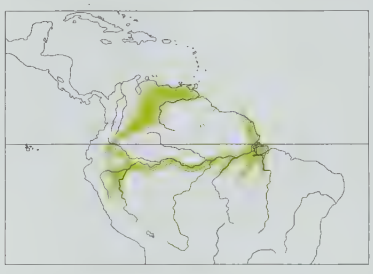
Genus *GYMNOMYSTAX* Reichenbach, 1850

85. **Oriole Blackbird**

Gymnomystax mexicanus

French: Carouge loriot **German**: Nacktaugentrupial **Spanish**: Chango Oriolino

Taxonomy. *O.*[*riolus*] *mexicanus* Linnaeus, 1766, Mexico; error = French Guiana.
Molecular data indicate close relationship to *Hypopyrrhus* and *Lampropsar*, despite very different plumage. Monotypic.
Distribution. N, NE & WC Venezuela S through E Colombia (E of Andes) and an isolated spot in Cauca Valley; also NE Guyana and extreme N Brazil (Roraima); and Amazonia from E Ecuador, NE Peru (S to Ucayali) and extreme SE Colombia (Leticia, in extreme SE Amazonas) E along R Amazon (S to lower R Tapajós and lower R Tocantins) to Amapá, Marajó I and Mexiana I (Brazil), and French Guiana.



Descriptive notes. Male average 30·5 cm, 93·5 g; female average 27 cm, 92 g. Distinctive, large, bright icterid. Head and underparts are bright chrome-yellow, upperparts and tail black; upperwing black, lesser coverts and carpal area yellow (epaulets); bare circumorbital area, lores and malar streak black; iris brown; bill and legs black. Sexes similar. Juvenile is paler yellow than adult, has black cap, brownish tinge on upperparts, indistinct thin pale edgings on flight-feathers, bare facial area pinkish-grey; immature like adult, sometimes some back on rear crown. Voice. Most vocalizations are screechy, rasping and unmusical. Song, by both sexes, variable, usually consists of 4–6 harsh buzzing sounds; one song type transcribed as "chaa-chaa-chrick-chaa". A characteristic call is a harsh buzzy crescendo, "chsssswk", sounding like a burst of white noise; also harsh rattles.
Habitat. In Orinoco Basin (the *llanos*) found in savannas with scattered trees, tall grasslands and marshes, cattle pastures and agricultural stubble, usually not far from water. In Venezuela also in artificial habitats such as open city parks and large suburban lots (even in Caracas). In Amazonia frequents open riparian vegetation (early successional) on new islands and sandbanks, floating *várzea* grasslands of *Paspalum* and *Echinochloa*, and muddy river beaches; reputedly absent from floodplains of blackwater rivers. Roosts in swamps. Lowlands to 400 m, rarely to 950 m.
Food and Feeding. Almost omnivorous. Diet arthropods, including spiders (Araneae), crickets (Gryllidae) and caterpillars (Lepidoptera), also small vertebrates (e.g. frogs), also seeds, including those of cultivated maize (*Zea mays*), and fruits (*Cordia*). Forages mostly on ground and in low vegetation. Turns over objects such as cow dung and river debris to find hidden prey. Found in pairs and in flocks of up to 80 individuals; rarely joins mixed-species foraging flocks.
Breeding. Season May–Jun in Venezuela, Feb in SE Colombia and Mar in Peru. Probably monogamous. Solitary breeder. Nest built by both sexes, mostly by female, a thick-walled open cup, one was made from weeds and grass stems, lined with rootlets, external diameter 17 cm and depth 11 cm, internal diameter 8·5 cm and depth 5·5 cm, placed 6 m up in parasitic plant, possibly mistletoe (Loranthaceae), growing in chaparro tree (*Curatella americana*); another nest was composed mostly of rachises of a leguminous tree, built 7 m above ground in crown of isolated palm (*Attalea butyracea*) in a pasture. Clutch 3 eggs, pale blue with spots and irregular blotches in lilac, shades of brown and black, mean dimensions 28 × 20·4 mm; incubation period c. 17 days; chicks fed by both parents, no information on duration of nestling period. Nests parasitized by *Molothrus bonariensis*.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Common in most of range. Rare in Guyana, from where few recent records; discovered only recently (1980s) in N Brazil (Roraima). Reported also in W Colombia (upper Cauca Valley), but status there uncertain. Tolerates, and expands with, moderate human disturbance. In Venezuela has spread into man-made environments in suburban and urban areas, including Caracas.
Bibliography. Barnett *et al.* (2002), Cherrie (1916), Cruz & Andrews (1989), Fraga (2009), Goeldi (1897), Hilty (2003), Jaramillo & Burke (1999), Remsen & Parker (1983), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schubart *et al.* (1965), da Silva (1998), Skutch (1967b), Thomas (1979).

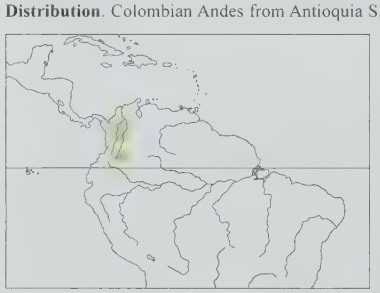
Genus *HYPOPYRRHUS* Bonaparte, 1850

86. **Red-bellied Grackle**

Hypopyrrhus pyrohypogaster

French: Carouge à ventre rouge **German**: Rotbauchstärling **Spanish**: Chango Ventrirrojo

Taxonomy. *Cassicus pyrohypogaster* de Tarragon, 1847, Colombia.
Molecular-genetic data indicate that this species' closest relatives are *Gymnomystax* and *Lampropsar*, but that it has evolved in isolation for a long time (4 million years) and is highly distinctive. Monotypic.
Distribution. Colombian Andes from Antioquia S, discontinuously, to Putumayo.



Descriptive notes. Male average 31·5 cm, 101 g; female average 27 cm. Distinctive, robust blackbird. Plumage is glossy black, with vivid red belly and crissum; feather shafts of head and throat pointed and shiny black, giving streaked appearance; iris pale yellow; bill and legs black. Sexes similar, female smaller than male. Juvenile differs from adult in having black areas dull dark brown, red areas paler and more orange, thigh and rear flanks brown with reddish feather tips; immature like adult, but retained juvenile flight-feathers contrastingly brown. Voice. A rather musical "peero-peero", also trills and warbles. Song described as "glok-glok-schle-o", but considerable geographical variation. Contact call a harsh note; shrill "peep".
Habitat. Primary and secondary montane forests, forest edge, also pastures and plantations near forest patches. Reported at 800–2750 m, mostly above 1200 m.
Food and Feeding. Possibly omnivorous. Feeds on arillate fruits of *Cupania*, also berries of *Miconia* and figs (*Ficus*), and reported as feeding on seeds of *Chusquea* bamboos during rare

mast occurrences; arthropods taken include spiders (Araneae), orthopteroid insects and caterpillars (Lepidoptera). Nestling diet mostly insects. Forages mostly in canopy, in flocks of up to 30 individuals; sometimes with mixed-species foraging flocks of other mountain icterids, e.g. *Cacicus uropygialis*, also with Red-ruffed Fruitcrows (*Pyroderus scutatus*) and Green Jays (*Cyanocorax yncas*).

Breeding. Season Jan–May in C Andes, Mar–Aug elsewhere, but reported also Aug–Dec. Solitary nester. Co-operative breeder, in groups of 3–6 individuals, including adults of both sexes and juveniles; mutual feeding between group-members reported. Nest built by female, a bulky open cup made from sticks and large dry leaves, one with external diameter 17·3 cm and external depth 15 cm, placed in tree or shrub of native species (*Cupania*, *Tibouchina*, *Miconia*), sometimes in exotic species, e.g. cypress; one nest was 9 m above ground in isolated tree in pasture. Clutch 2–4 eggs, greenish-grey with dark brown and lilac spots; incubation by female, period 13–15 days; chicks fed by many group-members, including older juveniles, nestling period 14–18 days; fledglings remain in vicinity of nest for c. 5 days.

Movements. Resident; perhaps some local altitudinal movements.

Status and Conservation. ENDANGERED. Restricted-range species: present in Colombian Inter-Andean slopes EBA and Chocó EBA. Rare and local; fairly common in a few places. Although recently discovered at several new localities, total population small and fragmented. Recorded in W Andes from Cerro Tatamá (Valle del Cauca) and N into Antioquia, in C Andes from Antioquia (many historical sites and a few modern ones) S locally to Putumayo, and in E Andes in S Huila and W Caquetá. Since c. 1980, observed in small numbers very locally, but reported as quite common in mountains around Medellín and La Linda, Las Nubes and La Noque, in Antioquia; captive-bred individuals released around Medellín in 1997–1998. Found recently at several new localities, e.g. Amalfi, in Antioquia. Present known range includes some protected areas, such as Ucumarí Regional Park (Risaralda) and Cueva de los Guácharos National Park (Huila), where present in small numbers; in Antioquia, reported as common in La Forzosa Nature Reserve, Alto San Miguel Ecological Reserve, and La Romera and La Serrana Municipal Reserves; recent records also from Tatamá National Park (Risaralda–Chocó–Valle), Las Orquídeas National Park (Antioquia) and Cordillera de los Pichados National Park (Caquetá). Appears able to live at forest edges and in old second growth (and has nested in isolated tree in pasture), suggesting some tolerance of forest clearance and disturbance. Sometimes persecuted as a crop pest; sometimes captured for cagebird trade.

Bibliography. Anon. (2010d), Betancur (1994), Butchart & Stattersfield (2004), Cadena *et al.* (2004), Cuervo (2002), Hilty & Brown (1986), Jaramillo & Burke (1999), Ochoa & Cuervo Maya (1998), Renjifo (1999), Ridgely & Tudor (1989), Salaman *et al.* (2002), Stattersfield & Capper (2000).

Genus *CURAEUS* P. L. Sclater, 1862

87. Austral Blackbird

Curaeus curaeus

French: Carouge austral **German**: Stachelkopfstärling **Spanish**: Tordo Patagón

Taxonomy. *Turdus Curaeus* Molina, 1782, Chile.

Similar in aspect and behaviour to *Gnorimopsar chopi*, but molecular data suggest closer relationship with quite different *Amblyramphus holosericeus*. Geographical variation partly clinal, body mass increases from N to S. Proposed race *recurvirostris* (described from Riesco I, in S Chile), resembling *reynoldsi* but supposedly with slightly recurved bill, requires further study, as recent observers have not reported peculiarities in bill shape. Two subspecies recognized.

Subspecies and Distribution.

C. c. curaeus (Molina, 1782) – C & S Chile from Coquimbo (rarely Atacama) S, including Chiloé I and most islands along coast, to Straits of Magellan, and SW Argentina (Neuquén S along Andes to Santa Cruz).

C. c. reynoldsi W. L. Sclater, 1939 – S Chile and extreme S Argentina (Tierra del Fuego and nearby islands).



Descriptive notes. Male average 26·8 cm and 83·3 g, female average 82·9 g (nominate, SW Argentina); male 114·6 g, female 99·1 g (*reynoldsi*). A large blackbird with long bill noticeably flattened on culmen ridge. Plumage is entirely black with slight bluish gloss, feathers of crown and nape somewhat lanceolated; iris dark brown; bill and legs black. Differs from superficially similar *Molothrus bonariensis* mainly in larger size, pointed bill shape, duller black colour. Sexes similar. Juvenile is duller and more brownish than adult. Race *reynoldsi* is larger and narrower-billed than nominate. VOICE. Song distinctive, a slow repetition of trills and hollow squeaky whistles mixed with "koo-ree-teeoo" call, phrases repeated slowly with clear pauses between them. A common call is a distinctive nasal, but not harsh, "koo-ree-teeoo" or "kooree-tee", often repeated. Much group calling and singing.

Habitat. Mesic Mediterranean-type scrub and woodland in C Chile, mostly in valley bottoms, also open evergreen or deciduous *Nothofagus* woodland, usually at edges or in clearings, farther S; also lakeshores and sea beaches, pastures, pine (*Pinus*) plantations and agricultural fields. In Argentina confined to *Nothofagus* forest and its surroundings, but even there seldom seen in continuous unbroken forest. In N half of Tierra del Fuego found in humid steppes. Sea-level to 1500 m.

Food and Feeding. Omnivorous, consuming insects, aquatic invertebrates, small vertebrates, seeds, fruits, some nectar (from the bromeliad *Puya*). Aquatic invertebrates taken include shrimps (Decapoda), small vertebrates include small rodents, and bird eggs and nestlings; feeds on seeds of cultivated cereals, e.g. maize (*Zea mays*) and wheat, and takes both wild fruits (such as *Aristotelia chilensis* and *Berberis*) and cultivated ones (cherries, grapes, apricots). Stomach contents included beetles (Coleoptera), moth caterpillars (Lepidoptera) and grass seeds. Picks chicken food in poultry yards, and household food scraps around houses and barns. Forages mostly on the ground, including on rocky seashores in S Chile. Probes into leaf litter; also finds prey items under pieces of bark and small stones lying on ground. Usually in groups of six to c. 20 individuals.

Breeding. Season Oct–Dec; three nests in Argentina (Victoria I, on L Nahuel Huapi) contained incubated eggs or recently hatched chicks in mid-Dec. Solitary nester, apparently monogamous. Some co-operative breeding. Nest a bulky cup of plant material e.g. twigs, grass stems, bamboo leaves, etc., mixed with some mud, lining of finer material, three nests from Victoria I had external diameter 20–25 cm and internal diameter 11 cm, internal depth 7 cm, placed 1·5–3 m above ground in dense vegetation in low tree or shrub, including native *Chusquea* bamboo and introduced plants e.g. European briar (*Rosa rubiginosa*), elmleaf blackberry (*Rubus ulmifolius*) or common broom (*Cytisus scoparius*). Clutch 3–6 eggs, pale bluish with few black spots and scrawls around large end, sometimes unmarked, mean dimensions 30·2 × 21 mm; no information on incubation and nestling periods, nor on roles of sexes (female has brood patch, presumably incubates); at least six individuals (three colour-ringed) observed to feed chicks at one nest on Victoria I; fledglings fed by several group-members. Not reported as host of *Molothrus bonariensis*, suggesting some effective anti-parasite defences.

Movements. Largely resident. Some movement apparent; nominate race recorded as accidental in S Mendoza (WC Argentina) and on Atlantic coast of Patagonia (Puerto Deseado).

Status and Conservation. Not globally threatened. Common and widespread in much of range; less common in Tierra del Fuego. Tolerates, and even benefits from, moderate transformations of natural landscape. Found in many protected areas, including Puyehue and Vincente Pérez Rosales National Parks (Chile) and Lanín, Nahuel Huapi, Los Alerces and Los Glaciares National Parks (S Argentina).

Bibliography. Christie (2009), Christie *et al.* (2004), Housse (1945), Humphrey *et al.* (1970), Imberti (2005, 2006), Jaramillo (2003), Jaramillo & Burke (1999), Johnson & Goodall (1967), Markham (1970, 1971), Orians, Orians & Orians (1977), Ridgely & Tudor (1989), Sosa (2008), Zapata (1967).

88. Forbes's Blackbird

Curaeus forbesi

French: Carouge de Forbes **German**: Forbesstärling **Spanish**: Chango de Forbes

Taxonomy. *Agelaius forbesi* P. L. Sclater, 1886, Macuca, Pernambuco, Brazil.

Taxonomic status of this species was for a long time uncertain; was sometimes considered a rare hybrid between *Gnorimopsar chopi* and *Chrysomus ruficapillus*. Placed in present genus because bill shape similar to that of *C. curaeus*, but no DNA data available. General behaviour and voice suggest possible relationship with *Macroagelaius*, *Lampropsar*, *Gymnomystax* and *Hypopyrrhus*. Monotypic.

Distribution. E Brazil: Pernambuco and Alagoas; and Minas Gerais.



Descriptive notes. 21–24 cm. Medium-sized, slim, all-dark icterid with long tail, short and rather rounded wing, and pointed bill with flat culmen. Plumage is entirely black, with brownish or dusky tinge on rump, lower back and belly; lanceolate feathers with glossy shafts on head, sometimes also on throat; iris black; bill and legs black. Differs from similar *Gnorimopsar chopi* mainly in smaller size, and slenderer bill with straight culmen and lacking groove on lower mandible. Sexes similar. Juvenile apparently undescribed. VOICE. Rather harsh song a double nasal buzz, with fundamental frequency c. 1·7 kHz. Flight call sounds like "perelet"; alarm call a rattle.

Habitat. In N of range frequents forest edges and nearby marshy pastures, as well as groves of introduced mango trees (*Mangifera indica*). In S (Minas Gerais), R Doce population occurs in a preserved tract of humid Atlantic Forest near a main river, and population at Cavernas do Peruaçu in deciduous forest growing in limestone area (with dry season lasting 6 months). Often reported from sugar-cane fields. Reported at up to 890 m.

Food and Feeding. Arthropods and fruits, but no detailed information. Chicks fed with insects. Forages in small flocks of up to c. 30 individuals; recent reports of flocks containing up to c. 700 individuals.

Breeding. Season Mar–Aug (Alagoas); two broods in a season. Co-operative breeder. During nest-building one individual arranged material brought by other 2–3 individuals; nest a thick cup of plant material (weed stems), sometimes mixed with mud and dung, external diameters 17 cm, height 12 cm, internal diameter 8 cm, depth 6 cm, placed 3–12 m above ground in tree, especially mango (38 of 46 nests), usually anchored to forked branch within thick foliage, sometimes in epiphytic bromeliad or liana. Egg-laying starts 4–10 days after nest completed, clutch 1–4 eggs, usually 3, pale blue to greenish-blue with few black spots and scrawls around large end, mean dimensions 26·3 × 18·6 mm; helpers at nest reported also during incubation stage, incubation period 12–14 days, usually 13 days; chicks fed by several adults, no information on duration of nestling period. Nests frequently parasitized by *Molothrus bonariensis*, e.g. 64% of nests in Alagoas, and most parasitized nests were abandoned; in subsequent studies, parasitism rates of up to 100% recorded.

Movements. Probably resident.

Status and Conservation. ENDANGERED. Restricted-range species: present in Atlantic Slope of Alagoas and Pernambuco EBA. Estimated global population 1000–2499 individuals; probably decreasing. Since initial discovery, in 1880 in Pernambuco and Alagoas, no further records for a century, probably chiefly because of confusion with far commoner *Gnorimopsar chopi*. In early 1980s rediscovered in Alagoas at Pedra Talhada, and in 1988 another population found, this more than 1400 km S, at Rio Doce, in Minas Gerais; in following year was found at other sites in Alagoas, with records from Usina Serra Grande, from near Matriz de Camaragibe, and from forest area known as Pedra Branca (near Murici), as well as from sugar-cane plantations and pastures bordering forest at Engenho Coimbra. More recently, has been recorded in Pernambuco at Usina Trapiche and at Mata do Estado (flocks of up to 709 individuals observed), and at São Vicente Ferrer and Engenho Água Azul, in Timbaúba, and reported as occurring at an additional nine localities in Pernambuco. Currently known from two sites in Minas Gerais, where up to 40 reported from confluence of Piracicaba and Doce rivers, and present on edge of Cavernas do Peruaçu National Park; other reports from Minas Gerais require confirmation. Seems to be naturally rare, but may be declining also owing to human alteration of its environment. Main threat appears to be parasitism by *Molothrus bonariensis*, which has increased in numbers; in addition, *Molothrus rufoaxillaris*, a specialist on icterids, has recently invaded E Brazil and may eventually parasitize this species. Experiments with removal of *Molothrus bonariensis* eggs found in the blackbird's nests are being conducted at Pedra Talhada. This blackbird is also captured for keeping as a pet and for cagebird trade. Occurs in several protected areas: at Pedra Talhada Biological Reserve (Alagoas) protection enforced by guards, but this species occurs mostly outside the reserve; at Rio Doce State Park (Minas Gerais) regularly recorded only in very small area between park entrance and L Carioca; at

Cavernas do Peruaçu National Park (Minas Gerais) seems to be present only at edge (in deciduous forest on limestone), but study in progress.

Bibliography. Anon. (2010d), Butchart & Stattersfield (2004), Jaramillo & Burke (1999), de Lyra-Neves *et al.* (2004), Ridgely & Tudor (1989), Short & Parkes (1979), Sick (1993), Stattersfield & Capper (2000), Studer (1982), Studer & Vielliard (1988), de Vasconcelos, D'Angelo Neto *et al.* (2006), Willis & Oniki (1991).

Genus *AMBLYRAMPHUS* Leach, 1814

89. **Scarlet-headed Blackbird**

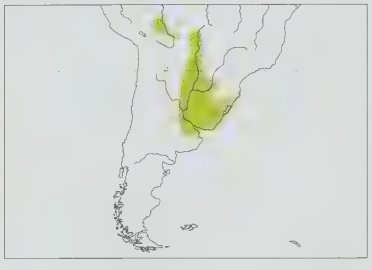
Amblyramphus holosericeus

French: Carouge à tête rouge **German**: Rotkopfstärling **Spanish**: Federal
Other common names: Scarlet-headed Marshbird, Orange-headed Blackbird

Taxonomy. *Xanthornus* (*holosericeus*) Scopoli, 1786, Panay island, Philippines; error = the Paraná River Delta, Argentina.

Analysis of mitochondrial DNA suggests relationship with *Curaeus*, but the two genera differ morphologically and behaviourally. Monotypic.

Distribution. NE Bolivia (Beni and Santa Cruz), most of Paraguay, and S Brazil (S from S Mato Grosso and Santa Catarina, occasionally Paraná and possibly also São Paulo) S to NW & E Argentina (N Salta, Córdoba, and E Chaco S to Buenos Aires) and Uruguay.



Descriptive notes. Male average 25 cm, 86 g; female average 22·5 cm, 75 g. Distinctive red-and-black icterid with sharply pointed, chisel-shaped bill, which sometimes appears slightly upturned. Narrow loral stripe and eyelids black, otherwise entire head, neck, upper breast and thigh bright scarlet-red, remaining plumage black with slight gloss; iris, bill and legs black. Sexes alike. Juvenile is very different from adult, lacks red altogether, has entire plumage brownish-black, paler and washed yellowish on throat and breast; gradually acquires orange-red feathers on head, older immature like adult but duller, sometimes with brown feathers admixed in reddish areas. Voice. Song (in sexual display) variable, may include rattles or a nasal buzz. Characteristic contact call, by both sexes, a long, descending and hesitant whistle, "fee-ee-ee", with some up-and-down pitch variations; has slight metallic quality and can be heard at considerable distances.

Habitat. Tropical to warm-temperate marshes with abundant, tall herbaceous vegetation, particularly with species of sedge (*Cyperus*), *Thalia* and cat-tail (*Typha*); sometimes visits grasslands or agricultural fields near marshes. Lowlands, usually below 600 m.

Food and Feeding. Diet mostly insects, and reported also as eating small frogs; may feed on cultivated maize (*Zea mays*) or sorghum seeds in non-breeding season. Specialized forager, extracts insect larvae (and adults) from stems of marsh plants, using its chisel-shaped bill as a probe and gaping to open stems. Generally found as scattered territorial pairs, but during non-breeding season flocks of up to 100 individuals observed.

Breeding. Season Oct–Dec in C Argentina, extending to Feb/Mar in N Argentina. Solitary nester. Apparently monogamous and strongly territorial. Reported territory sizes exceed 40 ha in Buenos Aires (Argentina). Nest built mostly by female, with some help from male, a sturdy cup-shaped structure built mostly from interlaced strips of *Typha* leaves, lined with finer strips of same material, most with internal diameter 8 cm and depth 7 cm, attached c. 1 m above water to 4–7 plant stems in marsh, favoured plants including duraznillo (*Solanum malacoxylon*), cat-tail and species of *Cyperus*; statement that this icterid builds a covered nest was based on an error. Clutch 3–4 eggs, pale greenish-blue with small spots and blotches in dark brown, mean dimensions 26·2 × 19 mm; incubation by female, male guards nest during this stage, period 13–14 days; chicks fed by both sexes, nestling period 13 days. Nests parasitized by *Molothrus bonariensis*, but aggressive nest-guarding seems to lower incidence of parasitism. Female may breed in juvenile plumage.

Movements. Apparently resident in permanent wetlands, such as Esteros del Iberá, in Corrientes (Argentina). Some movements evident in areas with strong dry season, e.g. most of the Chaco; seasonal movements seem to involve many immatures. Irregular movements also occur; abandons favoured localities during severe droughts, as at Paraná Delta (Argentina) in autumn 1997 (during a La Niña episode).

Status and Conservation. Not globally threatened. Categorized as "vulnerable" in Argentina. Uncommon to locally fairly common. As breeding territories large, this icterid does not occur at high densities. In Argentina, large-scale forestation of lower Paraná Delta with willows (*Salix*) and poplars (*Populus*) has removed or altered natural habitats; recent intensification of cattle-rearing on R Paraná islands, where natural vegetation now subject to extensive fires, probably has a negative effect on this icterid's populations. Drainage of marshes has so far not occurred on a large scale. Sometimes captured for the pet trade, although it cannot survive for long in captivity. Still found in several protected areas, including Beni Biosphere Reserve (Bolivia), San Rafael National Park (Paraguay), Pantanal Mato-grossense National Park (Brazil), Otamendi Reserve, Iberá Natural Reserve and Río Pilcomayo National Park (Argentina), and Bañados del Este Biosphere Reserve (Uruguay).

Bibliography. Azpiroz (1997), Belton (1985), Bornschein & Reinert (2000), Camperi (1990), Di Giacomo (2005), Fernández & Mermoz (2000), Fernández *et al.* (2007), Fraga (2001, 2007), Hartert & Venturi (1909), Jaramillo & Burke (1999), Kaiser (2006), Narosky & Di Giacomo (1993), Nores *et al.* (1991), Orians (1980), de la Peña (1987), Pereyra (1934), Ridgely & Tudor (1989), Schubart *et al.* (1965).

Genus *GNORIMOPSAR* Richmond, 1908

90. **Chopi Blackbird**

Gnorimopsar chopi

French: Carouge chopi **German**: Chopistärling **Spanish**: Chopí

Taxonomy. *Agelaius chopi* Vieillot, 1819, Paraguay.

Molecular data suggest an isolated position for this species, but in external morphology it seems closer to *Oreopsar bolivianus* and *Curaeus curaeus*; in nesting behaviour and voice it resembles *Agelaioides badius*. Race *megistus* sometimes subsumed in *sulcirostris*. Latter apparently intergrades with nominate in E Brazil (N Minas Gerais, possibly also Goiás). Three subspecies recognized.

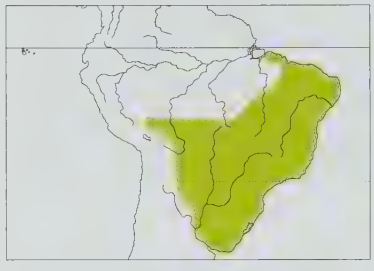
Subspecies and Distribution.

G. c. sulcirostris (Spix, 1824) – NE Brazil E from Maranhão and Ceará and S to Bahia and N Minas Gerais (possibly also N Goiás).

G. c. chopi (Vieillot, 1819) – C & E Brazil (C Mato Grosso E to Goiás, Minas Gerais and Espírito Santo) S to NE Argentina (S to Santa Fe and Entre Ríos) and Uruguay.

G. c. megistus (Leverkühn, 1889) – extreme SE Peru (Pampas de Heath and Madre de Dios) E to E Bolivia (La Paz, Beni and Santa Cruz).

Reported also from S Bolivia (Tarija) and extreme N Argentina (extreme N Salta), but racial assignation of these populations doubtful; they may represent feral populations originated from escaped cagebirds.



Descriptive notes. Male average 23 cm, 73·9 g (nominate), 90·3 g (*sulcirostris*); female 69·7 g. Medium-sized all-dark icterid with groove along base of lower mandible (sulcate bill). Plumage is black overall, with little gloss except on head; head with distinctive shaggy lanceolate feathers with glossy black shafts; iris black, bill and legs black. Sexes alike. Juvenile is duller and more brownish than adult, and often lacks lanceolate head feathers. Readily distinguished from superficially similar *Molothrus bonariensis* and *Molothrus rufoaxillaris* by larger size, bill shape and relative lack of gloss. Race *sulcirostris* is larger and glossier than nominate, with bill more markedly sulcate; *megistus* is very like previous, but smaller. Voice. Song, by both sexes (often in group), variable, musical and complex, mostly a series of loud whistles with rich harmonics, the phrases mixed with trills, rattles and *sotto voce* sounds; some songs appear to include mimicry of other bird species (captives are good mimics); songs of *sulcirostris* (and *megistus*) reputedly more variable and musical, but main difference is lower pitch. Common call a loud "choo-peeh", often included in the song.

Habitat. Large clearings and edges in mesic to humid forest, including Brazilian Atlantic Forest, humid *chaco* and dry Chiquitano Forest and woodland; also open woodland and savanna (*cerrado*, mesic *chaco*). Frequent in palm groves (*Copernicia alba*, *Acrocomia aculeata*, *Butia yatay*). Occurs also in plantations, agricultural and pastoral land, small villages and even suburbs (e.g. in Santa Cruz, in Bolivia); recently reported in suburban La Paz and Cochabamba (Bolivia). Lowlands, nominate race to 1400 m in Brazil; *megistus* mostly in lowlands below 1200 m, but in Bolivia recently reported (probably introduced) at 2000–3400 m in Cochabamba and La Paz.

Food and Feeding. Mostly arthropods and small vertebrates, also seeds, and some fruit and nectar. Vertebrates eaten include a small frog and a recently dead juvenile Yellow-billed Cardinal (*Paroaria capitata*); takes both wild and cultivated seeds, latter including e.g. maize (*Zea mays*) and sorghum; fruits (unidentified) reported in stomach contents; rarely, feeds on flower nectar of native trees (e.g. *Erythrina dominguezii* in Chaco) and of introduced species (e.g. *Grevillea robusta*). Forages mostly on ground. Usually found in groups, and flocks of up to 100 individuals reported in non-breeding season; has well-developed sentinel behaviour. Roosts gregariously, often in bamboo, sometimes with other icterids.

Breeding. Season Oct–Jan in Paraguay, C & SE Brazil and Argentina; juveniles in Mar in E Bolivia. Breeds solitarily or in small colonies of up to seven or so pairs. Co-operative breeder. Nest built by both sexes, a loose or a well-made cup of diverse plant material, also string and scraps of paper, its size and shape fitting chosen cavity; placed inside hole or crevice in tree, in crown of palm (*Butia yatay*, *Copernicia*, *Acrocomia*), in closed nest built by other bird, particularly furnariid such as Rufous Hornero (*Furnarius rufus*) or *Phacellodomus* thornbird, or in crevice or hole in building or other artificial structure (e.g. powerline pole); accepts nestboxes. Clutch 3–5 eggs, bluish-green, sparsely scrawled and spotted in dark brown and blackish, mean dimensions (nominate race) 26·4 × 19·4 mm; incubation by female, period 14–15 days; both parents and helpers feed and defend chicks, nestling period 16–18 days. Nests commonly parasitized by *Molothrus rufoaxillaris* in NE Argentina, Paraguay and Brazil (possibly also in Uruguay and Bolivia), e.g. of 250 nests of present species monitored in study in NE Argentina 46% were parasitized; reported as host also of *Molothrus bonariensis* (based on a parasitized set of eggs in Delaware Museum of Natural History, in USA).

Movements. Resident.

Status and Conservation. Not globally threatened. Relatively common to locally common over most of its range. Quite adapted for living in moderately modified environments. Widely captured and traded as a cagebird for its song, it has become scarce in densely settled rural areas such as Entre Ríos, in Argentina, and also Uruguay; bird-trappers often destroy nest cavities in order to obtain chicks. Found in many protected areas throughout its range.

Bibliography. Azara (1802–1805), Azpiroz (1997), Belton (1985), Coconier *et al.* (2007), Di Giacomo (2005), Fraga (1996, 2006, 2008c), Graham *et al.* (1980), Hayes & Areco de Medina (1988), Hellmayr (1937), Hoy *et al.* (1963), Jaramillo & Burke (1999), de la Peña (1983, 1987), Pinto (1944a), Pizo (2008), Ridgely & Tudor (1989), Sick (1993).

PLATE 80 ➤



PLATE 80

inches 3

cm 8

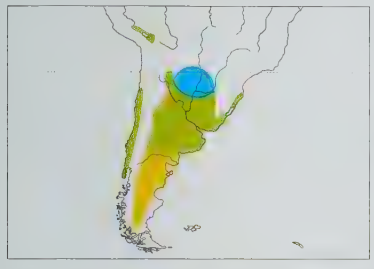
Genus *AGELASTICUS* Cabanis, 1851

91. Yellow-winged Blackbird

Agelasticus thilius

French: Carouge galonné **German**: Goldschulterstärling **Spanish**: Varillero Aliamarillo
Other common names: Yellow-shouldered Blackbird(!)

Taxonomy. *Turdus Thilius* Molina, 1782, Chile.
Genus often subsumed in *Agelaius* or *Chrysomus*. Analysis of mitochondrial DNA indicates that relationship of present species to two congeners (*A. xanthophthalmus* and *A. cyanopus*) is not close. Individuals somewhat intermediate between nominate race and *petersii* occur S of 42° S in Patagonia (Chile and Argentina). Three subspecies recognized.
Subspecies and Distribution.
A. t. alticola (Todd, 1932) – SE Peru (Cuzco, Puno) and W Bolivia (La Paz, Cochabamba and Oruro).
A. t. thilius (Molina, 1782) – Chile (Atacama S to Magallanes).
A. t. petersii (Laubmann, 1934) – breeds Argentina (from at least Santiago del Estero, Santa Fe and Corrientes S to Santa Cruz), Uruguay and SE Brazil (mostly along coastal marshes of Paraná, Santa Catarina and Rio Grande do Sul); in austral winter extends to extreme NE Argentina (Salta, Chaco, Formosa) and most of Paraguay, with few records in Bolivia (Izozog).



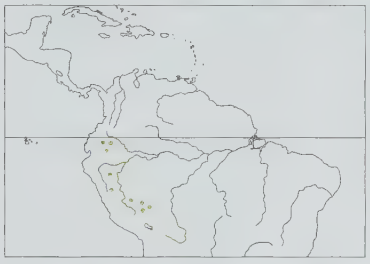
Descriptive notes. Male average 17·9 cm and 33·5 g; female 28·8 g (*petersii*). Male nominate race is entirely dull black, except for yellow marginal and lesser upperwing-coverts (epaulet), and similar pattern on underwing-coverts; iris brown; bill and legs black. Female has prominent pale buff supercilium, contrasting with dark brown, streaked crown and ear-coverts; rest of head and upperparts brown with broad dusky streaking, the brown edges becoming chestnut on lower scapulars and lower back; wing feathers dark brown with paler edges, more chestnut on inner greater coverts, hint of yellow on marginal coverts (but lacks male's epaulet); tail blackish, feathers thinly edged chestnut; light buff-brown below with darker streaking, chin and upper throat unstreaked, often a darker malar stripe; bare parts as for male. Juvenile is like female, but more buffish overall. Races differ mainly in size: *petersii* is smaller than nominate; *alticola* is larger than nominate, also female darker, more streaked, with thinner greyish supercilium (sometimes lacking), and usually with more yellow on marginal upperwing-coverts (sometimes approaching epaulet of male). Voice. Male song (nominate race and *petersii*) quite variable, but includes trills of 3–7 notes (resembling *A. cyanopus*), a whistled warble "tréé-o-lay" (or "séé-you-there"), and a similar warble ending with strong nasal or buzzing tone ("tree-o-lâáây"). Song of *alticola* less nasal. Sharp "chep" call given by both sexes.
Habitat. Patches of emergent aquatic plants, including cat-tails (*Typha*), bulrush (*Schoenoplectus*) and reeds (*Phragmites*), in marshes and wetlands, also surrounding grasslands and agricultural land; tolerates slightly brackish marshes. Roosts in marsh vegetation. May be found in treeless areas. Race *alticola*, the icterid that breeds at highest elevation, occurs mostly in wetlands in L Titicaca basin (Peru–Bolivia). Reported up to 2300 m (*petersii*); 2500–3800 m, rarely up to 4000 m (*alticola*).
Food and Feeding. Insects, including emerging aquatic insects, and seeds. Stomach contents of 85 adults from Buenos Aires province (Argentina) comprised 78% animal food and 22% seeds: animal food was mostly insects (66% of all food items) and included beetles (Coleoptera) of eleven families, mostly weevils (Curculionidae), other insect orders being Lepidoptera (mostly caterpillars and pupae), bugs (Hemiptera) and flies (Diptera); other invertebrates included wolf spiders (Lycosidae), crustaceans (Isopoda, Amphipoda) and molluscs; ingested seeds were mostly of native grasses (Poaceae) and sedges (Cyperaceae), also of families Papaveraceae and Caryophyllaceae. Seeks food items along edge of water and in shallow marshes or on nearby drier land; probes and gapes in stems. Forages in flocks.
Breeding. Season Oct–Dec in Chile and Argentina. Apparently monogamous. Colonial breeder, colonies usually in emergent marsh vegetation, less often in low dense vegetation in uplands but near a marsh; degree of nest-clumping variable, can reach five nests in radius of 5 m. Nest built by female, a well-made cup of plant material, usually pieces of wet rushes, cat-tails or other marsh plants, external diameter 8·5–9·5 cm, external height 7–7·5 cm, usually no more than 1 m above water or ground, mostly in bed of *Schoenoplectus californicus*, sometimes in cat-tails or *Phragmites* reeds, once in a patch of *Philostachys* bamboo near a marsh; if built in reeds, it is attached to several stems. Clutch 2–4 eggs, pale buffish-white with brownish-black spots and lines, mostly at large end, mean dimensions 23·4 × 17 mm; incubation by female, period 12–13 days; chicks fed by both sexes, female's feeding rate the higher in one study, male also guards nest and/or escorts breeding female, nestling period 10–12 days. Nests commonly parasitized by *Molothrus bonariensis*; successfully rears latter's chicks.
Movements. Resident in Uruguay and Brazil. Possibly some altitudinal movement in Peru–Bolivia (race *alticola*). S Argentinian populations of *petersii* (S from S Mendoza) migrate N during austral winter. In extreme NE Argentina and Paraguay mostly, or only, a non-breeding winter visitor; N limits of breeding range in Argentina not well known, but extend at least to Santiago del Estero, Santa Fe and (perhaps) S Corrientes.
Status and Conservation. Not globally threatened. Rather common over most of its range, becoming naturally rarer or local towards subtropics. Scarce but widespread non-breeding visitor in Paraguay. Occurs in several protected areas, including, among others, Laguna Alalay (Bolivia), Vicente Pérez Rosales and Puyehue National Parks (Chile), Nahuel Huapi and Lanín National Parks, Laguna Llancanelo Reserve and Laguna de Mar Chiquita Natural Park (Argentina), Taim Ecological Station (Brazil) and Bañados del Este Biosphere Reserve (Uruguay).
Bibliography. Azpiroz (1997), Belton (1985), Bornschein *et al.* (1997), Camperi (1988), Christie *et al.* (2004), Darrieu *et al.* (2001), Fraga (2002), Guerrero & Arambiza (2001), Hayes *et al.* (1994), Imberti (2003), Jaramillo & Burke (1999), Massoni & Reboreda (2001, 2005), Narosky & Di Giacomo (1993), Nores & Yzurieta (1980), Orians (1980).

92. Pale-eyed Blackbird

Agelasticus xanthophthalmus

French: Carouge à oeil clair **German**: Gelbaugenstärling **Spanish**: Varillero Ojipálido
Other common names: Yellow-eyed Blackbird

Taxonomy. *Agelaius xanthophthalmus* Short, 1969, Tingo Maria, Huánuco, Peru.
Genus often subsumed in *Agelaius* or *Chrysomus*. Present species closely related to *A. cyanopus*. Monotypic.
Distribution. Lowlands of Amazonian Ecuador (Napo) and Peru (San Martín, Huánuco and Madre de Dios).



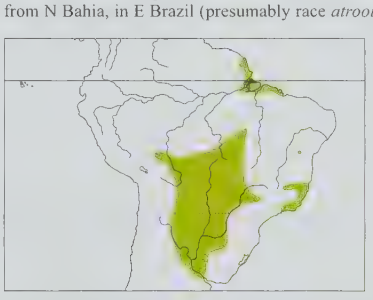
Descriptive notes. Male average 20·5 cm, 43 g; female 18·2 cm. A slender-billed all-dark icterid with pale eyes. Male is entirely black with slight bluish-green gloss, also ultraviolet reflection in crown and supercilium (not reported for related species); iris pale yellow; bill and legs black. Female is very like male, but smaller, somewhat less glossy, also possibly lacking ultraviolet reflection. Juvenile is brown, back feathers and tertials with thin buffy tips, yellowish-buff streaking below, particularly on throat and upper breast, iris dark. Voice. Song, by both sexes, variable series of repeated notes, e.g. "chee-cheee-chee..." or "tew-tew-tew...", also a slow trill; duets reported. Contact call "chek".
Habitat. Wetlands, particularly edges of oxbow lakes, with abundant emergent and floating vegetation; seems to prefer areas dominated by the aquatic grass *Panicum grande*. Up to 650 m.
Food and Feeding. Main food insects; presumably other arthropods, and seeds, also taken. Obtains prey by gaping in the sheathing bases of grass leaves and in clusters of dead leaves; also by gleaning in aquatic vegetation. Reported as catching alate termites (Isoptera) in flight. Moves in pairs and in family groups.
Breeding. Season Nov in Peru. Scant data indicate monogamy and solitary breeding. One nest described, built from plant materials like strips of the grass *Panicum grande*, also leaf strips of *Heliconia metallica*, the vine *Mikania* and the palm *Scheelea cephalotes*, unlined cup 7 cm in diameter, anchored 45 cm above water in aquatic plant *Ludwigia leptocarpa* within clump of *Panicum grande*. Clutch 2 eggs, pale bluish-white with scattered brown blotches, more heavily marked around large end. No further information available.
Movements. Resident.
Status and Conservation. Not globally threatened. Scarce to rare, and very local. Known from very few localities. Because of its restricted range and relatively small populations, it might require listing as Near-threatened (particularly in Ecuador). Protected in Manu National Park and Biosphere Reserve (Peru).
Bibliography. Eaton (2006), Jaramillo & Burke (1999), Kiltie & Fitzpatrick (1984), Orians & Orians (2000), Restall *et al.* (2006), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schulenberg *et al.* (2010).

93. Unicolored Blackbird

Agelasticus cyanopus

French: Carouge unicolore **German**: Einfarbstärling **Spanish**: Varillero Negro

Taxonomy. *Agelaius cyanopus* Vieillot, 1819, Paraguay.
Genus often subsumed in *Agelaius* or *Chrysomus*. Present species is closely related to *A. xanthophthalmus*. Four subspecies recognized.
Subspecies and Distribution.
A. c. xenicus (Parkes, 1966) – NE Brazil (Amapá, NE Pará and N Maranhão); possibly also French Guiana.
A. c. beniensis (Parkes, 1966) – N Bolivia (Beni).
A. c. cyanopus (Vieillot, 1819) – E Bolivia (Santa Cruz) and C & S Brazil (S from Mato Grosso and W São Paulo) S across Paraguay to NE Argentina (S to NE Buenos Aires) and W Uruguay.
A. c. atroolivaceus (Wied, 1831) – coastal plain of E Brazil from Espírito Santo S to Paraná.
A few individuals reported from SW Amazonian Peru may belong to race *beniensis*; reported also from N Bahia, in E Brazil (presumably race *atroolivaceus*).



Descriptive notes. c. 18–21 cm; male average 40·6 g, female 37·4 g. A slender-billed, long-tailed icterid. Male nominate race is entirely black with very slight bluish gloss; iris dark brown; bill and legs black. Female has crown and upperparts brown, boldly streaked blackish, with narrow yellowish supercilium (often ill-defined) and blackish ear-coverts; upperwing brownish, most feathers with conspicuous rufous edging, tail blackish; pale yellow below, streaked dusky brown on flanks, sometimes streaked also on breast, underwing-coverts pale yellow; lower mandible sometimes with bluish-grey to pale horn at base or along entire length. Juvenile resembles female, but more buffy yellow, also more heavily streaked above and below; many males do not acquire adult plumage until second year. Races differ mainly in coloration of female: *atroolivaceus* female is much darker overall than nominate, underparts dark brownish-olive with yellowish wash, palest on throat; *beniensis* is larger than others, female has darker upperparts and underwing-coverts, but underparts somewhat intermediate in tone between previous and nominate; *xenicus* female is distinctive in having entire head to mantle and breast blackish

On following pages: 94. Yellow-hooded Blackbird (*Chrysomus icterocephalus*); 95. Chestnut-capped Blackbird (*Chrysomus ruficapillus*); 96. Saffron-cowled Blackbird (*Xanthopsar flavus*); 97. Yellow-rumped Marshbird (*Pseudoleistes guirahuro*); 98. Brown-and-yellow Marshbird (*Pseudoleistes virescens*); 99. Greyish Baywing (*Agelaioides badius*); 100. Pale Baywing (*Agelaioides fringillarius*).

with olivaceous wash, and dull, dark olive-yellow belly. Voice. Song, apparently by both sexes, alternating liquid "shr-r-le" rattles with series of repeated warbles or trills ("wie-wie-wie-wie", "chie-chie-chee", etc.), somewhat resembling sound of distant car alarm. In courtship also a short buzzing "kt-zéé". Contact call "chieg".
Habitat. Permanent marshes with abundant emergent vegetation, such as sedge (*Cyperus*), *Thalia* and cat-tail (*Typha*), and floating vegetation, such as water-cabbage (*Pistia*), duckweed (*Lemna*) and water-fern (*Azolla*); often the most frequent icterid in extensive wetlands of this type (e.g. Iberá marshes, in Argentina). Also visits surrounding grassland and agricultural fields. Can be found in low riparian vegetation along slow rivers and channels. Sometimes perches on trees. Lowlands; nominate race up to 500 m.
Food and Feeding. Arthropods (mostly insects), small vertebrates and seeds; reported as taking nectar from inflorescences of the vine *Combretum lanceolatum*. Seeds constituted c. 50% of stomach contents; seeds ingested were of aquatic grasses (*Paspalum repens*, *Echinocloa polystacha*) and of Polygonaceae. Feeds on maize (*Zea mays*) and other seed crops, mostly in non-breeding season. Main insect prey in stomach contents were beetles (of families Curculionidae and Dytiscidae) and dipteran flies (of families Chironomidae and Stratiomyidae); vertebrates ingested were mostly small cichlid fishes (*Apistogramma commbrae*) up to 3 cm long. More aquatic than other marsh blackbirds, commonly searching for food while perched on floating vegetation. Picks prey from underside of floating plants (*Pistia*, *Azolla*, etc.) and from water's surface. Forages also on the ground, showing "rolling" behaviour. Often in small groups of fewer than ten individuals, but flocks of c. 100 birds seen in non-breeding season; sometimes joins other icterids, and in marshes may associate with Donacobius (*Donacobius atricapilla*).
Breeding. Season Oct–May (mainly Nov–Feb) in NE Argentina; more than one brood attempted per season. Breeds solitarily or in small colonies of up to 20–30 nests in marshes or flooded grasslands. Nest-building takes 5–10 days, nest cup-shaped and made from interlaced wet plant material (cat-tail and grass leaves) that dries to a cardboard-like consistency, external diameter 8–9 cm, external depth 9–10 cm, built 0·7–1·7 m over water mostly in emergent aquatic plants, e.g. cat-tails (*Typha domingensis*), "piri" (*Cyperus giganteus*) or *Thalia geniculata*, or in the grass *Panicum prionites* or in aquatic shrub *Solanum malacoxylum* or *Ipomea malvaeoides*. Clutch 3 eggs, pale greenish-blue with grey and brownish spots, also blackish lines, mostly around large end, mean dimensions 23·2 × 16·8 mm; incubation by female, period 12 days; chicks fed by both parents, nestling period 11 days; three broods of well-feathered fledglings in Iberá marshes (Argentina) fed only by female, roles of sexes in parental care require more study. Nests parasitized by *Molothrus bonariensis*.
Movements. Apparently sedentary.
Status and Conservation. Not globally threatened. Locally numerous; rare and local in Rio Grande do Sul (S Brazil) and Uruguay. Appears to be locally abundant particularly in Bajo Chaco (Paraguay), the Iberá marshes (Argentina), parts of the Pantanal (S Brazil and nearby areas) and the Beni savannas (Bolivia). Occurs in several protected areas, including Beni Biosphere Reserve (Bolivia), Pantanal Mato-grossense National Park (Brazil), Isla Yacyretá Reserve (S Paraguay), and Predelta and Chaco National Parks and Iberá Natural Reserve (Argentina).
Bibliography. Azpiroz (1997), Babarskas & López Lanús (1993), Beltzer & Paporello (1983), Bornschein *et al.* (1999a, 1999b), Di Giacomo (2005), Engblom & Durand (2010), Fraga (2001, 2007), Hayes (1995), Jaramillo & Burke (1999), Narosky & Di Giacomo (1993), Parkes (1966), Quiroga & Beltzer (2002), Sick (1993), da Silva & Colombo Rubio (2007).

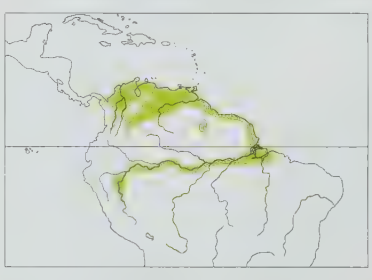
Genus *CHRYSOMUS* Swainson, 1837

94. Yellow-hooded Blackbird

Chrysomus icterocephalus

French: Carouge à capuchon **German**: Gelbkopfstärling **Spanish**: Varillero Capuchino

Taxonomy. *O.[riolus] icterocephalus* Linnaeus, 1766, Cayenne, French Guiana.
Genus often subsumed in *Agelaius*. Behavioural and molecular data indicate that this species is closely related to *C. ruficapillus*. Two subspecies recognized.
Subspecies and Distribution.
C. i. icterocephalus (Linnaeus, 1766) – N Colombia (S to N Tolima, Meta and Vichada), Venezuela (mostly N of R Orinoco), Trinidad, the Guianas, N Brazil (Roraima; both banks of R Amazon E to Amapá and NW Maranhão) and NE Peru (Loreto).
C. i. bogotensis (Chapman, 1914) – NC Colombia (highlands around Bogotá).



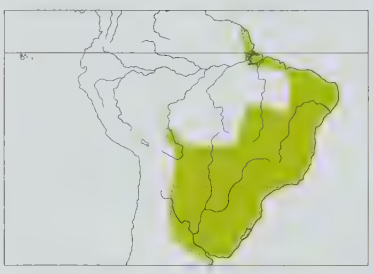
Descriptive notes. c. 17–19 cm; male average 35·9 g, female average 26·8 g. Male nominate race has head to throat and upper breast bright yellow, lores black; rest of plumage glossy black; iris dark brown; bill and legs black. Female has supercilium and throat to uppermost breast yellow, rest of face and crown citrine; upperparts dull greyish-olive with dusky streaking, wing and tail darker, more brownish-olive; underparts olive, more brownish on belly, faintly streaked olive; bill blackish, often paler at base of lower mandible. Juvenile is like female, but duller, with less yellow on head, paler upperparts, buffish underparts obscurely streaked; immature male like female, but brighter and more extensive yellow on throat, and may show black feathers in underparts and upperparts. Race *bogotensis* is larger than nominate, female darker, with head less yellowish, dusky olive or blackish mask over lores to ear-coverts strongly contrasting with long, narrow superciliary skirting ear-coverts and meeting a rather well-defined yellow bib. Voice. Male has two song types, one consisting of brief notes or whistles followed by harsh buzz, the other a more variable and pleasant sequence of warbles or whistles; the two types may be alternated; song structures similar to those of male *C. ruficapillus*, but tone harsher and less musical. Group singing frequent. Call "chek", also a descending whistle.
Habitat. Marshes (permanent or seasonal) with emergent aquatic plants such as cat-tails (*Typha*), bulrushes (*Schoenoplectus*), *Thalia* and similar; along R Amazon and main tributaries found mostly in *várzea* grasslands with grasses *Paspalum* and *Echinochloa*. Also humid savannas and mangroves, and agricultural land; particularly active in abandoned rice fields. Forages in ploughed fields. Lowlands to 1000 m (nominate race); race *bogotensis* to 2600 m.
Food and Feeding. Diet seeds and insects. Among seeds cultivated rice important; feeds also on wild rice (*Oryza perennis*). Insects in stomach contents included caterpillars (Lepidoptera) and weevils (Curculionidae). Nestling diet mostly insects, especially katydids (Tettigoniidae) and other Orthoptera. Forages mostly in grass and vegetation; occasionally on ground. Brood-feeding females of nominate race commonly obtain food outside male's territory, but *bogotensis* females locate food items within it. Found in small groups; in non-breeding season often in larger flocks, sometimes of several hundred individuals.
Breeding. Season mainly Jul–Oct in Venezuela (Oct–Nov in *llanos*), May–Nov in Trinidad, and Mar–Sept in Suriname; Mar–May in C Colombia (race *bogotensis*); breeding highly synchronized in seasonal Venezuelan *llanos* and other localities with clear-cut rainy season. Harem or successive polygyny the usual mating systems, harems small (mostly 2–5 females); solitary nesters and some colonial ones monogamous. Mostly colonial, in colonies of variable size (up to 100 nests reported) in or near marshes, or in rice fields; some nests solitary, or scattered in semi-colonies. Male territory 15–50 m in diameter (Trinidad, Suriname), smaller, 4–8 m in diameter, in *llanos*; average 308 m² in C Colombia (race *bogotensis*). Nest built by male, cup-shaped, made from wet plant material that dries up, external diameter 10·1 cm and external depth 9·1 cm (nominate race), or respectively 11·2 cm and 10·4 cm (*bogotensis*), tied to several stems usually 0·5–1 m above water in emergent aquatic vegetation (*Thalia*, *Eleocharis*, *Cyperus*, *Leersia*), rarely in tree or shrub near water; if female accepts nest, she lines it, male then remains with her until second day of incubation; many nests remain unused (in *llanos*, c. 33% of territorial males do not obtain a female). Clutch 2–4 eggs, pale blue to white with sparse blackish spots and lines around large end, mean dimensions 22 × 16·3 mm (Trinidad); incubation by female, in *llanos* starting with first egg (hatching asynchronous), period 11–13 days; chicks fed by female, some male participation, nestling period 11–12 days; male defends nest against predators and parasitic *Molothrus bonariensis*. About 30–40% of nests parasitized by *Molothrus bonariensis*; female seldom removes latter's eggs, but deserts if three or more parasite eggs (in *llanos* only 14% of parasitized nests produced cowbird chicks). Nesting success quite variable from one year to another in *llanos* population, depending on rainfall.
Movements. Largely resident. Local movements reported from areas with strongly marked dry season, such as Venezuelan *llanos*. Nominate race recorded as accidental in Netherlands Antilles.
Status and Conservation. Not globally threatened. Fairly common to locally common. Race *bogotensis*, with very small range, may merit local protection.
Bibliography. Belcher & Smooker (1937), Cadena *et al.* (2011), Cruz & Andrews (1989), Cruz *et al.* (1990), ffrench (1991), Haverschmidt (1968), Hilty (2003), Jaramillo & Burke (1999), Lowther *et al.* (2004), Manolis (1982), Naranjo (1995), Restall *et al.* (2006), Ridgely & Tudor (1989), Wiley & Wiley (1980a, 1980b).

95. Chestnut-capped Blackbird

Chrysomus ruficapillus

French: Carouge à calotte rousse **German**: Braunkopfstärling **Spanish**: Varillero Congo
Other common names: Rufous-headed Blackbird

Taxonomy. *Agelaius ruficapillus* Vieillot, 1819, Paraguay.
Genus often subsumed in *Agelaius*. Behavioural and molecular data indicate that this species is closely related to *C. icterocephalus*. Races probably once separated, but now appear to meet and possibly intergrade in SE Brazil (São Paulo). Two subspecies recognized.
Subspecies and Distribution.
C. r. frontalis (Vieillot, 1819) – coast of French Guiana, and E Brazil (Amapá, including Marajó I, E to Rio Grande do Norte, then S to Goiás, Minas Gerais and São Paulo).
C. r. ruficapillus (Vieillot, 1819) – E Bolivia (Santa Cruz) and S Brazil (Mato Grosso do Sul E to São Paulo and Rio Grande do Sul) S to NE Argentina (NE La Pampa and Buenos Aires) and Uruguay.



Descriptive notes. Males average 18·5 cm, 41·3 g; female average 17·1 cm, 32·2 g. Male nominate race has most of crown, throat and uppermost breast deep dark chestnut (looking black in poor light or at distance), rest of plumage black with slight bluish gloss; iris dark brown; bill and legs black. Female has indistinct buffish supercilium, is olivaceous brown above, faintly streaked with dusky; throat and upper chest pale buff to tawny, underparts dull olivaceous buff, all with faint dark streaking. Juvenile is similar to female, but paler, more buff-brown, with upperwing-coverts edged warmer brown, underparts more heavily streaked. Race *frontalis* male has crown and throat ferruginous, paler than nominate, and with narrow black band around base of bill, female has yellowish tinge on head and more visibly on throat. Voice. Males have two song types, sometimes produced in alternate sequences: one type starts with clicks, warbles or whistles and ends in descending nasal buzz, whereas the other can be quite musical, either a series of loud, short and tremulous whistles around a sustained pitch (like a flute playing coloratura) or flute-like notes on ascending scale (Brazilian name "do-re-mi"); much variation among males, even within single colony. Songs of N race *frontalis* similar to those of nominate, but harsher in tone. Much group singing performed by both races. Soft contact call "zeb"; also a "peet" call.
Habitat. Marshes (permanent or temporary), rice fields, wet grasslands and agricultural fields; invades recently flooded areas. May appear in open woodlands near wetlands, sometimes nesting and roosting in trees. N race *frontalis* commonly seen in irrigated fields, and around barnyards and corrals in the *caatinga*.
Food and Feeding. Seeds, insects and spiders (Araneae). Feeds heavily on cultivated rice seeds (12–62% of stomach contents); in natural conditions feeds mostly on grass seeds (especially *Sorghastrum*, *Paspalum* and *Echinocloa*). Forages on emergent vegetation in marshes, but also on ground in dry soil. Gregarious, almost invariably in flocks of up to 1000 individuals, sometimes several thousands; in Argentina males may segregate in separate flocks during Mar–Apr. Sometimes associates with other icterids, such as *Molothrus bonariensis* and, in interior NE Brazil, *Agelaioides fringillarius*.
Breeding. Season Nov–Mar in C & SE Brazil (both races) and Apr–May in NE (*frontalis*). Mating system sequential or harem polygyny, males spending most of their time in singing and displaying. A few solitary nests, but generally a colonial breeder in or near marshes, also in rice fields; colonies in natural (non-agricultural) habitat small, usually 10–30 nests (six in temperate Buenos Aires province had 6–29 active nests), whereas up to 350 nests per colony reported in rice-growing areas of NE Argentina, Uruguay and S Brazil. Nest built by male, cup-shaped, made from wet plant material (grass and sedges) that dries to a solid structure, external diameter 9–12·5 cm and external

depth 8–10 cm, sited in emergent aquatic vegetation e.g. giant bulrush (*Schoenoplectus californicus*), cat-tails (*Typha*), durazznillo (*Solanum malacoxylon*) and the like, less commonly in tree or shrub e.g. willow (*Salix humboldtiana*), *Sapium haematospermum* or similar, or even eucalypt (*Eucalyptus*) growing near marshes, ditches or rice fields; if female accepts nest, she lines it with thin fibres; a certain number of nests remain unused. Clutch 3–4 eggs, pale blue with few blackish spots and lines around large end, mean dimensions 23·4 × 17 mm (nominate race); incubation by female, period 13 days; chick fed mostly by female, nestling period 13 days; male may defend colony against aerial predators; post-breeding flocks composed only of females and dependent chicks common. Frequent host of *Molothrus bonariensis*, with almost 50% of nests parasitized; parasitism more intense in first months of breeding season.

Movements. Little reliable or detailed information. Movements seem to occur mostly in response to droughts and floods, particularly at S edge of range; becomes rare in C Chaco during dry winter season. During severe drought in Nov–Feb of 2008–2009 almost absent from R Paraná delta in Argentina, but numerous flocks arrived within a week of first rains in Mar.

Status and Conservation. Not globally threatened. Common to locally abundant. Expanding its range, notably in C Brazil. Much attracted to rice fields, and regarded as a major agricultural pest in rice-growing areas in S & SE Brazil (especially Rio Grande do Sul), Paraguay, Uruguay and NE Argentina. Attempts to control its population, including use of poisoned baits (causing huge mortality of other birds, too) have not been successful in reducing this species' numbers; also, studies in Argentina suggest that damage done to rice is exaggerated, and partly compensated by the species' consumption of insects harmful to the crop. Elsewhere in its range, this blackbird is usually tolerated. Occurs in several protected areas, including Amboró National Park (Bolivia), Pantanal Matogrossense National Park (Brazil), and Río Pilcomayo, Chaco and Pre-Delta National Parks (Argentina).

Bibliography. Azpiroz (1997), Bello Falavena (1988), Belton (1985), Blanco (1995), Bruggers & Zaccagnini (1994), Di Giacomo (2005), Fraga (2007), Jaramillo & Burke (1999), Klimaitis (1973), Lowther *et al.* (2004), Lyon (1997), Narosky & Di Giacomo (1993), Restall *et al.* (2006), Ridgely & Tudor (1989), Sick (1993).

Genus *XANTHOPSAR* Ridgway, 1901

96. Saffron-cowled Blackbird

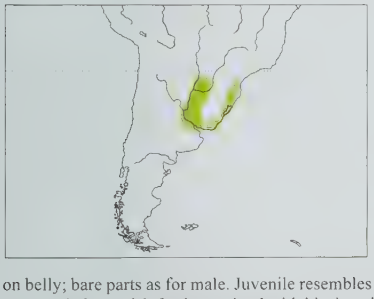
Xanthopsar flavus

French: Carouge safran **German**: Gilbstärling **Spanish**: Tordo Amarillo
Other common names: Saffron-crowned Blackbird; Yellow-throated Oriole ("*xantholemus*")

Taxonomy. *O.*[*riolus*] *flavus* J. F. Gmelin, 1788, "in Antigua insulae Panay et America australi" = Río de la Plata, Argentina and Uruguay.

Genus sometimes subsumed in *Agelaius*. Molecular data indicate close affinity with *Pseudoleistes* and more distant relationship to *Chrysomus*, these findings supported by behavioural data. In morphology resembles more the last two genera, but with rather stout tarsometatarsus and thin bill. Form *Icterus xantholemus*, based on a single speciment from S Brazil but erroneously published as from Ecuador, has been shown to be a synonym of present species. Monotypic.

Distribution. SE Paraguay and SE Brazil (from Santa Catarina, rarely Paraná) S to NE Argentina (Corrientes and Entre Ríos) and Uruguay.



Descriptive notes. Male average 20 cm, 42·5 g; female average 39·3 g. Male has hindcrown to back, wing and tail glossy black; rest of head and entire underparts yellow, tinged orange on forehead and breast; yellow epaulet formed by lesser and marginal upperwing-coverts, with similar pattern on underwing; rump yellow; thigh black, rearmost undertail-coverts black with yellow tips; iris orange-brown to deep red-brown; bill and legs black. Female has narrow eyestripe, crown, nape, back, wing and tail brownish-grey, remaining parts of head (including supercilium) and body (including rump) yellow, paler on belly; bare parts as for male. Juvenile resembles female, with rump lemon-yellow; yearling male may retain brownish feathers mixed with black and yellow in head and upperparts. Voice. Song, by both sexes, brief and unmusical, starts with short whistled or warbled notes, ends with rasping "kluiiiiiii". Commonest call "chep"; during nesting, an alarm whistle.

Habitat. Wet grassland, bogs and marshes, usually in open environments. In treeless areas in Argentinian *pampas*, but elsewhere tolerates some arboreal vegetation. In SE Paraguay found in abrupt interface between open grasslands (*campos*) and interior Atlantic Forest, living in large (50–100 ha) natural patches of grassland and marsh surrounded by dense subtropical forest or stands of the arboreal bamboo *Bambusa angustifolia*. Also in rice fields, even when breeding. In Entre Ríos (Argentina) occupies rolling countryside with fertile soils, mostly covered with agricultural fields and cattle pastures. In highlands of Rio Grande do Sul (Brazil) found in grassland near *Araucaria* forest. Up to 1000 m.

Food and Feeding. Insects, spiders (Araneae), small vertebrates (frogs); rarely, seeds (including some cultivated plants). Faecal analyses indicate that insects and spiders comprise bulk of diet; insects consumed represent all main orders, i.e. Hemiptera, Coleoptera, Lepidoptera, Diptera, Hymenoptera. Forages mostly on the ground, where flocks use "rolling" technique. Probes and gapes in soil, and picks prey from grass and low vegetation. Also captures alates of ants (Formicidae) in air. Food for chicks often obtained hundreds of metres from nest or colony. Sociable, in small groups and larger flocks; often associates with other bird species, notably Black-and-white Monjita (*Xolmis dominicanus*), also Streamer-tailed Tyrant (*Gubernetes yetapa*), and with *Pseudoleistes*.

Breeding. Season Oct–Dec, breeding activities in colony usually synchronized; apparently single-brooded. Nests solitarily or in small colonies of up to c. 30–40 nests, in shallow marshes or abandoned rice fields, sometimes on dry land (e.g. most of Entre Ríos, in Argentina). Evidence of possible co-operative breeding, with male helpers at nest. Nest built by female, an open cup made from plant material, mostly grass stems and leaves, lined with plant fibres external diameter 12–15 cm and depth 7–8 cm, placed up to 1 m above ground in emergent marsh vegetation such as *Ludwigia*, aquatic grasses, sedges e.g. *Rhynchospora corymbosa*, or in herbaceous vegetation including weeds such as thistles (*Cirsium vulgare*) or teasels (*Dipsacus fullonum*), or in low shrub e.g. *Baccharis*; a few nests built on the ground. Clutch 3–5 eggs, usually 4, pale with dense brick-red spotting; incubation by female, sometimes fed by male, period 12–13 days; both parents defend nest and feed chicks, nestling period usually 12 days. Nests parasitized by *Molothrus bonariensis*; in Entre Ríos, host chicks outnumber parasite chicks in post-breeding flocks.

Movements. Resident, although subject to some local movements.

Status and Conservation. VULNERABLE. Rare to locally uncommon; declining. Estimated global population 2500–10,000 individuals, and possibly no more than 5000. Range was once larger, but species possibly not common or widespread even in 19th century. In 1800s, range extended from S Brazil and most of Paraguay S over much of N & C Argentina (including rural suburbs of Buenos Aires city) and most of Uruguay; by end of that century, its range had decreased, especially in Argentina, where the species became extinct in most of Buenos Aires Province (last nesting attempt in 1932). Currently, small populations survive in E Paraguay, NE Argentina (parts of Entre Ríos and Corrientes), SE Brazil (mostly Rio Grande do Sul) and S & E Uruguay. Decline probably due to several factors: this species is captured (illegally) for cagebird trade during breeding season, which can destroy entire colonies; habitat destruction through large-scale replacement of natural grassland by pine (*Pinus*) and eucalypt (*Eucalyptus*) plantations, coupled with drainage of wetlands, a serious problem, and was probably a major cause of extinction of populations in Buenos Aires Province; fires during the breeding season, for centuries used as a tool in management of cattle, probably had serious impact; parasitism by *Molothrus bonariensis*, reported as long ago as 1881, no doubt exacerbates effects of other problems. Found in several protected areas, including San Rafael National Park (Paraguay), Aparados da Serra National Park (Brazil), and Bañados del Este Biosphere Reserve, including Potrerillo de Santa Teresa Reserve (E Uruguay). Generally unprotected in Argentina.

Bibliography. Anon. (2010d), Azpiroz (1997, 2000), Barreiro & Pérez del Val (2000), Belton (1985), Butchart & Stattersfield (2004), Codesido & Fraga (2010), Collar *et al.* (1992), Di Giacomo, A.S. *et al.* (2010), Dias & Mauricio (2002), Doering & Lorentz (1939), Esquivel *et al.* (2007), Fonseca *et al.* (2004), Fraga (2002, 2005b, 2008a), Fraga *et al.* (1998), Jaramillo & Burke (1999), Krüger & Petry (2010), López (1996), Narosky & Di Giacomo (1993), Pereyra (1933), Petry & Krüger (2010), Sick (1993), Stattersfield & Capper (2000).

Genus *PSEUDOLEISTES* P. L. Sclater, 1862

97. Yellow-rumped Marshbird

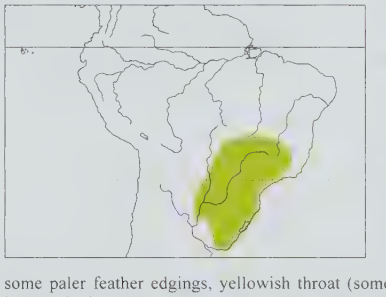
Pseudoleistes guirahuro

French: Carouge guirahuro **German**: Gelbbürzelstärling **Spanish**: Tordo Güirahuró
Other common names: Yellow-rumped Blackbird

Taxonomy. *Agelaius guirahuro* Vieillot, 1819, Paraguay and Río de la Plata.

Closely related to *P. virescens* and to *Xanthopsar flavus*. Monotypic.

Distribution. SE Brazil (S from S Goiás, Minas Gerais and Rio de Janeiro) S to E Paraguay, NE Argentina (Corrientes and N Santa Fe, rarely N Entre Ríos) and N Uruguay.



Descriptive notes. Male average 25·5 cm and 91·2 g; female 81·9 g. Head to upper breast blackish-brown, upperparts brown, except for rich yellow rump; most of wing and tail brown, lesser and median upperwing-coverts rich yellow, similar pattern on underwing; underparts from lower breast to lower belly rich yellow, undertail-coverts brown, narrowly margined yellow; iris brown; bill and legs blackish. Differs from similar *P. virescens* mainly in yellow rump, yellow flanks and generally darker brown and more contrasted appearance. Sexes similar. Juvenile is similar to adult, but duller and browner above, with some paler feather edgings, yellowish throat (sometimes also ear-coverts), paler yellow below, breast with broad brownish streaks. Voice. Song a mix of whistles, warbles, slurs and nasal buzzes, usually slower, less screechy and more pleasant than that of *P. virescens*; commonly vocalizes in group. Common calls are "kwet-kwetéé" and "koink". Often calls and sings in flight.

Habitat. Marshes and adjoining uplands, bogs and wet grasslands; also humid or flooded savannas, provided that tree cover not dense. One of the few icterids found in *cerrado*. W of R Paraguay in Paraguay and NE Argentina, occurs locally in marshes in humid Bajo Chaco. Commonly found in rice fields. Lowlands to 1400 m.

Food and Feeding. Insects and other arthropods, small vertebrates, and some seeds. Stomach contents in Paraguay included bugs (Hemiptera) and beetles (Coleoptera). Sometimes feeds on spilled rice left by harvesting machines. Forages on ground and in low vegetation. Has well-developed sentinel behaviour. Found in groups of up to 50 individuals when not breeding; sometimes associates with other icterids, particularly *Xanthopsar flavus*.

Breeding. Season Oct–Jan in Paraguay and Oct–Nov in Brazil (Rio Grande do Sul). Nests solitarily. Co-operative breeder, with up to six helpers at nest. Most nest-building by female, nest a solid and bulky cup of plant material mixed with mud, lined with rootlets and fine grass, placed low down (up to 2·5 m above ground) in herbaceous vegetation or grasses, in emergent marsh vegetation such as cat-tails (*Typha*), or in low shrub or small tree (*Sapium haematospermum*), or even palm (*Copernicia australis*). Clutch 3–6 eggs, white to pinkish-white with reddish-brown, violaceous-grey and purple blotches and spots, mean dimensions 25·6 × 19·3 mm; incubation by female, commonly fed by mate, period 14 days; chicks fed by both parents, also by helpers, estimated nestling period 12 days; soon after fledging, most chicks travel in post-breeding flocks with parents; trios seen at nests in Paraguay and Argentina (Corrientes), also feeding fledglings. Host of *Molothrus bonariensis*, sometimes rearing latter's chicks.

Movements. Resident.

Status and Conservation. Not globally threatened. Fairly common in most of range; in Argentina common only in N Corrientes and S Misiones; numerous in E Paraguay, but rarer in the Chaco. A single old report from Buenos Aires (Argentina) apparently invalid. Present in several protected areas, including Ybicuí and San Rafael National Parks and Mbaracayú Forest Nature Reserve (Paraguay), Serra do Cipó and Brasília National Parks (Brazil), and Iberá Natural Reserve and Mburucuyá National Park (Argentina).

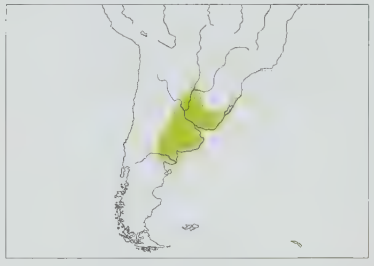
Bibliography. Azpiroz (1997), Belton (1985), del Castillo & Clay (2004), Di Giacomo (2005), Fraga (2001), Fraga & Di Giacomo (2004), Fraga *et al.* (2003), Hartert & Venturi (1909), Hayes (1995), Jaramillo & Burke (1999), Pacheco *et al.* (1997), Ridgely & Tudor (1989), Sick (1993).

98. **Brown-and-yellow Marshbird**

Pseudoleistes virescens

French: Carouge dragon **German**: Drachenstärling **Spanish**: Tordo Pechiamarillo
Other common names: Yellow-breasted Marshbird

Taxonomy. *Agelaius virescens* Vieillot, 1819, Buenos Aires, Argentina.
Closely related to *P. guirahuro*. Monotypic.
Distribution. Extreme S Paraguay (Ñeembucú) and SE Brazil (Santa Catarina and Rio Grande do Sul) S to EC Argentina (E from E San Luis, S to Buenos Aires, E La Pampa and NE Río Negro) and Uruguay.



Descriptive notes. Male average 24 cm, 79·6 g; female average 72·9 g. Head to upper breast, upperparts and most of wing are deep brown to olive-brown, lesser upperwing-coverts and bend of wing rich yellow, forming very small epaulet (visible in flight) with similar pattern on underwing; tail deep brown to olive-brown; lower breast and belly rich yellow, flanks, thighs and undertail-coverts olive-brown; iris brown; bill and legs blackish. Differs from *P. guirahuro* in browner and less colourful appearance and brown rump. Sexes similar. Juvenile is similar to adult, but throat yellowish and breast striped pale yellow and brownish, lower mandible yellowish; this plumage lasts for only a short time. Voice. Noisy. Song a mixture of call notes, a series of screechy chattering notes mixed with ascending or (rarely) descending whistles. A common call, by both sexes, a loud repeated "chrrr-wéé", often given in chorus before flock departs; usual alarm call a loud wooden rattle. Much group calling, even in flight.
Habitat. Marshes and wet grasslands, pastures, even agricultural fields and roadsides; sometimes in treeless areas. Locally common in rolling and rocky landscapes near streams, e.g. Sierra de la Ventana, in Buenos Aires (Argentina). Commonly roosts in emergent vegetation in marshes or in tall grass clumps, e.g. *Panicum prionites* and pampas grass (*Cortaderia selloana*). Lowlands; non-breeding visitors reported occasionally to 2100 m in NW Argentina.
Food and Feeding. Insects and other arthropods, small vertebrates, rarely seeds. Arthropod prey include spiders (Araneae), particularly wolf spiders (Lycosidae), also beetles (Coleoptera), Orthoptera and Lepidoptera. Spiders formed 13% and seeds 7% of stomach contents. Forages on ground, probing and gaping in soil or in low vegetation; will turn over objects (such as cow dung) to find hidden items. Forages in flocks, usually leaving some individuals as sentinels. In non-breeding season flocks reportedly contain up to 40–50 individuals; associates with other ground-feeding icterids, such as cowbirds and *Xanthopsar flavus*, less commonly with its congener *P. guirahuro*.
Breeding. Season Aug–Dec in Argentina; starts to nest earlier than sympatric icterids, some fledglings by end of Sept. Co-operative breeder, with up to six helpers. Commonly in small groups or colonies, inter-nest distance variable, sometimes as little as 4 m. Appears to be non-territorial. Nest-building mostly by female, nest a solid bulky cup of plant material mixed with mud, lined with rootlets and fine grass, placed low down in herbaceous vegetation such as pampas grass, introduced thistles (*Cynara* and *Carduus*), cat-tails (*Typha*) or similar, or in low shrub or small tree (*Sambucus australis*, *Celtis spinosa*). Clutch 3–6 eggs, white with reddish-brown blotches and spots; incubation by female, commonly fed by mate, period 14 days; chicks fed by both sexes, assisted by helpers, nestling period 11–12 days; soon after fledging, most chicks and their families travel in post-breeding flock. Nests parasitized by *Molothrus bonariensis* and *Molothrus rufoaxillaris*; rears chicks of these.
Movements. Apparently non-migratory, but flocks move considerable distances in non-breeding season. Possibly only accidental in NW Argentina (Jujuy, Salta and Tucumán), where flocks reported too irregularly to constitute true migration; movements perhaps linked to floods during rainy years.
Status and Conservation. Not globally threatened. Common and rather widespread, particularly in EC Argentina and Uruguay. Drainage of wetlands may have eliminated some areas of suitable habitat in the Pampas, but this species seems quite tolerant of moderate human disturbances. Present in several protected areas, including Otamendi Reserve (Argentina), Lagoa do Peixe National Park and Taim Ecological Station (Brazil) and Bañados del Este Biosphere Reserve (E Uruguay).
Bibliography. Azpiroz (1997), Belton (1985), Darrieu & Camperi (1998), Darrieu *et al.* (1996), Duré Ruiz *et al.* (2008), Fraga (2002), Fraga *et al.* (2003), Gibson (1918), Jaramillo & Burke (1999), Mermoz & Reboreda (1994, 1996, 1998, 1999, 2003), Narosky & Di Giacomo (1993), Nores & Yzurieta (1980), Orians (1980), Orians, Orians & Orians (1977), Ridgely & Tudor (1989), Svagelj *et al.* (2009).

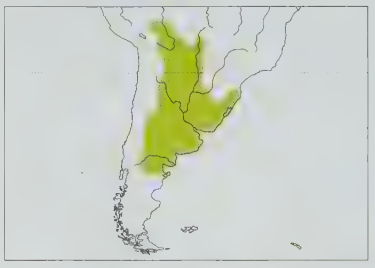
Genus *AGELAIOIDES* Cassin, 1866

99. **Greyish Baywing**

Agelaioides badius

French: Carouge à ailes baies **German**: Graukuhstärling **Spanish**: Tordo Músico
Other common names: Bay-winged Cowbird, Baywing

Taxonomy. *Agelaius badius* Vieillot, 1819, Paraguay.
Genus formerly subsumed in *Molothrus*. Sometimes treated as conspecific with *A. fringillarius*, but the two differ in plumage coloration, vocalizations and some details of social behaviour. Behaviour suggests close relationship with monotypic genera *Gnorimopsar* and *Oreopsar*, and this is supported by molecular data. Races probably intergrade in Bolivia. Two subspecies recognized.
Subspecies and Distribution.
A. b. badius (Vieillot, 1819) – E Bolivia (Beni) and S Brazil (Mato Grosso do Sul and Rio Grande do Sul) S to S Argentina (N Chubut) and Uruguay.
A. b. bolivianus (Hellmayr, 1917) – C & S Bolivia.
Descriptive notes. Male average 18·6 cm, 46·6 g; female average 18·4 cm, 43·7 g. Nominate race is brownish-grey overall, with blackish lores and narrow mask around eye; upperwing blackish,



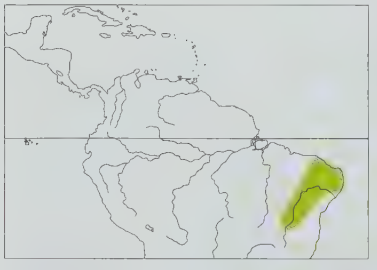
feathers with broad rufous edgings (wing appears rufous), tail blackish with narrow brownish or greyish fringes; iris dark brown; bill and legs black. Differs from juvenile of *Molothrus rufoaxillaris* (which closely mimics that of present species) mainly in smaller size, shorter wing, somewhat smaller bill, paler wing-linings. Sexes similar. Juvenile is similar to adult, but mask not so dark, outer tail feathers edged rufous, inside of mouth pinkish (rather than black). Race *bolivianus* is very similar to nominate, but slightly larger and on average somewhat greyer in coloration. Voice. Song, by both sexes, slow, musical and continuous, a mix of trills, whistles, slurs, warbles and short buzzing notes; quite variable among individuals. Much group singing, particularly around roost. Contact calls "chuck" and a loud whistle, "peeh".
Habitat. Open woodland, savanna and scrub, from mesic to xeric. Prefers edges or clearings, and rare within dense unbroken woodland; almost absent from Atlantic Forest in E Paraguay and NE Argentina (Misiones). Common in *chaco* woodland with *Prosopis*, *Aspidosperma*, *Schinus* and similar, and arborescent cacti; seen also in palm savannas with yatay palm (*Butia yatay*). In the Monte Desert of W Argentina usually near water or in the most humid locations, but visits nearby scrub. Nowadays frequents agricultural and pastoral land, parks, plantations, gardens, even suburbs of large cities (e.g. Buenos Aires, Argentina). Nominate race from lowlands to 3100 m (in NW Argentina); *bolivianus* in montane valleys at up to 3200 m.
Food and Feeding. Seeds, insects (particularly Orthoptera and Lepidoptera) and other invertebrates, including spiders (Araneae) and amphipods; also some fruit, and rarely nectar, latter from flowers of introduced Australian trees such as eucalypts (*Eucalyptus*) and *Grevillea*. Seeds predominate in stomach contents. In agricultural areas feeds on cultivated seeds of e.g. maize (*Zea mays*), sunflower (*Helianthus*) and sorghum, but also on weed seeds (*Chenopodium*, *Amaranthus*, thistles). Nestling diet includes large mantids (Mantidae). Forages on bare ground, also in dense vegetation such as weed-covered fields; also arboreal, commonly foraging in branches and leaves of trees and shrubs. Sometimes uses a foot to hold food items. Usually in small groups; in non-breeding season also in larger flocks of up to c. 25 individuals.
Breeding. Season Oct–Mar in Argentina; usually single-brooded. Nests solitarily; usually territorial. Co-operative breeder, with up to four helpers present at most nests in Argentina; helpers commonly related to breeders, usually males 1–3 years old. Nest built by female, a loose or a well-made cup (depending on the site) of plant material (gathered from around nest), hair and some feathers, site variable, but usually covered or closed, often inside hole or crevice in tree, at base of palm frond or, more rarely, within thick foliage or among epiphytic bromeliads; avoids very dark sites, but may nest in shallow nestbox; commonly nests inside closed structure built by another species, mostly furnariid such as Rufous Hornero (*Furnarius rufus*), Firewood-gatherer (*Anumbius annumbi*), thornbird (*Phacellodomus*) or Brown Cacholote (*Pseudoseisura lophotes*), sometimes that of *Procacicus solitarius* or Great Kiskadee (*Pitangus sulphuratus*); utilizes old and rather ruined structure (particularly nest of Rufous Hornero) or new one, sometimes through piracy. Clutch 3–5 eggs, variable in colour (buff, greyish or bluish), always spotted or marked in shades of brown; incubation by female, period 13 days; chicks fed and preened by both sexes, also by any helpers present, nestling period usually 13–14 days; male guards nests throughout cycle; territory abandoned soon after chicks fledge, post-breeding groups coalesce into flocks, and fledglings fed by several adults for almost a month. Nests frequently parasitized by *Molothrus rufoaxillaris*, e.g. 80% of nests in NE Argentina study, and present species found to fledge on average one parasite chick for every three of its own chicks. Also parasitized by *M. bonariensis*.
Movements. Apparently resident. Accidental in C Chile.
Status and Conservation. Not assessed. Common and widespread; locally abundant. Quite adapted for living in modified environments. Has colonized N Patagonia (in S Argentina) and increased in numbers and distribution. Reports from São Paulo, Goiás and other places in EC Brazil are erroneous, being referable to misidentified mimetic *Molothrus rufoaxillaris* juveniles. Although impact of brood parasitism by latter species appears not to be heavy, present host seems more abundant in areas where *Molothrus rufoaxillaris* absent (e.g. Cochabamba Valley, in Bolivia, in 1990s). Found in many protected areas, including, among others, Kaa-Iya del Gran Chaco National Park (Bolivia), Pantanal Mato-grossense National Park (Brazil), and El Palmar, Pre-Delta and Chaco National Parks (Argentina).
Bibliography. Azpiroz (1997), Belton (1985), Beltzer (1988b), De Mársico & Reboreda (2010), De Mársico *et al.* (2010), Di Giacomo (2005), Fraga (1972, 1979, 1983b, 1984, 1986, 1988, 1991, 1992, 1998, 2004, 2006, 2008b), Friedmann (1929), Jaramillo & Burke (1999), Mason (1980), Orians, Orians & Orians (1977).

100. **Pale Baywing**

Agelaioides fringillarius

French: Carouge de Spix **German**: Braunkuhstärling **Spanish**: Tordo de Spix
Other common names: Spix's Baywing

Taxonomy. *Icterus fringillarius* Spix, 1824, Minas Gerais, Brazil.
Genus formerly subsumed in *Molothrus*. Sometimes treated as conspecific with *A. badius*, but the two differ in plumage coloration, vocalizations and some details of social behaviour. Monotypic.
Distribution. Interior of NE Brazil from Piauí, Ceará and W Rio Grande do Norte S to N Minas Gerais.



Descriptive notes. Male 17·5 cm, 40·1 g. Plumage is pale sandy brown overall, paler on rump, with blackish lores and narrow mask around eye, greyish-brown ear-coverts; upperwing blackish-brown, feathers with broad rufous-cinnamon edgings (wing appears mostly rufous), dusky tail; iris dark brown; bill and legs black. Differs from juvenile of *Molothrus rufoaxillaris* (which closely mimics that of *A. badius*) mainly in smaller size, shorter wing, somewhat smaller bill, paler wing-linings. Sexes similar. Juvenile is similar to adult. Voice. Song (possibly by both sexes) a slow, hesitant sequence of descending whistles mixed with calls, softer, more plaintive and less varied than that of *A. badius*; group

singing occurs. Many rasping or chattery calls somewhat resembling those of *Pseudoleistes*, including "kwoink" contact call; calls likened to those of House Sparrow (*Passer domesticus*).
Habitat. Edges and clearings in *caatinga* (dry forest), second growth of the same, and modified environments such as pastures and crop fields. Commonly seen around human habitations in rural properties (*fazendas*) in the *caatinga*, and breeds even in small towns. Mostly below 800 m.
Food and Feeding. Seeds and arthropods; once, a group attempted to catch small lizards. Seeds often of cultivated plants, such as maize (*Zea mays*) and sorghum. Forages mostly on the ground, commonly in corrals, barnyards and pig pens. In pairs and in small flocks of up to c. 20 individuals; associates at roosts with *Chrysomus ruficapillus*, *Molothrus bonariensis* and House Sparrows.
Breeding. Season Jan–Apr in N of range (Rio Grande do Norte) and Nov–Jan in S (Minas Gerais). Co-operative breeder, with up to six helpers present at most nests. Nest a loose or well-made cup of plant material, hair and feathers, placed inside closed nest built by other species, particularly the furnariid Rufous-fronted Thornbird (*Phacellodomus rufifrons*), sometimes another furnariid, e.g. Caatinga Cachalote (*Pseudoseisura cristata*) or Chotoy Spinetail (*Schoeniophylax phryganophilus*), less commonly in natural hole or crevice in tree or at base of palm frond. No information on clutch size and on duration of incubation and nestling periods; old reports that eggs white and unmarked require confirmation (eggs perhaps those of *Molothrus bonariensis*); helpers guard nest, mob predators and bring food, aggressive interactions with pairs of *Icterus jamacaii* (nest-site competitor and potential predator) can involve whole group. Nests parasitized by *Molothrus bonariensis*; is also a potential host of *Molothrus rufoaxillaris*, expanding in N Brazil.
Movements. Apparently sedentary.
Status and Conservation. Not assessed. Uncommon to locally fairly common; has reasonably extensive distribution. Adapts to human-modified environments.
Bibliography. Fraga (2006, 2008b), Friedmann (1929), Jaramillo & Burke (1999), Pacheco (2000).


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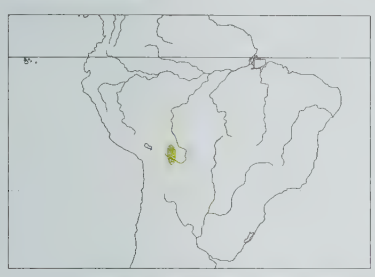
Genus *OREOPSAR* W. L. Sclater, 1939

101. **Bolivian Blackbird**

Oreopsar bolivianus

French: Carouge de Bolivie **German**: Andenstärling **Spanish**: Tordo Boliviano

Taxonomy. *Oreopsar bolivianus* W. L. Sclater, 1939, Sucre, 2700 m, Chuquisaca, Bolivia.
Mitochondrial DNA data indicate that this species could be sister to *Agelaioides badius*, but in general aspect, skeletal morphology and behaviour it also resembles *Gnorimopsar chopi*. Proposal to merge present genus into *Agelaioides* would require name of present species changing to *A. oreopsar*, as name "*bolivianus*" preoccupied therein. Monotypic.
Distribution. C Bolivia, mostly in Cochabamba, Potosí and Chuquisaca, probably also in nearby parts of La Paz and Oruro.



Descriptive notes. Male 23 cm, average 73·5 g; female average 66·2 g. Medium-sized, all-dark icterid, bill with decurved culmen. Plumage is almost entirely black, with little iridescence; flight-feathers sepia-brown, conspicuous in flight; iris brown; bill grey; legs dusky grey. Differs from *Molothrus bonariensis* in larger size and lack of obvious iridescence; from *Gnorimopsar chopi* in brownish wings. Sexes similar. Juvenile resembles adult, but with brownish tinge on upperwing-coverts and underparts. Voice. Song a simple sequence of short "chip" notes interspersed with "chip-it" notes, simpler, less harmonious and higher-pitched than that of *Gnorimopsar chopi*. Calls include "chu-pee" as contact and "pee" flight call, reminiscent of those of both *Agelaioides badius* and *Gnorimopsar chopi*; also a dry rattle.
Habitat. Dry intermontane valleys (six or more months of dry season). Often in open xeric woodland (with *Prosopis*, *Acacia*, *Schinus*, arborescent cacti, etc.) and scrub; commonly seen in irrigated and cultivated land in such sites, even around rural buildings. Usually not far from cliffs used for nesting. At 1400–3500 m.
Food and Feeding. Insects and other arthropods; also seeds, including crop seeds i.e. maize (*Zea mays*), and cactus fruits. Usually forages on ground, often probing and gaping in soil; also gleans prey from leaves and branches of trees and shrubs. May use gaping as means of opening sacks of maize. Invariably in medium-sized groups, containing up to c. 20 individuals; may join flocks of other icterids, particularly *Agelaioides badius* or *Gnorimopsar chopi*.
Breeding. Season Apr. Co-operative breeder. Nest a loose open cup of plant material, placed in hole or crevice in rocky wall or cliff; material shaped so as to fill cavity. Clutch 3 eggs, pale greenish-grey with spots and blotches in brown and black, mean dimensions 26·6 × 19·6 mm; no information on incubation and nestling periods; several individuals may feed chicks.
Movements. Apparently resident.
Status and Conservation. Not globally threatened. Restricted-range species: present in High Andes of Bolivia and Argentina EBA. Locally common in suitable habitat. Tolerates some habitat disturbance. Found in some protected areas, e.g. Tunari National Park (near Cochabamba).
Bibliography. Fraga (2004), Jaramillo & Burke (1999), Lowther (2001), Orians (1985a), Orians, Eckermann & Schultz (1977), Ridgely & Tudor (1989), Sclater (1939), Vuilleumier (1969a), Webster (2003).

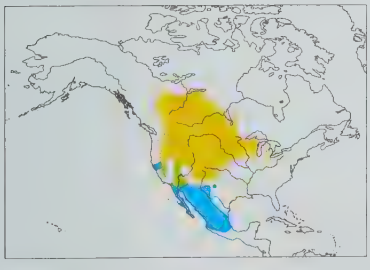
Genus *XANTHOCEPHALUS* Bonaparte, 1850

102. **Yellow-headed Blackbird**

Xanthocephalus xanthocephalus

French: Carouge à tête jaune **German**: Brillenstärling **Spanish**: Tordo Cabeciamarillo

Taxonomy. *Icterus xanthocephalus* Bonaparte, 1826, Nebraska, USA.
Analyses of mitochondrial DNA indicate that this species is distantly related to *Sturnella*; resembles *Agelaius* in breeding ecology, but displays quite different. Monotypic.
Distribution. Breeds in SC Canada (from interior British Columbia E to N Saskatchewan, SC Manitoba and SW Ontario) S in W & C USA to California, C New Mexico, N Kansas, N Illinois and Michigan and extreme NW Mexico (NE Baja California); migrates to S USA and Mexico (S to N Oaxaca and Veracruz).



Descriptive notes. Male average 26·5 cm, 97 g; female average 21·5 cm, 59·3 g. Male has lores and narrow area around eye black, rest of head, throat and breast bright yellow (crown and nape feathers with yellowish-brown tips in non-breeding plumage); upperparts, including wing and tail, black, primary coverts, some outer greater coverts and part of alula white; underparts below breast black, yellow patch on lower belly; iris dark brown; bill and legs black. Female is smaller than male, has lores greyish, forehead to nape and neck brown, ear-coverts similar, superciliary line, area surrounding ear-coverts and moustachial stripe pale yellow, throat whitish and upper breast yellow; rest of plumage brown to brownish-black; bare parts as for male. Juvenile has cinnamon-buff head and underparts, dark facial mask, brownish upperparts with cinnamon tips and edges above, two pale wingbars, male lighter, more tawny above and with whiter wingbars than female, latter with darker back and buff wingbars. Voice. Male has two song types: "accenting song" is more musical, lasts for c. 1·5 seconds and is directed towards distant conspecifics; "buzzing song", c. 4 seconds and directed at close conspecifics, is distinctive and rather dissonant, has been likened to sound of an unwinding clock machine or even the braying of an ass. Female produces a chatter, equivalent to male song. Common call a hoarse "chuk" or "chek", deep and hollow in quality; alarm a harsh rattle by male, screaming chatter by female.
Habitat. Wetlands in prairies, also wetlands associated with quaking aspen (*Populus tremuloides*), and lake edges. In non-breeding season also agricultural land, pastures, mountain meadows. Mainly in lowlands; to 2500 m in winter quarters. Flocks usually roost in marshes.
Food and Feeding. Contents of 138 adult stomachs were 66% plant food and 34% animal food. Vegetal items predominantly weed seeds and cultivated seeds, the former mostly *Panicum*, *Echinochloa*, *Ambrosia* and *Polygonum*, the latter included wheat, oats and maize (*Zea mays*); insects comprised mostly beetles (Coleoptera), Orthoptera and Lepidoptera. Nestling diet 60–90% insects, particularly emergent dragonflies and damselflies (Odonata); small amounts of grass seeds, grains and molluscs also fed to young. Forages mostly on ground in cropland and grassland, also around wetlands. Post-breeding flocks of several thousands to many thousands of individuals, often segregated by sex; on migration often in mixed flocks with other icterids.
Breeding. Season May–Jun; single-brooded. Polygynous; in Washington (USA) mean number of females per male territory or harem varied from 1·7 to 4·2 (range 0–8). Breeds in semi-colonies of grouped male territories, with several hundred nests; male defends territory of 100–600 m² (some food obtained within territory); females arrive later than males and defend small area (minimum size c. 1 m²) around nest; male expels *Agelaius phoeniceus* from main nesting habitat in deep-water marshes. Female may start nest-building three days after arrival, completing work in average of 4–5 days; nest cup-shaped, neatly built from long, interlaced wet strips of plant material, further (non-interlaced) plant material forms inner wall, lined with fine grasses or other plumose vegetation, external diameter 13–14 cm, external height 13–15 cm; built in living or dead emergent water plants such as cat-tails (*Typha*), rushes (*Scirpus*) or reeds (*Phragmites*) growing in water 30–110 cm deep, and firmly attached to minimum of 4–5 plant stems (up to 30 stems and leaves if built in cat-tails), sometimes in willow (*Salix*) or tamarix (*Tamarix gallica*) in flooded areas. Clutch 2–5 eggs, usually 3–4 (2-egg clutches typical of renesting females), greyish-white to pale greenish-white, densely blotched and spotted in brown, rufous and grey, mean dimensions 26·3 × 18·1 mm; incubation by female, generally beginning when second egg laid, period 12–13 days; hatching usually asynchronous, chicks fed by both sexes, female more constantly, male feeds chicks from day 4 after hatching (but feeds mostly chicks of primary, earlier-breeding females; chicks of secondary females fed mostly if broods of primary female smaller); nestling period 9–14 days; males with larger harems devote less time to brood-feeding, and will not feed fledglings that leave their territory; both sexes attack nest predators. Normally parasitized only infrequently by *Molothrus ater*, and rears few of latter's chicks; of 266 nests in Washington (USA) only two (0·75%) were parasitized, but in Idaho four of 19 nests (21%) were; unlike other large hosts, present species does not remove parasite's eggs.
Movements. Medium-distance and long-distance migrant. Winters in S USA (mainly C California E to New Mexico) and S to C Mexico (Michoacán, Guerrero, Puebla and N Oaxaca). Diurnal migrant. Leaves breeding grounds from late Aug and Sept (some failed breeders in Jul), last ones in Oct, arriving in non-breeding quarters from Aug/Sept; sexes migrate separately, majority of males wintering in SW USA, whereas females move farther S. Return migration begins Feb–Mar, with arrival of males in breeding areas from Mar, later (May–Jun) in N of range; females reach nesting areas 1–2 weeks after males. Vagrants recorded widely throughout E North America, also Bahamas, Cuba, Cayman Is and Yucatán Peninsula.
Status and Conservation. Not globally threatened. Fairly common to uncommon, and locally numerous; generally uncommon in S of range. In Mexico, very local and uncommon breeder, and more widespread and fairly common non-breeding visitor. Despite some loss of wetland habitat, is still a reasonably widely distributed species. Populations in some US states, such as Illinois, are declining and are of local conservation concern. Occurs in several protected areas in Canada and USA.
Bibliography. Arnold (1992), Barber & Evans (1995), Bent (1958), Briskie (1994), Bump (1986), Cash & Johnson (1990), Collins (2003), Cosens & Falls (1984), Crawford (1977), Dufty (1994), Fautin (1941), Gori (1988a, 1988b), Jaramillo & Burke (1999), Lanyon & Omland (1999), Leonard & Picman (1986), Lightbody & Weatherhead (1987), McCarthy (2006), Nero (1963), Orians (1966, 1980), Orians & Christman (1968), Orians & Willson (1964), Ortega & Cruz (1991), Picman & Isabelle (1996), Price (1996), Proctor & Donald (2003), Richter (1984), Rohwer & Roskaft (1989), Twedt & Bleier (1991), Twedt & Crawford (1995), Twedt *et al.* (1994), Westmoreland & Kiltie (1996), Willson (1966a).

Genus *DOLICHONYX* Swainson, 1827

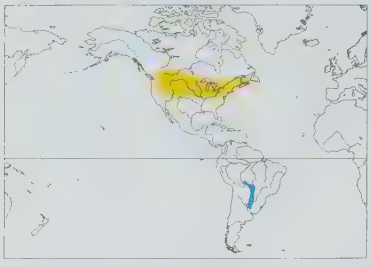
103. **Bobolink**

Dolichonyx oryzivorus

French: Goglu des prés **German**: Reisstärling **Spanish**: Tordo Charlatán

Taxonomy. *Fringilla oryzivora* Linnaeus, 1758, South Carolina, USA.
Distinctive, and has sometimes been placed in a subfamily of its own (Dolichonychinae). Nesting habits resemble those of *Sturnella*, but mitochondrial DNA indicates only distant relationship with latter. Monotypic.
Distribution. Breeds across S Canada (interior SE British Columbia E to S Ontario, S Quebec and Nova Scotia, to E Newfoundland) S in USA to Oregon, N Colorado, Nebraska, C Illinois and Virginia; migrates to non-breeding grounds mostly in E Bolivia (Beni and Santa Cruz), SC Brazil (Pantanal of Mato Grosso), Paraguay, and N Argentina (R Paraná basin S to Buenos Aires).
Descriptive notes. 16–18 cm; male average 47 g, female average 37·1 g. Emberizid-like icterid with long, pointed wings and sharply pointed tail feathers. Male breeding has large, variable pale buffish nape patch, rest of head, throat and entire underparts black; upper back black with long buff streaks (central stripe widest), lower back and rump pale grey, becoming whitish on uppertail-coverts; tail black; scapulars white, upperwing and its coverts black, inner greater coverts and tertials with white fringes, primaries

On following pages: 104. Red-breasted Blackbird (*Sturnella militaris*); 105. White-browed Blackbird (*Sturnella superciliaris*); 106. Pampas Meadowlark (*Sturnella defilippii*); 107. Peruvian Meadowlark (*Sturnella bellicosa*); 108. Long-tailed Meadowlark (*Sturnella loyca*); 109. Lilian's Meadowlark (*Sturnella lilianae*); 110. Eastern Meadowlark (*Sturnella magna*); 111. Western Meadowlark (*Sturnella neglecta*).



with narrow white edges; iris dark brown; bill black, grey base of lower mandible; legs brownish-flesh to dark brownish-grey. Non-breeding male is like female breeding, sometimes with blackish spots on throat; male in late austral summer (Feb–Mar) generally has plumage intermediate between breeding and non-breeding. Female breeding has head mostly pale buff, including long, broad supercilium bordered below by dark postocular stripe and above by dark crown, which is dusky with narrow brownish feather edges, with a well-defined pale buff central crown stripe (broadest at rear); upperparts buff with broad black or dusky-brown streaks; upperwing dark brown, all feathers fringed pale buffish to grey; tail dusky greyish, feathers edged paler; throat whitish, underparts creamy buff, flanks and belly with dusky stripes; bill pinkish or flesh-coloured, usually palest at base of lower mandible, often dusky at tip and along culmen; legs pinkish-grey. Non-breeding female is similar to breeding, but brighter, feathers of upperparts having warmer golden-buff or orangey edges, face and underparts with richer orange-buff tone, bill brighter pink. Juvenile resembles non-breeding female, but feathers of upperparts have thin buff fringes (looking scaly), and underparts entirely buff and unstreaked except for few thin dark streaks on side of breast. VOICE. Song, by male only, in flight or from perch, a pleasant, fast series of warbles, gurgles and some whistles; two song types, each composed of 25–50 notes, and lasting 0·5–11 seconds; main frequency range 1150–7450 Hz, with much individual and dialectal variation. Commonest call, by both sexes, "ping" or "pink", given often in flight; other calls include soft "chuk", also "tchek" by male during territorial chases, "zeep" by female in aggression towards other females.

Habitat. In breeding season mostly wet meadows; commonly also hay fields, pastures of alfalfa (*Medicago*) and clover (*Trifolium*), and wheat fields. Avoids woodlands. In non-breeding quarters (and during migration) found mostly in emergent or floating vegetation in tropical to subtropical marshes, also riparian environments, wet grasslands and pastures, and particularly rice fields. Mostly in lowlands in both breeding and non-breeding ranges; one record from as high as 3400 m in Cochabamba (Bolivia).

Food and Feeding. Seeds and insects. On breeding grounds stomach contents indicate 57% arthropods, including beetles (Coleoptera), Lepidoptera, Hymenoptera and Orthoptera, and 43% seeds and other plant food; seeds consumed include those of crop cereals (particularly rice), but also agricultural weeds. During migration and in winter quarters feeds on rice, also on seeds of wild grasses such as species of *Paspalum*, *Echinochloa*, *Leptochloa* and others. Forages mainly on ground and low in vegetation. In pairs, small groups and larger flocks. Non-breeding flocks containing thousands of individuals reported, and 90,000 in a roost in Bolivia. In South America associates in mixed-species foraging flocks with *Sporophila* seedeaters, often eating same grass seeds; loosely associates also with other local icterids, including *Sturnella superciliaris* and *Sturnella militaris*.

Breeding. Season May–Jul; usually single-brooded. Monogamous to polygynous. Male defends territory of 0·5–2 ha, containing 1–4 nesting females. Male helpers reported as feeding chicks at a few nests. Nest placed on ground, usually concealed by dense vegetation, built by female, starting by creating slight depression in ground or deepening an existing one; nest cup-shaped, composed of coarse, dead grass leaves and weed stems, entirely lined with very fine grasses or sedges, internal diameter c. 9 cm, internal depth c. 3 cm; about a third of nests covered by loose dome of plant material. Clutch 4–7 eggs, pale grey to pale rufous-brown, spotted and blotched in shades of brown and violaceous grey, mean dimensions 21·7 × 16·2 mm; incubation by female, period 12–13 days; chicks fed by both sexes, female more constantly, polygynous males feed mostly chicks of first two nests in territory; nestling period 9–12 days.

Movements. Long-distance migrant. Entire population migrates to C South America, making round trip of c. 20,000 km every year between breeding and non-breeding quarters; main wintering areas include the Pantanal, the Beni savannas (Bolivia), rice-growing areas of Santa Fe (Argentina), and E Chaco. Migrates in large flocks; c. 20,000 individuals, spread over a few flocks, observed on N passage in Paraguay. Leaves breeding areas mainly in Aug (after moult), passing mostly along E US seaboard and through Greater Antilles (especially Cuba and Jamaica), also across open W Atlantic Ocean, reaching N coasts of South America from late Oct; arrival in Brazil and Paraguay in Nov, and often not until Jan in S part of non-breeding quarters in Argentina. Within main wintering grounds in C South America flocks move in search of seasonal seeds, including rice. Return migration starts in Mar, some remaining in Argentina until early Apr; route apparently more to W than that in autumn; arrives in S USA from Apr, and back in breeding areas mostly in Apr and early May, a few not until Jun in N. Females arrive on breeding grounds c. 1 week after males. Smaller flocks regularly reported in autumn along Pacific coast from Ecuador (including Galapagos Is) S to Chile, and possibly an additional wintering area exists in this region; further study required. Recorded as a passage migrant over most of Central America and N South America. Accidental in Greenland, E Atlantic islands (Canaries, Azores) and W Europe (British Is, France, Norway, Italy).

Status and Conservation. Not globally threatened. Common to locally abundant; less numerous at periphery of breeding range. Declining in numbers; continues to suffer loss of breeding habitat (hayfields and meadows) in Canada and USA, and adversely affected by pesticide use. Flocks containing several thousands of individual still reported in Argentina. Formerly was widely hunted for food in S USA; this still happens in Jamaica and other places, where well-fattened migrants can provide good nourishment for local human populations. On wintering grounds sometimes captured for the pet trade in Argentina, and commonly regarded as a pest in rice-growing areas of Bolivia and Argentina. Found in many protected areas both in its breeding range and on its wintering grounds.

Bibliography. Ammer & Capp (1999), Avery & Oring (1977), Bakker *et al.* (1983), Beason (1989, 1992), Beason & Trout (1984), Bent (1958), Bollinger & Gavin (1989, 1991, 2004), Bollinger, Bollinger & Gavin (1990), Bollinger, Gavin, Hibbard & Wootton (1986), Bollinger, Gavin & McIntyre (1988), Capp (1992), Fajardo *et al.* (2009), Fletcher & Koford (2003), Gavin (1984), Gavin & Bollinger (1985), Gifford & Odum (1965), Herkert (1997), Lanyon & Omland (1999), López-Lanús *et al.* (2007), Martin (1974), Martin & Gavin (1995), Mather & Robertson (1992), Morcira Lima (2004), Moskwik & O'Connell (2006), Renfrew & Saavedra (2007), Trainer & Peltz (1996), Velásquez (1994), Wittenberger (1978, 1980a, 1980b, 1982, 1983).

Genus *STURNELLA* Vieillot, 1816

104. **Red-breasted Blackbird**

Sturnella militaris

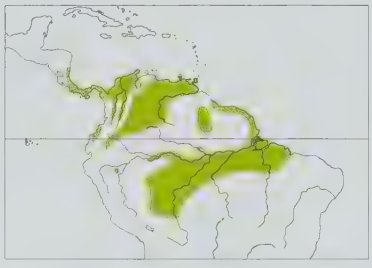
French: Sturnelle militaire **German**: Rotbruststärling **Spanish**: Loica Pechirroja

Other common names: Northern Marsh Meadowlark

Taxonomy. *E.[mberiza] militaris* Linnaeus, 1758, Suriname.

Formerly placed with *S. superciliaris* in a separate genus, *Leistes*, but molecular data indicate close affinity with present genus. Closely related to *S. superciliaris*, and the two may form a superspecies; sometimes considered conspecific, but ranges overlap locally in SE Peru (E Madre de Dios), NE Bolivia (Pando and N Beni) and NE Brazil (NE Pará, Maranhão and N Tocantins) with no evidence of interbreeding, and no intermediates or hybrids between the two have been reported; range overlap sometimes attributed to seasonal N movements by *S. superciliaris*, but verification required. Monotypic.

Distribution. Extreme SE Nicaragua S to Colombia, Venezuela, Trinidad, the Guianas, Amazonian Brazil (Acre, Rondônia, Amapá, Pará, N Tocantins and Maranhão), NW & NE Ecuador, Peru (Loreto; Madre de Dios), and NE Bolivia (Pando, Beni).



Descriptive notes. Male average 19 cm and 53 g; female average 18 cm and 46·1 g. Male is mostly blackish on head and upperparts; chin, throat and breast bright crimson-red, marginal and most of lesser upperwing-coverts and marginal underwing-coverts red, belly and vent black; when freshly moulted (non-breeding plumage), black feathers have buff edges (giving striped appearance) and red breast feathers are tipped buff (barred appearance); iris blackish-brown; bill black, sometimes dark brown to black with horn-coloured or grey base of lower mandible; legs horn-coloured to brownish-black. Female is streaked blackish and buff on head and upperparts, with pale buff supercilium and median crownstripe, some red in marginal upperwing-coverts; throat and underparts buff, palest on throat, streaked dusky brown on breast and flanks, centre of underparts tinged with pink, undertail-coverts narrowly barred blackish; in fresh plumage (non-breeding), more boldly patterned, with more obvious streaks; bill horn-coloured, often duskier on upper mandible, palest at base of lower mandible; legs fleshy-horn to dark grey. Juvenile resembles female, but all feathers of upperparts and upperwing-coverts fringed pale (scaly appearance), more extensively streaked below, no hint of red in plumage. VOICE. Male song, from perch or in aerial display, varies among populations, consists of 1–5 brief notes (clicks, warbles) followed by dissonant buzz, usually ending in a few short notes; buzzing part of song usually harsher and more strident than that of *S. superciliaris*. Call "ee", also "pist" as alarm; several other calls reported.

Habitat. Savanna and lush grassland, often near water; also agricultural land, including rice fields. In Amazonia partial to cattle pastures (natural and planted) in *várzea*, but also in grassy clearings, including airfields. Seems to breed mostly in lowlands below 600 m, but reported at up to 1855 m in NE Ecuador; from sea-level up to 800 m in NW Ecuador.

Food and Feeding. Insects and other arthropods, also seeds (including rice), rarely fruit. Forages on or near ground. Sociable; commonly in flocks of up to c. 100 individuals, occasionally more.

Breeding. Season May–Aug in Costa Rica, Mar–Dec in Trinidad, Jan–Nov in Suriname, and Jan–Apr in Colombian lowlands (Jun at higher elevations); in Venezuelan *llanos* breeds at start of rainy season (May–Jun), stops during floods of the full rainy season, and nests again during early dry season (Nov). Possibly polygynous. May breed in loose colonies in dense grasslands, pastures or crop fields. In short flight display, male parachutes to ground while singing, with red epaulets flared. Nest probably built by female alone, a deep cup of grass stems and other plant material, in Trinidad reportedly lined with fine grass or plant down, placed on ground among thick overhanging vegetation, often at base of grass clump; sometimes tunnel in surrounding vegetation leading to the nest. Clutch 2–4 eggs, mean 2·9 in Venezuela, pale blue or pale cream, densely marked with dark reddish-brown, mean dimensions 23·4 × 17·2 mm; incubation probably by female alone, but details of parental roles lacking; no information on incubation and nestling periods. Frequent host of *Molothrus bonariensis*; of 14 nests in Venezuelan *llanos* ten held eggs of latter, but parasitism probably rarer in Nov season. In Venezuelan study, c. 50% of nests produced fledglings.

Movements. Resident. Some seasonal movements reported in areas with strong dry season (e.g. *llanos* in Venezuela).

Status and Conservation. Not globally threatened. Rather common. Extending its range N as a result of deforestation; invaded Costa Rica in 1970s, and recently reported in Nicaragua. Also expanding through Amazonia. Formerly restricted to natural savannas, but has adapted to agricultural landscapes.

Bibliography. Arendt & Tórrez (2009), Belcher & Smooker (1937), De Las Casas *et al.* (2004), Dornas *et al.* (2007), Gochfeld (1975), Haverschmidt (1970b), Haverschmidt & Mees (1994), Hilty (2003), Jaramillo & Burke (1999), Olmstead *et al.* (2011), Ramo & Busto (1981), Ridgely & Tudor (1989), Short (1968), Stiles & Skutch (1989), Wetmore *et al.* (1984).

105. **White-browed Blackbird**

Sturnella superciliaris

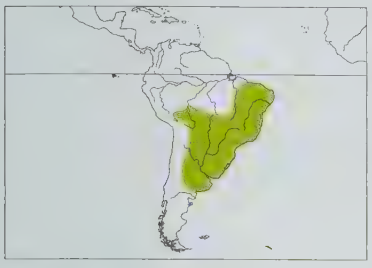
French: Sturnelle à sourcils blancs **German**: Weißbrauenstärling **Spanish**: Loica Cejiblanca
Other common names: Southern Marsh Meadowlark, Bonaparte's Blackbird

Taxonomy. *Trupialis superciliaris* Bonaparte, 1850, Mexico; error = Mato Grosso, Brazil.

Formerly placed with *S. militaris* in a separate genus, *Leistes*, but molecular data indicate close affinity with present genus. Closely related to, and may form a superspecies with, *S. militaris*; sometimes considered conspecific, but ranges overlap locally in SE Peru (E Madre de Dios), NE Bolivia (Pando and N Beni) and NE Brazil (NE Pará, Maranhão and N Tocantins) with no evidence of interbreeding, and no intermediates or hybrids between the two have been reported; range overlap sometimes attributed to seasonal N movements by present species, but verification required. Monotypic.

Distribution. SE Peru (Madre de Dios), E Bolivia (Beni) and C & E Brazil (S from Mato Grosso, and from NE Pará, Maranhão and Ceará) S to Paraguay, Argentina (S to Mendoza, La Pampa and Río Negro) and Uruguay.

Descriptive notes. Male average 17·8 cm, 50·2 g; female average 17 cm, 40·9 g. Male has mostly black head and upperparts, with prominent white superciliary line behind eye; chin, throat and breast bright crimson-red, marginal and most of lesser upperwing-coverts and marginal underwing-coverts red, belly and vent black; when freshly moulted (non-breeding plumage), black feathers have buff edges (giving striped appearance) and red breast feathers are tipped buff (barred appearance); iris brown; bill black, grey base of lower mandible; legs dark grey. Female is streaked blackish and buff on head and upperparts, with pale buff supercilium and median crownstripe,



some red in marginal upperwing-coverts; underparts buff, palest on throat, streaked dusky brown on breast, flanks and vent, centre of underparts tinged with pink; in fresh plumage (non-breeding), more boldly patterned, with broader buff edgings, pink area below obscured by brownish feather tips; bill horn-coloured to pinkish-flesh, usually greyer or duskier on upper mandible. Juvenile resembles female, but more extensively streaked below, no hint of red in plumage. Voice. Male song, from perch or in flight display, a nasal buzz preceded and followed by shorter notes, "tsi-tziéé-teng chup chup...", with some individual variation. Female may produce a dry rattle. Contact call (Argentina) a metallic "peng"; other described calls are "chuk" and harsh "pshee".

Habitat. Lush wet meadows and humid grasslands, nowadays particularly common in agricultural fields or pastures with wheat, oat, alfalfa (*Medicago*) and the like. In winter frequents wetlands and flooded grassland. Roosts in dense stands of grass. Mostly lowlands; reported at up to 2500 m in Bolivia (possibly as accidental).

Food and Feeding. Mostly arthropods, also seeds. Insects and spiders (Araneae) comprised 75–85% of stomach contents in spring and summer in C Argentina. Insect remains include beetles (of families Curculionidae, Chrysomelidae, and scarabaeid subfamily Dynastinae), grasshoppers (Acrididae), stink bugs (Pentatomidae) and larvae of Lepidoptera; seeds mostly of wild grasses (*Panicum*, *Stipa*, *Lolium*), sedges (*Carex*) and weeds in family Asteraceae. In the Pantanal stomach contents include remains of small freshwater crabs (*Trichodactylus*). Forages on or near ground. Mostly in single-species flocks, reaching some hundreds of individuals; sometimes associates with other icterids.

Breeding. Season Oct–Jan in Argentina. Probably some males polygynous. Breeds solitarily or, more usually, in loose colonies; in Entre Ríos (Argentina) may nest near colonies of *Xanthopsar flavus*. Displaying male rises to 4–6 m and then descends, with red epaulets flared, in slow gliding flight while singing. Nest a deep cup of grass and other plant material, placed on ground among thick overhanging vegetation (mostly grass), sometimes a tunnel in surrounding vegetation leading to nest; site usually in pasture (natural or planted) or crop field, common crop plants used including wheat, alfalfa and oats. Clutch 3–5 eggs, pale blue, densely marked in reddish-brown, mean dimensions 23 × 17·3 mm; no information on incubation and nestling periods; chicks out of nest fed mostly by female. Parasitized by *Molothrus bonariensis*, and rears latter's chicks.

Movements. Probably resident in tropical and subtropical parts of range. Usually abandons nesting sites in agricultural fields soon after breeding; in austral winter found in wetlands over much of range in Argentina, roosting in patches of bunch-grass. Seasonal movements perhaps occur there during very dry or cold winters.

Status and Conservation. Not globally threatened. Rather common to locally uncommon. Extending its range in many areas as a result of deforestation and expansion of agriculture.

Bibliography. Belton (1985), Camperi, Cicchino & Darrieu (1998), Camperi, Ferretti *et al.* (2004), Di Giacomo (2005), Fraga (2002), Gochfeld (1979a), Jaramillo & Burke (1999), Narosky & Di Giacomo (1993), de la Peña (1987), Ridgely & Tudor (1989), Schubart *et al.* (1965), Short (1968), Tubaro (1992), Tubaro & Segura (1993), Zotta (1936).

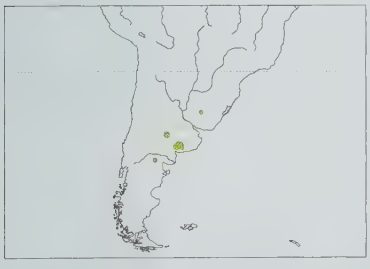
106. Pampas Meadowlark

Sturnella defilippii

French: Sturnelle des pampas **German**: Schwarzschenkelstärling **Spanish**: Loica Pampeana
Other common names: Military Starling, Lesser (Red-breasted) Meadowlark, Red-breasted Meadowlark

Taxonomy. *Trupialis defilippii* Bonaparte, 1850, Montevideo, Uruguay.
Sometimes placed in a separate genus, *Pezites*, along with *S. bellicosa* and *S. loyca*; formerly treated as conspecific with both. In aspect and behaviour present species is almost a perfect intermediate between latter two species and the "red-breasted blackbirds" (*S. militaris* and *S. superciliaris*) formerly placed in *Leistes*. In the past was sometimes regarded as conspecific with *S. loyca*, but the two nest sympatrically and without interbreeding in parts of Argentina. Monotypic.

Distribution. N Uruguay (Salto Department) and CE Argentina (SW Buenos Aires, La Pampa and Río Negro).



Descriptive notes. Male average 21 cm, 73·6 g; female 67·5 g. Male has head and side of neck black, long white superciliary line becoming red in front of eye, white submoustachial stripe and lower eyelid; otherwise mostly dusky brown with brownish streaks above, uppertail-coverts barred, tail blackish with thin olive barring, marginal and a few lesser upperwing-coverts rosy red; chin to belly rosy red, side of breast, flanks and vent black, underwing-coverts black, with red marginal coverts; in fresh plumage (non-breeding) black areas above more prominently streaked brown, supercilium more buff, upperwing-coverts pale-tipped, red of underparts obscured by buff or olive feather tips; bill silver-grey, culmen and tip dark; legs dark brown. Differs from similar *S. loyca* in stockier build and shorter tail, less striped appearance, in flight also by black underwing-coverts. Female is paler and browner than male, with white throat, and streaked underparts enclosing pale pink-red lower breast. Juvenile is like female, but no red on underparts, and bill horn-coloured. Voice. Male flight song variable and rather musical, often combining ascending and descending whistles with a loud sustained note, e.g. "tse-tse-réé-tsew-tsee-tsew", last notes rather soft; perched song (from low above ground, mostly on bunch-grass) includes final buzzy or rasping notes, resembling those of *S. loyca*. Call "peet", also a rasping note.

Habitat. Native grasslands and pastures; only rarely in agricultural fields. Most individuals (82% of extant population) nest in natural grassland, the rest in agricultural fields; grasslands used for nesting in Argentina include *Baccharis* (Asteraceae) and grasses in genera *Stipa* and *Piptochaetium*. Uruguayan population breeds in native grassland mixed with carqueja (*Baccharis trimera*). Agricultural land abandoned for five years or more becomes increasingly suitable for nesting. Can live in treeless areas, and seldom perches on shrubs or fences. Lowlands to 900 m.

Food and Feeding. Insects and seeds. Contents of three stomachs included beetles (of families Scarabaeidae and Curculionidae) and seeds. Forages in small groups; in non-breeding season moves in flocks of some hundreds (formerly thousands, then compared to marching armies).

Breeding. Season Oct–Nov in Argentina. Mating system unstudied. Breeds in "reproductive groups" or dispersed colonies, nests more clumped than those of *S. loyca*; colonies contain 2–66 displaying males in Argentina, 3–25 in Uruguay. Male defends rather small territory, mean inter-nest distance in one study 23 cm. In flight display male flies upwards to c. 7 m, and then descends while singing. Nest a cup built from plant material, external diameter 9·5 cm, placed within depression on ground, near a grass clump, may have entrance corridor c. 8 cm long. Clutch 3–5 eggs, mean 3·14 eggs in recent study, variable, buff to grey with darker spots, blotches and lines, mean dimensions 25·8 × 18·3 mm; no information on incubation period; chicks fed mostly by female, nestling period c. 10 days; male possibly feeds fledglings. Parasitized by *Molothrus bonariensis*, but far less frequently than *S. loyca*; apparently female of this brood parasite find nests of present species hard to locate. Nesting success: in one study 29% of eggs produced fledglings.

Movements. The few reliable Brazilian records sometimes interpreted as representing seasonal movements; recent research on main population in Argentina suggests year-round resident. Further research needed.

Status and Conservation. VULNERABLE. Rare to locally uncommon. Nowadays found mostly around Sierra de la Ventana, a low (1200 m) range of rocky mountains in SW Buenos Aires, in Argentina; one population in N Uruguay. Formerly occurred in extreme SE Brazil (coastal Rio Grande do Sul), more widely in Uruguay, and in at least seven provinces in CE Argentina (S Cordoba, San Luis, E La Pampa, Corrientes, Santa Fe, Entre Ríos and Buenos Aires). Has declined considerably in range and numbers in both Argentina and Uruguay. In 1870s and 1890s flocks of many thousands reported in Buenos Aires *pampas*, particularly in territories recently taken from the native Indians; was still reported as a regular breeder throughout *pampas* up to early 1950s, but thereafter seriously declined. Main stronghold now SW Buenos Aires province, around Sierra de la Ventana and nearby ranges, where rocky soils do not favour ploughing and agriculture; recent surveys in this area have shown that population may approach 28,000 individuals. Uruguayan population much smaller, c. 200 individuals, and perhaps isolated. The possibility that similar isolated populations may be found elsewhere within its historical range merits investigation. Main cause of this species' rapid decline is replacement of natural grasslands with crops and planted pasture; interspecific competition with two sympatric meadowlarks (*S. superciliaris* and *S. loyca*) may also play a role. Capture for trade appears not to be an extensive problem, although, in 1988, more than 100 individuals of this species were seen in local markets. Breeding areas of this species mostly unprotected, but a few may be found in provincial reserves.

Bibliography. Anon. (2010d), Antoniazzi (2007), Aravena (1928), Azpiroz (1997, 2005), Belton (1985), Benites *et al.* (2007), Butchart & Stattersfield (2004), Cozzani *et al.* (2004), Doering & Lorentz (1939), Fraga (2007), Gabelli *et al.* (2004), Gochfeld (1975, 1978, 1979a, 1979b), Hudson (1920), Jaramillo & Burke (1999), Ridgely & Tudor (1989), Runnacles (1933–1940), Short (1968), Stattersfield & Capper (2000), Tubaro & Gabelli (1999), Zalba *et al.* (2009).

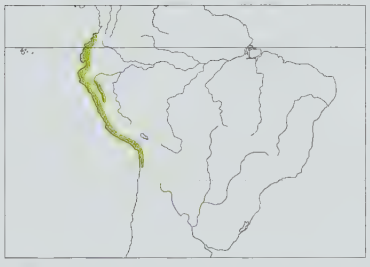
107. Peruvian Meadowlark

Sturnella bellicosa

French: Sturnelle du Pérou **German**: Weißschenkelstärling **Spanish**: Loica Peruana
Other common names: Greater Red-breasted/Peruvian Red-breasted Meadowlark, White-thighed Meadowlark

Taxonomy. *Sturnella bellicosa* De Filippi, 1847, Lima, Peru.
Sometimes placed in a separate genus, *Pezites*, along with *S. defilippii* and *S. loyca*; formerly treated as conspecific with latter or both. Two subspecies recognized.

Subspecies and Distribution.
S. b. bellicosa De Filippi, 1847 – SW Colombia (Nariño) and W Ecuador S to C Peru.
S. b. albipes (R. A. Philippi [Krumwiede] & Landbeck, 1861) – SW Peru S along Pacific slope of Andes to extreme N Chile.



Descriptive notes. Male average 20·5 cm, 78·5 g; female average 61·4 g. Male nominate race is mostly greyish-brown with blackish streaks above, head and side of neck blackish; long superciliary line, red in front of eye and white behind, short white submoustachial stripe and white lower eyelid; marginal and a few lesser upperwing-coverts red; chin to breast bright red, surrounded by blackish, belly black, flanks and undertail-coverts striped buffish-grey and blackish; underwing-coverts pale greyish-white, with red marginal coverts; iris dark brown; bill bluish-ivory, culmen and tip blackish-brown; legs grey-brown to blackish. Differs from similar *S. loyca* in smaller size and shorter tail and bill. Female is paler and more dusky than male, with buffy-white supercilium lacking red; underparts pale grey, throat whitish, central abdomen tinged pale red, breast and flanks to vent streaked dusky. Juvenile is like female, but lacks reddish tinges and more extensively streaked below. Race *albipes* is very like nominate, but smaller and less red. Voice. Male flight song complex and variable, not very musical, ending in buzzy note, the whole lasting c. 3 seconds; song from perch much shorter, consisting of 3–4 descending notes followed by harsh buzz, "tee-tleptu-chzzz". Call is a buzzing note.

Habitat. Meadows, grassland and agricultural land; in coastal deserts found at oases or in irrigated fields, sometimes in brackish marshes with *Salicornia*. Nominate race to 2500 m.

Food and Feeding. Rather scant information. Diet presumably mostly arthropods, small vertebrates, seeds and some fruit. One stomach from Ecuador contained only seeds. Forages mostly on ground.

Breeding. Season Mar–May in Ecuador and Oct–Nov in Chile. Mating system not known. Male has short up-and down flight display accompanied by song. Nest made from dry grass and stems, with no obvious lining material, some substantial and often covered with dome, other nests reported as flimsy; built on ground, commonly using a slight depression, and placed under cover of small shrub or grass tuft. Clutch 4–5 eggs in Ecuador, 3–4 in Chile, buff, pinkish or creamy white, spotted, blotched and smeared with reddish-brown and lavender, sometimes with blackish scrawls, mean dimensions 25·4 × 18·5 mm; incubation period 14 days, nestling period c. 12 days; no further details. Parasitized by *Molothrus bonariensis*.

Movements. Apparently resident. Altitudinal movements probable in highlands.

Status and Conservation. Not globally threatened. Reasonably common. Has recently expanded its distribution following conversion of woodlands into pasture.

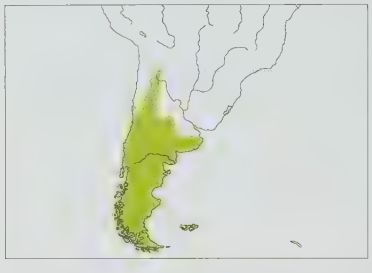
Bibliography. De Las Casas *et al.* (2004), Gochfeld (1975), Johnson & Goodall (1967), Marchant (1960), Olmstead *et al.* (2011), Ridgely & Greenfield (2001a, 2001b), Ridgely & Tudor (1989), Schulenberg *et al.* (2010), Short (1968).

108. Long-tailed Meadowlark

Sturnella loyca

French: Sturnelle australe **German**: Langschwanzstärling **Spanish**: Loica Común
Other common names: Red-breasted Starling, Greater Red-breasted Meadowlark

Taxonomy. *Sturnus loyca* Molina, 1782, Chile.
Sometimes placed in a separate genus, *Pezites*, along with *S. defilippii* and *S. bellicosa*; formerly treated as conspecific with latter or both. Birds intermediate between nominate race and *catamarcana* said to occur in W Argentina, and range listed for latter below is tentative; more detailed study required. Geographical variation partly clinal; size appears to increase from N towards S and in Andean highlands. If present species and *S. militaris* [= *Emberiza militaris* Linnaeus, 1758] are treated in separate genera, present species reverts to its older specific epithet, *militaris* [= *Sturnus militaris* Linnaeus, 1771], which has priority over *loyca*; as a result, present species has in some works been known as *Sturnella militaris*. Four subspecies recognized.
Subspecies and Distribution.
S. l. catamarcana (Zotta, 1937) – local in highlands of NW Argentina (Jujuy and Salta S to La Rioja).
S. l. loyca (Molina, 1782) – Chile (S Atacama S to Cape Horn) and Argentina (San Juan, San Luis, Córdoba and Buenos Aires S to Tierra del Fuego).
S. l. obscura Nores & Yzurieta, 1979 – Sierras de Córdoba and San Luis, in C Argentina.
S. l. falklandica (Leverkühn, 1889) – Falkland Is.



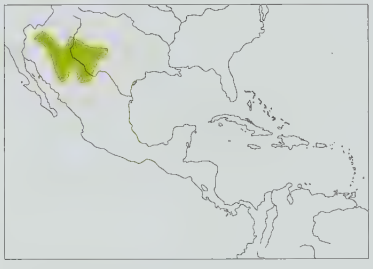
Descriptive notes. Male average 26·9 cm, 112·4 g; female average 97·1 g. Male nominate race is mostly brown with blackish streaks above, head and side of neck blackish; long superciliary line red in front of eye and white posteriorly, white submoustachial stripe and lower eyelid; marginal wing-coverts rosy red; chin to throat and underparts rosy red surrounded by blackish, belly black, side of breast to flanks and undertail-coverts striped buffish and black; underwing-coverts pale greyish-white; iris dark brown; bill bluish-ivory, culmen and tip blackish-brown; legs grey-brown. Differs from similar *S. defilippii* in larger size, longer tail and bill, pale underwing-coverts. Female is paler than male, with white throat, no red in superciliary; underparts with much heavy streaking surrounding pale red lower belly. Juvenile resembles female, but red below reduced, often just a pale pink patch, also bill paler. Race *catamarcana* is paler than nominate; *obscura* is darker than nominate, with red below restricted more to upper belly; *falklandica* has longer bill than nominate, bill slightly wide at tip ("spatulate"), also some white on outermost tail feathers. Voice. Song, by both sexes, usually from perch (e.g. shrub, rock, fence post), male rarely while flying, quite variable in different areas (possibly dialects): some populations produce whistles or warbles followed by long nasal buzz; others sing phrases of up to 8 notes, usually mixing some harsh buzzes; songs of race *catamarcana* may have reduced pitch range (1·5–5 kHz). Breeding partners may duet. Calls "peet" and "chuck".
Habitat. Mesic to dry grasslands and shrubby steppes of various types. In drier Andes partial to relatively wet grasslands (*vegas*) along watercourses or near marshes, often with clumps of pampas grass (*Cortaderia selloana*), also irrigated fields; in more humid highlands of Córdoba and San Luis (Argentina) found in rocky grasslands of *Festuca* and *Stipa*, also steppes of the resinous romerillo shrub (*Heterothalamus alienus*). Along Atlantic coast of Buenos Aires lives in bunchgrass formation of humid depressions near coastal dunes. In Patagonia in the most mesic or humid shrubby steppe, reaching edge (and clearings) of southern beech (*Nothofagus*) forest. In Falklands found in whitegrass (*Cortaderia pilosa*) fields, also near settlements. Is nowadays seen in agricultural fields (wheat) and planted pastures. Nominate race recorded from sea-level up to 2800 m; race *catamarcana* occurs at 1200–3100 m, sometimes up to 3500 m; race *obscura* breeds above 1100 m.
Food and Feeding. Arthropods (mostly insects), seeds and some fruit (*Berberis*). Feeds on maize (*Zea mays*) seeds in W Argentina. In Falkland Is said to feed on planted potatoes by probing and possibly gaping through the top soil. Forages mostly on ground and in low vegetation. Often turns pieces of dung or debris to find hidden prey. Perches in shrubs, on rocks and in small trees, also on poles and fence posts. Commonly forages in groups; during austral winter sometimes in flocks of up to 100 individuals.
Breeding. Season Sept–Jan in Chile and Argentina; nesting sometimes starts in late Aug in Falkland Is. Probably monogamous. Solitary breeder, nesting in pairs; pairs rather scattered and territorial in Sierra de San Luis (race *obscura*). Nest built by female, a cup of plant material, mostly grass stems, sometimes with partial dome-shaped roof, external dimensions quite variable, two nests from Argentina have inner diameter 8–11 cm and internal depth 5·5–9 cm, built within depression on ground among dense vegetation, quite well hidden and difficult to find, sometimes a tunnel leading through vegetation to nest; nests in Falklands nest may be up to 1 m above ground in clump of the tussock grass *Poa flabellata*. Clutch 3–4 eggs, buff to grey, densely marked with darker spots, blotches and lines, mean dimensions 28·6 × 20·6 mm (nominate race), 30·3 × 21·1 mm (*falklandica*), eggs laid at daily intervals; incubation by female, male may guard nest, both sexes feed chicks; no information on duration of incubation and nestling periods; family group persists for some months. Nests parasitized by *Molothrus bonariensis* in Argentina.
Movements. Apparently resident, even in extreme S (Tierra del Fuego). Some latitudinal and altitudinal movements in non-breeding season; in Los Glaciares National Park (Argentina) many individuals leave the area during severe winters. Race *falklandica* recorded as accidental on South Georgia.
Status and Conservation. Not globally threatened. Common and reasonably widespread; more local in drier Andes. Has expanded its range in C Argentina because of replacement of native woodland with pastures and irrigated agriculture; nominate race now found in Argentinian lowlands of Córdoba and San Luis, but this may be due to recent expansion. Population in Falkland Is (race *falklandica*) estimated at 6000–10,000 individuals in 1983–1993.
Bibliography. Christie *et al.* (2004), Fraga (2002, 2007), Gochfeld (1975, 1979a, 1979b), Humphrey *et al.* (1970), Imberti (2005), Jaramillo & Burke (1999), Narosky & Di Giacomo (1993), Nores & Yzurieta (1979), de la Peña (1987), Pettingill (1973), Ridgely & Tudor (1989), Schönwetter & Meise (1981, 1982), Shirihai (2002), Woods (1975, 1988), Zotta (1937).

109. Lilian's Meadowlark

Sturnella lilianae

French: Sturnelle de Lilian **German**: Lilianstärling **Spanish**: Pradero de Lilian

Taxonomy. *Sturnella magna lilianae* Oberholser, 1930, Huachuca Mountains, Arizona, USA.
Thought to form a superspecies with *S. magna*, the two being geographically separated by distributional gaps. Previously treated as conspecific with *S. magna*, but differs vocally and morphologically; also, recent DNA data from mitochondria and the sex-linked Z chromosome revealed a deep genetic divergence, supporting treatment as two distinct species. Some races currently included in *S. magna* (notably *auropectoralis*) may belong with present species. Detailed genetic and morphological analysis of all Mexican breeding populations needed. Treated as monotypic.
Distribution. S USA (from C Arizona, C New Mexico and W Texas) S to N Mexico (S to N Sonora and C Chihuahua).



Descriptive notes. c. 20–22 cm; male average 112·4 g, female average 90·3 g. A stocky, long-billed icterid with relatively short tail. Male has crown blackish with pale buff to white central stripe, long supercilium mostly pale buffish, but yellow in front of eye, ear-coverts whitish, dark eyestripe behind eye; upperparts and upperwing striped blackish and buff; tail with central feathers barred, outer three or four pairs of rectrices entirely white (visible in flight); chin to belly golden-yellow, V-shaped black breastband, dark-streaked buffish flanks and lower belly; iris brown; bill grey, darker culmen and tip; legs greyish-pink. Differs from *S. magna* mainly in shorter tail with distinctive pattern (outer four rectrices almost entirely white). Female is similar to male, but duller in colour. Juvenile resembles adult, but neat pale feather fringes above (scaly-looking), duller yellow below, breastband replaced with black streaks. Voice. Song 4–7 plaintive whistled notes. Call a harsh "dzzht".
Habitat. Grasslands, and grasslands with mesquite (*Prosopis*), in desertic areas. Prefers drier areas than those occupied by *S. magna*. Reported as breeding mostly in highlands, from 1070 m up to 2750 m.
Food and Feeding. Few data. Diet presumably insects and seeds. Forages on ground, sometimes in small flocks.
Breeding. Season Apr–Jun. Mating system not known. Nest made from dry grass or dry stems, with dome-shaped cover, hidden in dense dry grass or weed clump, sometimes in depression in soil, in desertic grassland. Clutch 4–5 eggs, white to greyish-white, variably speckled and blotched in shades of brown, mean dimensions 28 × 20·5 mm; no information available on incubation and nestling periods.
Movements. Little information; sight identification of wintering meadowlarks may not be reliable. Altitudinal movements likely in Arizona. Further research needed.
Status and Conservation. Not assessed. Has reasonably large breeding range, and the species was rated as abundant in Arizona in 2005. Further research required.
Bibliography. Barker *et al.* (2008b), Barlow *et al.* (1994), Bent (1958), Bock *et al.* (1986), Corado (2008), Corman (2005), Herbert *et al.* (2004), Howell & Webb (1995), Jaramillo & Burke (1999), Lanyon (1962), Ligon (1961), McCarthy (2006), Navarro-Sigüenza & Peterson (2004), Phillips *et al.* (1964), Rohwer (1972a, 1972b, 1972c, 1976).

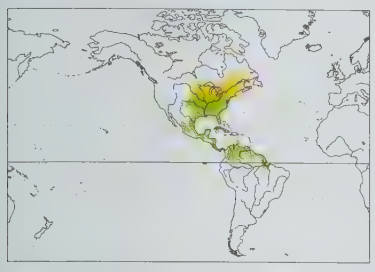
110. Eastern Meadowlark

Sturnella magna

French: Sturnelle des prés **German**: Lerchenstärling **Spanish**: Pradero Oriental
Other common names: Cuban Meadowlark (*hippocrepis*)

Taxonomy. *A.*[*lauda*] *magna* Linnaeus, 1758, South Carolina, USA.
Thought to form a superspecies with *S. lilianae*, the two being geographically separated by distributional gaps; previously treated as conspecific, but they differ vocally and morphologically, and recent DNA data from mitochondria and the sex-linked Z chromosome revealed a deep genetic divergence, supporting treatment as two distinct species; some races currently placed in present species (notably *auropectoralis*) may belong instead in *S. lilianae*. Present species is also closely related to *S. neglecta*. Race *hippocrepis* may merit full species rank. Subspecific limits, particularly in South America, need further study, e.g. race *monticola* commonly subsumed into *praticola*; distributions listed below are tentative. Populations in French Guiana and NE Brazil (Amapá) sometimes treated as race *quinta*, but type specimen of latter is from Roraima (N Brazil), technically within range of *monticola* (or *praticola*); these three taxa require re-evaluation. Race *inexspectata* has often been listed as "*inexpectata*" but this is an unjustified emendation. Fifteen subspecies currently recognized.
Subspecies and Distribution.
S. m. magna (Linnaeus, 1758) – breeds SE Canada (S Ontario E to New Brunswick) and E USA from Minnesota E to Maine S to C Texas and C North Carolina.
S. m. argutula Bangs, 1899 – S USA from Kansas and Oklahoma E to South Carolina and S to E Texas and Florida.
S. m. hoopesi Stone, 1897 – extreme S USA (SE Texas) and NE Mexico (N Tamaulipas).
S. m. auropectoralis G. B. Saunders, 1934 – highlands of W Mexico from Sinaloa S to upper R Lerma drainage (in México) and to coastal Nayarit.
S. m. mexicana P. L. Sclater, 1861 – coastal lowlands of E Mexico (from N Veracruz) S to Guatemala (Petén) and Belize.
S. m. griscomi Van Tyne & Trautman, 1941 – coast of N Yucatán, in SE Mexico.
S. m. hippocrepis (Wagler, 1832) – Cuba, including I of Pines.
S. m. saundersi Dickerman & A. R. Phillips, 1970 – Pacific lowlands of S Mexico (SE Oaxaca).
S. m. inexspectata Ridgway, 1888 – Honduras and adjacent NE Nicaragua.
S. m. alticola Nelson, 1900 – highlands from S Mexico (Chiapas) S to Costa Rica.
S. m. subulata Griscom, 1934 – Panama (mostly along Pacific slope).
S. m. meridionalis P. L. Sclater, 1861 – NE Andes from Colombia (Santander and Cundinamarca) E to NW Venezuela (Trujillo).
S. m. paralios Bangs, 1901 – N Colombia (Santa Marta Mts S to W base of E Andes) and savannas of N & C Venezuela.
S. m. praticola C. Chubb, 1921 – E *llanos* of Colombia and SE Venezuela E to Guyana and Suriname.

S. m. monticola C. Chubb, 1921 – Guianan highlands from Venezuela (Bolívar) and Guyana E to French Guiana and extreme N Brazil (Roraima and Amapá).



Descriptive notes. 20–24 cm; male average 102 g and female 76 g (*argutula*), male 86–110 g and female 65·6–88·7 g (*alticola*). A stocky, long-billed icterid. Male nominate race has crown blackish with pale buff to white median stripe, long supercilium dull whitish-buff, but yellow in front of eye, ear-coverts pale grey-brown, blackish eyestripe behind eye, whitish malar stripe; upperparts and upperwing striped blackish and buff; tail with central feathers barred, outer three rectrices largely white (visible in flight); chin to belly yellow, V-shaped black breastband, dark-streaked buffy flanks and lower belly; iris dark brown; bill grey, darker culmen and tip; legs light pinkish-flesh to greyish. Female is similar to male, but duller in colour. Juvenile is similar to adult, but paler, with more prominent pale fringes above (looking scaly), throat and underparts paler, black breastband replaced with dark streaking. Race *argutula* is smaller than nominate and has deeper yellow underparts; *hippocrepis* resembles previous, but much smaller, and more conspicuously streaked below; *mexicana* is characterized by more rufescent upperparts, and narrower pectoral band; *griscomi* resembles last, but larger and paler; *inexspectata* is smallest race in body weight and measurements, also darker than nearby *mexicana*, and white in tail more restricted; *hoopesi* is paler above than nominate, the rich brown tinges in upperparts and wing replaced by greyish-brown, blackish bars on wing and tail more distinct; *auropectoralis* closely resembles previous, but darker above and deeper orange-yellow below, shorter wing, tail has completely white outer rectrix; *saundersi* is like last, but with shorter wing and bill; *alticola* is medium-sized, with shorter wing and longer legs, has more greyish-brown upperparts than previous; *subulata* resembles *inexspectata*, but more white in tail; *meridionalis* has longest bill, is also larger and darker than neighbouring races; *paralios* resembles preceding race, but smaller and paler, with more white in tail; *praticola* is smaller and paler than last, with less white in tail; *monticola* differs from last in being slightly larger and darker. Voice. Song variable, usually a series of 4 pleasant, descending whistles. Female commonly produces a chatter, possibly equivalent to male song. Common call a sharp "dzert" or "jerzik"; also has loud rattle as alarm, also "weet" flight call.

Habitat. Open humid grasslands, meadows, alfalfa (*Medicago*) fields, hay fields, and pastures in general, with some variations within its huge range; less often in cultivated fields. Reported from open pine (*Pinus*) savannas, grassy marshes, agricultural land, weedy fields, and in South American *páramos*. Roosts primarily in thick grass. Up to 4100 m in C Mexico; 1700–3500 m in Andes (*meridionalis*).

Food and Feeding. Contents of 1514 stomachs comprised 74% animal food and 26% plant food. Feeds mostly on adult and larval insects, main insect prey consisting of crickets and grasshoppers (Orthoptera), also many Lepidoptera and beetles (Coleoptera); also takes invertebrates such as spiders (Araneae) and earthworms (Oligochaeta). A few stomachs contained lizards. Feeds on carrion of small roadkill mammals and birds. Eats wild and cultivated seeds, rarely fruits. Forages on ground. In non-breeding season found in flocks of up to c. 200 individuals, often mixed with *S. neglecta*.

Breeding. Season Apr–Aug in USA, Jan–Jul in Cuba, and from late Apr in Nicaragua; second broods frequent. In North America monogamous to moderately polygynous, with 1–3 females per male. Breeds solitarily. Male defends multi-purpose territory (feeding and mating), territories in Wisconsin (N USA) 1·2–6·1 ha; male also defends territory from sympatric male *S. neglecta*. Nest built by female, materials coarse dried grasses, stems, even bark, attached to nearby plants, lining of fine grass, external diameter 14–21 cm, internal diameter 8–15 cm, most nests partially covered with a dome, built on ground, sometimes in shallow depression, and well concealed by vegetation, many have entrance tunnel up to 1 m long; nests in C prairies of USA usually oriented against prevailing winds. Clutch 3–7 eggs, usually 4 in Cuba, white, spotted, blotched and speckled over entire surface in shades of brown and lavender, mean dimensions 27·8 × 20·4 mm; incubation by female, period 13–14 days; chicks fed by female, only minor contribution by male, nestling period 10–12 days; post-fledging parental care lasts c. 2 weeks. Nests parasitized by *Molothrus ater*.

Movements. Usually resident in Cuba and in Central and South America. Populations from Canada S to N Mexico migratory, but seasonal status and winter ranges of Mexican populations require more study; sight identification of wintering meadowlarks may not be reliable. Leaves breeding grounds in N of range in Sept–Oct; returns to Canada and N USA from Mar, earlier (late Feb) in S USA.

Status and Conservation. Not globally threatened. Common and widely distributed in N portion of range; fairly common to locally common in Mexico and in Central and South America. Records of race *auropectoralis* in coastal Nayarit (W Mexico) possibly involve migrants, rather than breeding individuals. Some of the C & S populations may be of conservation concern, e.g. Cuban race *hippocrepis*, especially in view of its possible status as a distinct species; further study required.

Bibliography. d'Agincourt & Falls (1983), Balát & González (1982), Barker *et al.* (2008b), Bent (1958), Dickerman (1989), Dickerman & Phillips (1970), Elliot (1977), Falls & d'Agincourt (1981), García Romero & Fernández García (1998), Garrido & Kirkconnell (2000), Granfors *et al.* (1996), Hilty (2003), Hilty & Brown (1986), Howell & Webb (1995), Hubbard & Hubbard (1969), Jaramillo & Burke (1999), Joseph (2001), Kershner *et al.* (2004a, 2004b), Knapton (1988), Lanyon (1956, 1962, 1966, 1979, 1995), Long *et al.* (2009), McCarthy (2006), Peck & James (1987), Pieman (1992), Quevedo & López-Lanús (2002), Rohwer (1972a, 1972b, 1972c, 1976), Roseberry & Klimstra (1970), Terres (1956), Tostain (1980), Sick (1993).

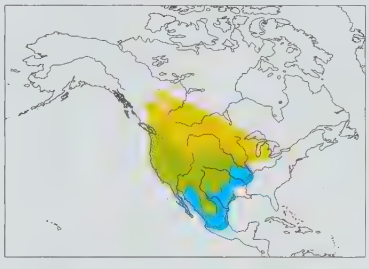
111. Western Meadowlark

Sturnella neglecta

French: Sturnelle de l'Ouest **German**: Wiesenstärling **Spanish**: Pradero Occidental

Taxonomy. *Sturnella neglecta* Audubon, 1844, near Fort Croghan, North Dakota, USA.
Closely related to *S. magna*. Monotypic.

Distribution. Breeds in Canada (from S British Columbia and NC Alberta E to SW Ontario) and S in W USA (E to Michigan, W Iowa and W Texas) to Mexico (S to N Baja California, Sonora and C plateau in Guanajuato); in winter extends farther S into Mexico and E in USA to R Mississippi and the Gulf Coast.



Descriptive notes. Male average 21 cm, 106 g; female average 19 cm, 89·4 g. A stocky, long-billed icterid. Male has blackish crown with pale buff to white median stripe, long supercilium mostly dull whitish-buff, but yellow in front of eye, ear-coverts usually smudged brownish or striped blackish, dark eyestripe behind eye; upperparts and upperwing striped blackish and buff; tail brown, central feathers thinly barred dark, outer three pairs white with dark shaft streak (visible in flight); malar region (and sometimes submoustachial area) and chin to belly yellow, V-shaped black breastband, buffy flanks and lower belly with darker streaks; iris dark brown; bill grey-blue, darker culmen and tip; legs light flesh-coloured. Differs from similar *S. magna* mainly in paler coloration, yellow malar. Female is similar to male, but duller in colour. Juvenile is paler than adult, particularly in yellow areas of plumage, and has breastband replaced with dark streaking; bill pinkish, tipped dark. Voice. Song of male lasts c. 1·5 seconds, consists of 1–6 rather pure whistles followed by 1–5 gurgling notes. Also a flight song, a jumbled series of notes. Calls include "chuck" and a rattle or chatter.

Habitat. Pastures, meadows, hay fields, less often in cultivated fields. Where range overlap with *S. magna*, present species usually in drier grasslands; when overlapping with *S. lilianae*, occupies more humid habitats. Roosts in dense grassland. Breeds at up to 2200 m.

Food and Feeding. Stomach contents 70% animal food, 30% plant food. Insects commonly represented included weevils (Curculionidae), crickets and grasshoppers (Orthoptera), caterpillars of Lepidoptera, and ants (Formicidae). Reported as feeding on eggs of Mormon crickets (*Anabrus simplex*). Feeds on carrion of roadkilled vertebrates. Plant food mostly seeds; weed seeds predominate in autumn, cultivated seeds in winter. Rarely feeds on fruits. Forages on ground. Forms flocks of up to c. 200 individuals in non-breeding season.

Breeding. Season Apr–Aug in USA; second broods frequent. Monogamous to moderately polygynous, with two or three females per male. Male defends multi-purpose territory (feeding, mating), even against male *S. magna*; territory size in Iowa (USA) 3–14 ha. Nest built by female, from coarse dried grasses, stems and bark, lined with fine grass, partially covered with a dome, placed on ground, sometimes in shallow depression, well concealed by vegetation, and usually with entrance tunnel. Clutch 3–7 eggs, white, spotted, blotched and speckled over entire surface in shades of brown and lavender, mean dimensions 28·1 mm × 20·6 mm; incubation by female, period 13–14 days; chicks fed by female, with variable contribution by male, nestling period 10–12 days; post-fledging parental care c. 2 weeks. Nests parasitized by *Molothrus ater*.

Movements. Medium-distance migrant, with overlapping breeding and non-breeding ranges. Winters from extreme SW Canada across much of US breeding range, but extending farther E in S USA and reaching Gulf Coast; also into most of N & C Mexico S to S Baja Califonia, Michoacán and S Tamaulipas. Also performs altitudinal movements in highlands. Recorded from Guadalupe I (off W Baja California) in Mar. Vagrant in Alaska.

Status and Conservation. Not globally threatened. Common to abundant in much of its extensive range. In North America seems to be a more numerous species than *S. magna*.

Bibliography. Anderson & Merritt (1977), Aweida (1995), Barker *et al.* (2008b), Bent (1958), Dickinson *et al.* (1987), Falls & d'Agincourt (1981), Falls & Krebs (1975), Falls *et al.* (1988), Horn & Falls (1988), Horn *et al.* (1993), Howell & Webb (1995), Hubbard & Hubbard (1969), Jaramillo & Burke (1999), Knowlton & Maddock (1943), Lanyon, W.E. (1956, 1962, 1966, 1979, 1994), McCarthy (2006), Rodgers (1983), Rohwer (1972a, 1972b, 1972c, 1976).

REFERENCES

REFERENCES OF SCIENTIFIC DESCRIPTIONS

Aldrich (1937). *Sci. Publ. Cleveland Mus. Nat. Hist.* **7**: 138 [*Atlapetes albinucha azuerensis*].
Aldrich (1943). *Proc. Biol. Soc. Washington* **56**: 163 [*Passerella schistacea olivacea*].
Alexander (1906). *Bull. Brit. Orn. Club* **16(9)**: 124 [*Emberiza tahapisi goslingi*].
Allen, J.A. (1875). *Proc. Boston Soc. Nat. Hist.* **17**: 293 [*Ammodramus nelsoni*].
Allen, J.A. (1880). *Bull. Nuttall Orn. Club* **5**: 166 [*Loxigilla noctis sclateri*].
Allen, J.A. (1888). *Auk* **5**: 284 [*Ammodramus maritimus peninsulae*], 286 [*Ammodramus maritimus sennetti*].
Allen, J.A. (1890). *Auk* **7**: 344 [*Icterus northropi*].
Allen, J.A. (1891). *Bull. Amer. Mus. Nat. Hist.* **3**: 351 [*Tangara cayana margaritae*], 374 [*Zonotrichia capensis costaricensis*].
Allen, J.A. (1892). *Bull. Amer. Mus. Nat. Hist.* **4**: 51 [*Ramphocelus carbo capitalis*].
Anthony (1889). *Proc. Calif. Acad. Sci.* **Ser. 2, no. 2**: 76 [*Junco hyemalis townsendi*].
Anthony (1890). *Zoe* **1**: 238 [*Junco hyemalis thurberi*].
Anthony (1895). *Auk* **12**: 111 [*Pyrgisoma crissale senicula*], 348 [*Passerella megarhyncha stephensi*].
Audubon (1829). *Birds Amer. (folio)* **1(24)**: plate 70 [*Ammodramus henslowii*].
Audubon (1833). *Birds Amer. (folio)* **2(33)**: plate 165 [*Peucaea aestivalis bachmani*].
Audubon (1834). *Birds Amer. (folio)* **2(39)**: plate 193 [*Melospiza lincolnii*].
Audubon (1834). *Orn. Biogr.* **2**: 285 [*Ammodramus maritimus macgillivraii*].
Audubon (1837). *Birds Amer. (folio)* **4(75)**: plate 373, figs. 2–4 [*Pheucticus melanocephalus maculatus*], plate 388, fig. 1 [*Agelaius tricolor*].
Audubon (1838). *Birds Amer. (folio)* **4(85)**: plate 424, fig. 7 [*Passerella unalaschcensis townsendi*].
Audubon (1839). *Orn. Biogr.* **5**: 336 [*Pipilo chlorurus*].
Audubon (1839). *Syn. Birds North Amer.*: 117 [*Peucaea*].
Audubon (1844). *Birds Amer. (octavo)* **7**: 338, plate 488 [*Ammodramus leconteii*], 339, plate 489 [*Sturnella neglecta*], 359, plate 500 [*Ammodramus bairdii*].
Aveledo & Pérez (1989). *Bol. Soc. Venez. Cienc. Nat.* **43**: 13 [*Conirostrum sitticolor pallidum*].
Aveledo & Pérez (1994). *Bol. Soc. Venez. Cienc. Nat.* **44**: 251 [*Tangara nigroviridis lozanoana*].
Baird, S.F. (1852). In: Baird & Stansbury, *Explor. Great Salt Lake of Utah*: 325 [*Pyrgisoma aberti*].
Baird, S.F. (1854). *Proc. Acad. Nat. Sci. Philadelphia* **7(3)**: 119 [*Melospiza melodia fallax*, *Pyrgisoma fuscum mesoleucum*].
Baird, S.F. (1858). In: Baird, Cassin & Lawrence, *Rep. Explor. Surv. Railroad Mississ. Pacific Ocean* **9**: 432 [*Rhynchophanes*], 439 [*Pooecetes*], 448 [*Pooecetes gramineus confinis*], 476 [*Melospiza*], 478 [*Melospiza melodia heermanni*], 479 [*Melospiza melodia gouldii*], 490 [*Passerella schistacea*], 515 [*Pipilo maculatus megalonyx*], 925 [*Passerella megarhyncha*].
Baird, S.F. (1858). *Proc. Boston Soc. Nat. Hist.* **6**: 379 [*Melospiza melodia samuelis*].
Baird, S.F. (1860). *Proc. Acad. Nat. Sci. Philadelphia* **11** (1859): 305 [*Cardinalis cardinalis igneus*, *Pyrgisoma crissale albigula*].
Baird, S.F. (1863). *Proc. Acad. Nat. Sci. Philadelphia* **15(6)**: 297 [*Tiaris bicolor marchii*].
Baird, S.F. (1867). *Ann. Lyc. Nat. Hist. New York* **8(32)**: 447 [*Saltator coerulescens plumbiceps*].
Baird, S.F. (1869). *Trans. Chicago Acad. Sci.* **1**: 319, plate 29, fig. 2 [*Melospiza melodia insignis*].
Baird, S.F. (1873). *Amer. Naturalist* **7**: 611 [*Coereba flaveola newtoni*], 612 [*Coereba flaveola barbadensis*, *Coereba flaveola caboti*].
Bangs (1898). *Proc. Biol. Soc. Washington* **12**: 139 [*Sicalis citrina browni*], 141 [*Piranga lutea faceta*], 143 [*Dacnis cayana napaea*], 159 [*Arremon basilicus*], 180 [*Diglossa humeralis nocticolor*].
Bangs (1899). *Proc. Biol. Soc. Washington* **13**: 102 [*Phrygilus unicolor nivarius*].
Bangs (1899). *Proc. New England Zoöl. Club* **1(4)**: 20 [*Sturnella magna argutula*].
Bangs (1900). *Proc. New England Zoöl. Club* **2(3)**: 31 [*Saltator atriceps lacertosus*].
Bangs (1901). *Auk* **18**: 31 [*Ramphocelus dimidiatus limatus*].
Bangs (1901). *Proc. New England Zoöl. Club* **2(8)**: 52 [*Coereba flaveola cerinoclunis*]; **2(10)**: 56 [*Sturnella magna paralios*].
Bangs (1902). *Proc. New England Zoöl. Club* **3(3)**: 67 [*Chlorospingus ophthalmicus novicius*]; **3(7)**: 88 [*Chlorophonia cyanea psittacina*], 89 [*Catamenia analis alpica*].
Bangs (1903). *Proc. New England Zoöl. Club* **4(3)**: 6 [*Cardinalis cardinalis magnirostris*].
Bangs (1905). *Proc. Biol. Soc. Washington* **18**: 154 [*Dacnis cayana callaina*], 155 [*Tangara lavinia cara*].
Bangs (1906). *Proc. Biol. Soc. Washington* **19**: 112 [*Chlorospingus ophthalmicus regionalis*].
Bangs (1907). *Auk* **24**: 306 [*Cyanerpes lucidus isthmicus*], 310 [*Arremon costaricensis*].
Bangs (1907). *Proc. Biol. Soc. Washington* **20**: 30 [*Piranga hepatica dextra*].
Bangs (1908). *Proc. Biol. Soc. Washington* **21**: 160 [*Dacnis venusta fuliginata*, *Tangara gyrola deleticia*], 161 [*Atlapetes tricolor crassus*].
Bangs (1908). *Proc. New England Zoöl. Club* **4(2)**: 31 [*Ramphocelus sanguinolentus apricus*], 34 [*Emberizoides herbicola lucaris*].
Bangs (1909). *Proc. Biol. Soc. Washington* **22**: 37 [*Aimophila rufescens hypaethra*].
Bangs (1915). *Proc. Biol. Soc. Washington* **28**: 126 [*Cyanocompsa parellina beneplacita*].
Bangs (1917). *Proc. New England Zoöl. Club* **6(12)**: 76 [*Tangara gyrola nupera*].
Bangs (1931). *Proc. New England Zoöl. Club* **12**: 86 [*Xenospiza*], 87 [*Xenospiza baileyi*], 91 [*Latoucheornis*].
Bangs & Barbour (1922). *Bull. Mus. Comp. Zool. Harvard* **65**: 225 [*Chlorophanes spiza argutus*], 227 [*Tangara inornata languens*].
Bangs & Griscom (1932). *Proc. New England Zoöl. Club* **13**: 53 [*Lanio leucothorax reversus*].
Bangs & Noble (1918). *Auk* **35**: 460 [*Thraupis episcopus quaesita*], 461 [*Piranga lutea desidiosa*].
Bangs & Peck (1908). *Proc. Biol. Soc. Washington* **21**: 45 [*Ammodramus savannarum cracens*].
Bangs & Penard, T.E. (1918). *Bull. Mus. Comp. Zool. Harvard* **62**: 90 [*Sporophila minuta centralis*], 91 [*Saltator coerulescens brewsteri*].
Bangs & Penard, T.E. (1919). *Bull. Mus. Comp. Zool. Harvard* **63**: 32 [*Saltator striatipectus furax*], 33 [*Saltator striatipectus speratus*], 38 [*Cnemoscopus*].
Bangs & Penard, T.E. (1921). *Bull. Mus. Comp. Zool. Harvard* **64**: 396 [*Sicalis flaveola valida*].
Bangs & Penard, T.E. (1921). *Proc. Biol. Soc. Washington* **34**: 92 [*Tangara gyrola toddi*].
Banks (1963). *Occas. Pap. Calif. Acad. Sci.* **37**: 3 [*Amphispiza bilineata belvederei*, *Cardinalis cardinalis clintoni*].
Bannerman & Bates (1926). *Ibis* **Ser. 12, no. 2**: 801 [*Emberiza affinis nigeriae*].
Barbour & Peters, J.L. (1927). *Proc. New England Zoöl. Club* **9**: 96 [*Torreornis*, *Torreornis inexpectata*].
Barnés (1945). *Auk* **62**: 299 [*Agelaius xanthomus monensis*].
Barrows (1883). *Bull. Nuttall Orn. Club* **8**: 92 [*Sporophila palustris*].
Bartlett, E. (1890). *Ann. Mag. Nat. Hist.* **Ser. 6, no. 6(32)**: 168 [*Cyanocompsa cyanoides rothschildii*].
Bechstein (1798). *Lathams Allgem. Uebers. Vög.* **3**: 544, plate 120, fig. 1 [*Spizella passerina*].
Bechstein (1802). *Orn. Taschenb. Deutschl.* **1**: 130 [*Calcarius*].
Behle & Selander (1951). *J. Washington Acad. Sci.* **41**: 364 [*Passerella schistacea swarthi*].
Bell (1849). *Ann. Lyc. Nat. Hist. New York* **5** (1852): 6 [*Pipilo maculatus oregonus*].
Berlepsch (1880). *Ibis* **Ser. 4, no. 4**: 113 [*Tachyphonus cristatus intercedens*].
Berlepsch (1883). *Ibis* **Ser. 5, no. 1**: 487 [*Habia fuscicauda salvini*].
Berlepsch (1884). *J. Orn.* **32**: 287 [*Cyanerpes caeruleus microrhynchus*], 290 [*Tangara cyanicollis granadensis*].
Berlepsch (1885). *Ibis* **Ser. 5, no. 3**: 288 [*Hemispingus reyi*].
Berlepsch (1885). *Proc. Zool. Soc. London* **1885(1)**: 115 [*Catamenia inornata minor*].
Berlepsch (1888). *Auk* **5(4)**: 451 (Suppl.) [*Eucometis penicillata pallida*, *Eucometis penicillata stictothorax*], 453 (Suppl.) [*Eucometis penicillata affinis*].
Berlepsch (1889). *J. Orn.* **37**: 299 [*Cacicus haemorrhous pachyrhynchus*].
Berlepsch (1892). *J. Orn.* **40**: 77 [*Coereba flaveola uropygialis*].
Berlepsch (1893). *Ibis* **Ser. 6, no. 5**: 207 [*Compsospiza*], 208, plate 6 [*Compsospiza garleppi*].
Berlepsch (1893). *Orn. Monatsber.* **1**: 11 [*Anisognathus lacrymosus melanops*, *Chlorospingus ophthalmicus venezuelanus*, *Conirostrum sitticolor intermedium*].
Berlepsch (1897). *Bull. Brit. Orn. Club* **7(1)**: 3 [*Bangsia rothschildi*].
Berlepsch (1901). *J. Orn.* **49**: 82 [*Conirostrum albifrons lugens*], 83 [*Conirostrum albifrons sordidum*, *Tangara arthus sophiae*], 86 [*Chlorospingus ophthalmicus fulvigularis*].
Berlepsch (1903). *Orn. Monatsber.* **11**: 18 [*Tangara cyanocephala corallina*].
Berlepsch (1906). *Bull. Brit. Orn. Club* **16(8)**: 97 [*Poospiza hypocondria affinis*, *Sicalis columbiana goeldii*].
Berlepsch (1906). In: Berlepsch & Stolzmann, *Ornis* **13(2)**: 127 [*Phrygilus alaudinus excelsus*].
Berlepsch (1907). *Ornis* **14**: 348 [*Tangara cayana sincipitalis*], 349 [*Chlorothraupis frenata*].
Berlepsch (1912). In: Schalow, *Verh. V. Int. Orn.-Kongr., Berlin 1910* (1911): 1017 [*Euphonia xanthogaster exsul*], 1034 [*Tangara larvata centralis*], 1043 [*Iridosornis jelskii bolivianus*], 1045 [*Anisognathus lacrymosus olivaceiceps*], 1049 [*Anisognathus somptuosus antioquiae*], 1073 [*Lanio versicolor parvus*], 1080 [*Chrysothlypis*], 1081 [*Erythrothlypis*], 1082 [*Hemithraupis flavicollis hellmayri*], 1084 [*Nemosia pileata nana*], 1088 [*Chlorospingus ophthalmicus honduratius*], 1102 [*Arremon phygas*], 1110 [*Chlorornis riefferii bolivianus*], 1114 [*Saltator similis ochraceiventris*, *Saltator coerulescens yucatanensis*].
Berlepsch & Hartert, E.J.O. (1902). *Novit. Zool.* **9**: 19 [*Tangara mexicana media*].
Berlepsch & Stolzmann (1892). *Proc. Zool. Soc. London* **1892(3)**: 375 [*Saltator striatipectus immaculatus*], 378 [*Dives warczewiczi kalinowskii*, *Molothrus bonariensis occidentalis*].
Berlepsch & Stolzmann (1894). *Ibis* **Ser. 6, no. 6**: 386 [*Dubusia taeniata stictocephala*, *Sicalis uropigyalis sharpei*].
Berlepsch & Stolzmann (1896). *Proc. Zool. Soc. London* **1896(2)**: 334 [*Diglossa caerulescens pallida*], 336 [*Conirostrum cinereum littorale*, *Dacnis cayana glaucogularis*], 342 [*Buthraupis montana cyanonota*], 343 [*Thraupis episcopus major*], 344 [*Ramphocelus carbo connectens*], 345 [*Thlypopsis ornata macropteryx*], 347 [*Arremon assimilis poliophrys*], 350 [*Catamblyrhynchus diadema citrinifrons*, *Phrygilus punensis chloronotus*].
Berlepsch & Stolzmann (1906). *Ornis* **13**: 67 [*Atlapetes nationi brunneiceps*], 80 [*Buthraupis montana saturata*, *Tangara viridicollis fulvigula*], 84 [*Sporophila nigricollis inconspicua*].
Berlepsch & Taczanowski (1884). *Proc. Zool. Soc. London* **1883(4)**: 543 [*Chlorophanes spiza exsul*, *Dacnis egregia aequatorialis*], 544 [*Euphonia laniirostris hypoxantha*], 545 [*Tangara cyanicollis cyanopygia*], 546 [*Chlorothraupis stolzmanni*, *Thraupis palmarum violilavata*]; **1884(3)**: 291, plate 24, fig. 1 [*Hemispingus ochraceus*], 293 [*Tiaris obscurus pauper*].
Berlioz (1939). *Bull. Brit. Orn. Club* **59(7)**: 102 [*Conothraupis mesoleuca*].
Bertoni, A. (1901). *Anal. Cient. Paraguay* **1**: 94 [*Euphonia violacea aurantiicollis*].
Bianchi (1904). *Bull. Brit. Orn. Club* **14(8)**: 80 [*Emberiza koslowi*].
Bishop (1901). *Auk* **18**: 269 [*Ammodramus caudacutus diversus*].
Blake & Hocking (1974). *Wilson Bull.* **86(4)**: 321 and plate [*Hemispingus rufosuperciliaris*], 323 and plate [*Buthraupis aureodorsalis*].
Blake (1940). *Field Mus. Nat. Hist. (Zool. Ser.)* **24(14)**: 155 [*Diglossa sittoides mandeli*].
Blyth (1840). In: Cuvier, *Animal Kingdom*: 184 [*Habia*].
Blyth (1845). *J. Asiatic Soc. Bengal* **13** (1844): 957 [*Emberiza buchanani*], 958 [*Emberiza spodocephala sordida*].
Blyth (1854). *J. Asiatic Soc. Bengal* **23**: 215 [*Emberiza stewarti*].
Boddaert (1783). *Table Planches Enlum.*: 31 [*Quiscalus niger*], 37 [*Molothrus ater*], 40 [*Sporophila collaris*], 44 [*Tachyphonus rufus*], 45 [*Hemithraupis guira nigrigula*, *Nemosia pileata*], 50 [*Lanio fulvus*].
Boie (1826). *Isis (Oken)* **19(10)**: col. 974 [*Thraupis*].
Boie (1828). *Isis (Oken)* **21(4)**: col. 324 [*Sicalis*].
Boissonneau (1840). *Rev. Zool.* **Ser. 1, no. 3**: 4 [*Chlorornis riefferii*, *Diglossa lafresnayii*, *Tangara vassorii*], 5 [*Diglossa sittoides dorbignyi*], 66 [*Buthraupis eximia*], 67 [*Arremon assimilis*, *Dubusia taeniata*,

Tangara labradorides], 68 [*Atlapetes albofrenatus*, *Atlapetes pallidinucha*], 69 [*Atlapetes schistaceus*, *Atlapetes semirufus*], 70 [*Macroagelaius subalaris*].
Bonaparte (1824). *J. Acad. Nat. Sci. Philadelphia* **4(1)**: 45 [*Spiza*].
Bonaparte (1825). *J. Acad. Nat. Sci. Philadelphia* **4(2)**: 389 [*Cassiculus melanicterus*].
Bonaparte (1826). *J. Acad. Nat. Sci. Philadelphia* **5(2)**: 223 [*Xanthocephalus xanthocephalus*].
Bonaparte (1831). *Antologia (Florence)* **44(130)**: 164 [*Ramphocelus passerinii*].
Bonaparte (1832). *Giorn. Arcad. Sci. Lett. Arti (Rome)* **52**: 205 [*Spizella*], 206 [*Paroaria*].
Bonaparte (1838). *Geograph. Comp. List Birds Europe North Amer.*: 30 [*Calamospiza*], 33 [*Passerculus*], 35 [*Cardinalis*].
Bonaparte (1838). *Proc. Zool. Soc. London* **1837(5)**, no. 59: 110 [*Icterus parisorum*], 111 [*Cardinalis phoeniceus*, *Cardinalis sinuatus*], 112 [*Euphonia elegantissima*], 117 [*Euphonia hirundinacea*], 120 [*Passerina versicolor*], 121 [*Thraupis bonariensis darwinii*, *Tangara nigrocincta*].
Bonaparte (1838). *Rev. Zool.* **Ser. 1, no. 1**: 8 [*Ramphocelus icteronotus*].
Bonaparte (1845). *Atti Soc. Ital. Sci. Nat. Milano* **1844**: 405 [*Cacicus leucoramphus*].
Bonaparte (1850). *Compt. Rend. Acad. Sci. Paris* **31**: 424 [*Dubusia*].
Bonaparte (1850). *Consp. Gen. Avium* **1**: 240 [*Cyanicterus*], 425 [*Hypopyrrhus*], 426 [*Clypicterus*], 429 [*Sturnella defilippii*], 430 [*Sturnella superciliaris*], 431 [*Xanthocephalus*], 432 [*Icterus pyrrhopterus periporphyrus*], 435 [*Icterus auratus*], 466 [*Emberiza cioides ciopsis*], 469 [*Oriturus*], 470 [*Melanodera*], 473 [*Poospiza cabanisi*, *Poospiza cinerea*, *Poospiza hispaniolensis*], 476 [*Diuca diuca minor*], 477 [*Melospiza melodia rufina*], 486 [*Pyrgisoma*, *Pyrgisoma kieneri*], 488 [*Arremon flavirostris polionotus*, *Arremon schlegeli*, *Arremonops conirostris*], 493 [*Catamenia*], 495 [*Sporophila torqueola*], 497 [*Sporophila torqueola morelleti*], 502 [*Cyanocompsa parellina*, *Cyanoloxia*].
Bonaparte (1851). *Compt. Rend. Acad. Sci. Paris* **32**: 76 [*Chlorochrysa*, *Chlorochrysa phoenicotis*, *Chlorochrysa calliparaea bourcieri*, *Tangara icterocephala*], 77 [*Tangara rufigula*], 80 [*Tangara mexicana boliviana*].
Bonaparte (1851). *Rev. Mag. Zool.* **Ser. 2, no. 3**: 136 [*Euphonia xanthogaster brevirostris*], 137 [*Chlorophonia*], 171 [*Buthraupis montana gigas*], 173 [*Hemithraupis flavicollis peruana*], 178 [*Phaenicophilus poliocephalus*].
Bonaparte (1853). *Compt. Rend. Acad. Sci. Paris* **37**: 833 [*Psarocolius guatimozinus*], 918 [*Peucaea ruficauda*], 921 [*Phrygilus unicolor geospizopsis*], 922 [*Eucometis penicillata spodocephalus*], 923 [*Saltator coerulescens plumbeus*], 924 [*Melopyrrha*].
Bonaparte (1854). *Compt. Rend. Acad. Sci. Paris* **38**: 259 [*Coereba flaveola minima*].
Bonaparte (1855). *Compt. Rend. Acad. Sci. Paris* **41**: 657 [*Arremon virenticeps*].
Bond, G.M. & Stewart (1951). *Wilson Bull.* **63**: 38 [*Melospiza georgiana nigrescens*].
Bond, J. (1955). *Proc. Acad. Nat. Sci. Philadelphia* **107**: 37 [*Diglossa caerulescens media*].
Bond, J. & Dod (1977). *Notulae Naturae* **451**: 2 [*Calyptophilus frugivorus neibae*].
Bond, J. & Meyer de Schauensee (1939). *Notulae Naturae* **12**: 2 [*Paroaria capitata fuscipes*, *Saltator aurantiirostris hellmayri*], 3 [*Oryzoborus atrirostris gigantirostris*], 5 [*Ammodramus humeralis tarijensis*, *Atlapetes rufinucha carrikeri*]; **40**: 1 [*Xenodacnis parina petersi*], 2 [*Xenodacnis parina bella*].
Bond, J. & Meyer de Schauensee (1940). *Proc. Acad. Nat. Sci. Philadelphia* **92**: 167 [*Chlorospingus semifuscus livingstoni*].
Bond, J. & Meyer de Schauensee (1941). *Notulae Naturae* **93**: 6 [*Thraupis sayaca boliviana*].
Bosc (1792). *J. Hist. Nat. (Paris)* **2(17)**: 179, plate 34, fig. 4 [*Ammodramus humeralis*].
Boucard (1878). *Proc. Zool. Soc. London* **1878(1)**: 57, plate 4 [*Junco vulcani*].
Brandt, J.F. (1841). *Bull. Acad. Imp. Sci. St. Pétersb.* **9**: col. 12 [*Emberiza bruniceps*].
Brandt, J.F. (1843). *Bull. Acad. Imp. Sci. St. Pétersb. (Cl. Phys.-Math.)* **1**: col. 363 [*Emberiza cioides*].
Brehm, C.L. (1855). *Vollst. Vogelfang*: 114 [*Emberiza cineracea*], 414 [*Emberiza citrinella erythrogenys*].
Brewster (1882). *Bull. Nuttall Orn. Club* **7**: 228 [*Passerella arborea ochracea*].
Brewster (1886). *Auk* **3**: 108 [*Junco hyemalis carolinensis*].
Brewster (1888). *Auk* **5**: 91 [*Icterus wagleri castaneopectus*], 92 [*Aimophila rufescens mcleodii*].
Brewster (1889). *Auk* **6**: 90 [*Euphonia affinis godmani*].
Brewster (1891). *Auk* **8**: 146 [*Pipilo maculatus magnirostris*].
Brewster (1896). *Auk* **13**: 46 [*Melospiza melodia merrilli*].
Brewster (1918). *Proc. New England Zoöl. Club* **6**: 78 [*Ammodramus henslowii susurrans*].
Brisson (1760). *Ornithologia Syn. Meth. Sist. Avium* **1**: 30 [*Icterus*], 36 [*Tangara*].
Brodkorb (1938). *Occas. Pap. Mus. Zool. Univ. Mich.* **367**: 3 [*Thraupis bonariensis schulzei*], 4 [*Coryphospingus cucullatus fargoi*]; **369**: 6 [*Melozone biarcuata hartwegi*].
Brodkorb (1940). *Auk* **57**: 548 [*Saltator atriceps peeti*].
Brodkorb (1943). *J. Washington Acad. Sci.* **33**: 33 [*Sicalis luteola mexicana*].
Brown, N.C. (1882). *Bull. Nuttall Orn. Club* **7(1)**: 26 [*Aimophila ruficeps eremoeca*].
Bryant, H. (1866). *Proc. Boston Soc. Nat. Hist.* **10** (1865): 252 [*Coereba flaveola portoricensis*, *Spindalis portoricensis*], 254 [*Icterus portoricensis*, *Loxipasser*].
Bryant, H. (1867). *Proc. Boston Soc. Nat. Hist.* **11** (1866): 92 [*Spindalis dominicensis*].
Bryant, W.E. (1888). *Proc. Calif. Acad. Sci.* **Ser. 2, no. 1**: 197 [*Melospiza melodia rivularis*].
Buden (1986). *Bull. Brit. Orn. Club* **106(4)**: 159 [*Loxigilla violacea ofella*].
Burleigh & Lowery (1939). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **6**: 68 [*Amphispiza bilineata opuntia*].
Burleigh & Peters, J.L. (1948). *Proc. Biol. Soc. Washington* **61**: 121 [*Euphagus carolinus nigrans*].
Burmeister (1860). *J. Orn.* **8**: 254 [*Lophospingus pusillus*, *Saltatricula multicolor*], 256 [*Phrygilus gayi caniceps*].
Burmeister (1861). *Reise La Plata-Staaten* **2**: 481 [*Saltatricula*].
du Bus de Gisignies (1839). *Bull. Acad. Roy. Sci. Bruxelles* **Ser. 1, no. 6(1)**: 439, plate 6 [*Anisognathus igniventris lunulatus*].
du Bus de Gisignies (1846). *Esquisses Orn.*, Livr. **2**: plate 7 [*Tangara chrysotis*], plate 9 [*Tangara larvata*], plate 10 [*Anisognathus lacrymosus*].
du Bus de Gisignies (1847). *Bull. Acad. Roy. Sci. Bruxelles* **Ser. 1, no. 14(2)**: 105 [*Caryothraustes poliogaster*], 106 [*Chlorospingus ophthalmicus*].
du Bus de Gisignies (1847). *Esquisses Orn.*, Livr. **3**: plate 14 [*Chlorophonia occipitalis*].
du Bus de Gisignies (1855). *Bull. Acad. Roy. Sci. Bruxelles* **Ser. 1, no. 22(1)**: 150 [*Cyanocompsa cyanoides concreta*], 153 [*Eucometis penicillata cristata*], 154 [*Atlapetes latinuchus*], 155 [*Chlorophonia cyanea longipennis*], 156 [*Euphonia plumbea*].
Buturlin (1910). *Mess. Orn.* **1**: 262 [*Emberiza schoeniclus parvirostris*].
Cabanis (1844). *Arch. Naturges.* **10(1)**: 289 [*Phrygilus*], 291 [*Sporophila*].
Cabanis (1847). *Arch. Naturges.* **13(1)**: 246 [*Lamprospiza*], 333 [*Lampropsar*], 349 [*Poospiza*].
Cabanis (1848). In: Schomburgk, *Reisen Brit.-Guiana* **3**: 668 [*Tangara callophrys*], 671 [*Euphonia minuta*], 676 [*Diglossa major*, *Saltator coerulescens olivascens*], 678 [*Atlapetes personatus*], 679 [*Sporophila castaneiventris*], 682 [*Lampropsar tanagrinus guianensis*].
Cabanis (1851). In: Cabanis & Heine, *Mus. Hein.* **1**: 21 [*Hemithraupis*], 23 [*Trichothraupis*], 26 [*Tangara guttata*], 27 [*Tangara preciosa*], 28 [*Tangara vitriolina*, *Thraupis glaucocolpa*], 29 [*Buthraupis*], 31 [*Tangara heinei*], 96 [*Coereba flaveola luteola*, *Cyanerpes caeruleus longirostris*, *Cyanerpes cyaneus brevipes*, *Cyanerpes cyaneus eximius*], 97 [*Coereba flaveola chloropyga*, *Coereba flaveola guianensis*, *Diglossa sittoides hyperythra*], 130 [*Emberiza pallasi*], 132 [*Peucaea humeralis*], 133 [*Spizella atrogularis*], 136 [*Donacospiza*], 138 [*Hemispingus*, *Pyrrhocoma*, *Thlypopsis*, *Thlypopsis fulviceps*], 139 [*Chlorospingus*], 140 [*Pyrgisoma kieneri rubricatum*], 142 [*Saltator maximus gigantodes*, *Saltator maxillosus*], 143 [*Orchesticus*], 144 [*Caryothraustes canadensis brasiliensis*, *Cissopis leverianus major*], 145 [*Coryphospingus*], 147 [*Haplospiza*, *Haplospiza unicolor*, *Sicalis columbiana*], 149 [*Sporophila intermedia*], 150 [*Sporophila hypoxantha*, *Sporophila ruficollis*], 151 [*Oryzoborus*, *Oryzoborus maximiliani*], 188 [*Agelasticus*], 190 [*Amblycercus*], 192 [*Molothrus armenti*].
Cabanis (1861). *J. Orn.* **8** (1860): 331 [*Chlorophonia callophrys*], 332 [*Euphonia luteicapilla*], 334 [*Euphonia minuta humilis*], 335 [*Euphonia hirundinacea gnatho*], 336 [*Euphonia saturata*], 411 [*Diglossa plumbea*], 413 [*Melozone leucotis*], 415 [*Pezopetes*, *Pezopetes capitalis*]; **9**: 3 [*Amaurospiza*, *Amaurospiza concolor*], 4 [*Cyanocompsa*, *Cyanocompsa brissonii minor*], 6 [*Sporophila corvina hoffmanni*], 83 [*Dives warczewiczi*], 86 [*Habia fuscicauda*], 87 [*Tangara icterocephala frantzii*].
Cabanis (1865). *J. Orn.* **13**: 412 [*Coereba flaveola columbiana*].
Cabanis (1866). *J. Orn.* **14**: 163 [*Chlorospingus ophthalmicus postocularis*], 235 [*Anisognathus somptuosus cyanopterus*].
Cabanis (1867). *J. Orn.* **15**: 347 [*Xenospingus*].
Cabanis (1870). *J. Orn.* **18**: 459 [*Nemosia rourei*].
Cabanis (1873). *J. Orn.* **21**: 154 [*Nesospiza*], 154, plate 1, fig. 2 [*Nesospiza acunhae*], 309 [*Psarocolius angustifrons atrocastaneus*, *Psarocolius angustifrons sincipitalis*], 311 [*Xenodacnis*], 312, plate 4, figs. 1–2 [*Xenodacnis parina*], 316 [*Iridosornis jelskii*], 317 [*Anisognathus igniventris ignicrissa*], 318 [*Diglossa nystacalis pectoralis*, *Hemispingus auricularis*].
Cabanis (1878). *J. Orn.* **26**: 195 [*Lophospingus*].
Cabanis (1883). *J. Orn.* **31**: 109 [*Phrygilus dorsalis*], 109, plate 1, fig. 1 [*Atlapetes citrinellus*].
Cabot, S. (1845). *Boston J. Nat. Hist.* **5(1)**: 90, plate 12 [*Saltator atriceps raptor*].
Cabot, S. (1846). *Boston J. Nat. Hist.* **5(3)**: 416 [*Piranga roseogularis*].
Cardoso da Silva (1990). *Bull. Brit. Orn. Club* **110(4)**: 172 [*Saltator aurantiirostris parkesi*].
Carriker (1932). *Proc. Acad. Nat. Sci. Philadelphia* **83**: 467 [*Sicalis citrina occidentalis*].
Carriker (1933). *Proc. Acad. Nat. Sci. Philadelphia* **85**: 35 [*Chlorospingus ophthalmicus peruvianus*], 36 [*Chlorospingus parvirostris huallagae*].
Carriker (1934). *Proc. Acad. Nat. Sci. Philadelphia* **86**: 331 [*Lanio fulvus peruvianus*].
Carriker (1935). *Proc. Acad. Nat. Sci. Philadelphia* **87**: 356 [*Diglossa caerulescens intermedia*], 357 [*Tangara argyrofenges caeruleigularis*], 359 [*Diuca speculifera magnirostris*].
Cassin (1848). *Proc. Acad. Nat. Sci. Philadelphia* **3** (1847): 332 [*Icterus maculialatus*, *Icterus auricapillus*], 333 [*Icterus chrysater giraudii*].
Cassin (1850). *Proc. Acad. Nat. Sci. Philadelphia* **5**: 103, plate 3 [*Amphispiza bilineata*], 104, plate 4 [*Artemisiospiza belli*].
Cassin (1852). *Proc. Acad. Nat. Sci. Philadelphia* **6**: 184 [*Aimophila ruficeps*, *Passerculus rostratus*].
Cassin (1856). *Proc. Acad. Nat. Sci. Philadelphia* **8**: 40 [*Spizella breweri*].
Cassin (1858). *Proc. Acad. Nat. Sci. Philadelphia* **10**: 178 [*Tangara lavinia*].
Cassin (1860). *Proc. Acad. Nat. Sci. Philadelphia* **12**: 140 [*Chlorothraupis olivacea*].
Cassin (1864). *Proc. Acad. Nat. Sci. Philadelphia* **16**: 268 [*Chlorophanes spiza caerulescens*], 287, plate 1, fig. 2 [*Tangara cyanicollis hannahiae*].
Cassin (1865). *Proc. Acad. Nat. Sci. Philadelphia* **17**: 170 [*Arremon aurantiirostris rufidorsalis*, *Arremon crassirostris*], 172 [*Euphonia anneae*].
Cassin (1866). *Proc. Acad. Nat. Sci. Philadelphia* **18**: 13 [*Macroagelaius*], 15 [*Agelaioides*], 22 [*Molothrus bonariensis cabanisii*], 23 [*Molothrus rufoaxillaris*].
Cassin (1867). *Proc. Acad. Nat. Sci. Philadelphia* **18** (1866): 406 [*Quiscalus niger gundlachii*, *Quiscalus niger brachypterus*], 413 [*Dives*, *Euphagus*], 414 [*Idiopsar*, *Idiopsar brachyurus*]; **19**: 48 [*Icterus pustulatus graysonii*], 49 [*Icterus pustulatus sclateri*], 51 [*Icterus mesomelas salvinii*], 52 [*Icterus graceannae*].
Chadbourne (1886). *Auk* **3**: 248 [*Spizella pusilla arenacea*].
Chapman (1891). *Bull. Amer. Mus. Nat. Hist.* **3**: 324 [*Cardinalis cardinalis canicaudus*].
Chapman (1892). *Bull. Amer. Mus. Nat. Hist.* **4**: 307 [*Ptiloxena*].
Chapman (1899). *Auk* **16**: 10 [*Ammodramus maritimus fisheri*].
Chapman (1901). *Bull. Amer. Mus. Nat. Hist.* **14**: 225 [*Chlorochrysa calliparaea fulgentissima*], 226 [*Euphonia xanthogaster brunneifrons*], 227 [*Chlorospingus parvirostris*].
Chapman (1911). *Auk* **28**: 3 [*Icterus fuertesi*].
Chapman (1912). *Bull. Amer. Mus. Nat. Hist.* **31**: 161 [*Ammodramus savannarum caucae*], 162 [*Atlapetes flaviceps*], 163 [*Cyanocompsa brissonii caucae*], 165 [*Diglossa gloriosissima*, *Thraupis cyanocephala margaritae*], 166 [*Chlorospingus ophthalmicus nigriceps*].
Chapman (1914). *Bull. Amer. Mus. Nat. Hist.* **33**: 182 [*Saltator atripennis caniceps*], 183 [*Ammodramus aurifrons cherriei*], 184 [*Arremonops conirostris inexpectatus*], 185 [*Atlapetes fuscoolivaceus*], 186 [*Coereba flaveola caucae*], 187 [*Tangara guttata tolimae*], 188 [*Tangara arthus occidentalis*], 189 [*Chlorospingus flavigularis marginatus*], 190 [*Psarocolius angustifrons neglectus*], 191 [*Chrysomus icterocephalus bogotensis*], 322 [*Saltator nigriceps*].
Chapman (1915). *Bull. Amer. Mus. Nat. Hist.* **34**: 387 [*Atlapetes albinucha brunnescens*], 649 [*Catamenia analis schistaceifrons*, *Sporophila murallae*], 655 [*Cyanerpes cyaneus pacificus*], 656 [*Iridosornis rufivertex ignicupillus*], 657 [*Cacicus microrhynchus pacificus*, *Iridosornis rufivertex caeruleoventris*], 659 [*Amblycercus holosericeus flavirostris*], 661 [*Molothrus bonariensis aequatorialis*].
Chapman (1919). *Bull. Amer. Mus. Nat. Hist.* **41**: 330 [*Atlapetes canigenis*], 331 [*Diglossa mystacalis albilinea*], 333 [*Amblycercus holosericeus australis*].
Chapman (1919). *Proc. Biol. Soc. Washington* **32**: 266 [*Pheucticus aureoventris terminalis*], 267 [*Catamenia analis griseiventris*].
Chapman (1923). *Amer. Mus. Novit.* **67**: 11 [*Arremon assimilis nigrifrons*, *Arremon atricapillus tacarcunae*, *Arremon torquatus fimbriatus*, *Hemispingus piurae*]; **96**: 12 [*Melanodera xanthogramma barrosi*].
Chapman (1924). *Amer. Mus. Novit.* **143**: 9 [*Catamenia analis soderstromi*], 14 [*Sicalis luteola bogotensis*].
Chapman (1925). *Amer. Mus. Novit.* **160**: 3 [*Incaspiza watkinsi*], 4 [*Phrygilus unicolor tucumanus*], 6 [*Arremon aurantiirostris santarosae*], 7 [*Atlapetes seebohmi celicae*, *Diglossa albilatera schistacea*], 9 [*Euphonia mesochrysa tavarae*, *Tangara punctata perenensis*, *Tangara punctata zamorae*], 10 [*Tangara labradorides chaupensis*], 12 [*Anisognathus somptuosus alamoris*], 13 [*Anisognathus somptuosus baezae*]; **187**: 8 [*Tachyphonus cristatus huarandosae*]; **191**: 11 [*Diglossa venezuelensis*], 13 [*Hemispingus frontalis iteratus*].
Chapman (1927). *Amer. Mus. Novit.* **250**: 5 [*Atlapetes latinuchus chugurensis*], 6 [*Atlapetes latinuchus caucae*]; **261**: 3 [*Saltator aurantiirostris iteratus*].
Chapman (1929). *Amer. Mus. Novit.* **341**: 5 [*Zonotrichia capensis roraimae*], 6 [*Coereba flaveola roraimae*]; **380**: 25 [*Emberizoides duidae*], 26 [*Atlapetes personatus duidae*, *Diglossa duidae*].
Chapman (1935). *Auk* **52**: 25 [*Quiscalus quiscula stonei*].
Chapman (1939). *Amer. Mus. Novit.* **1051**: 11 [*Diglossa major gilliardi*], 13 [*Atlapetes personatus collaris*, *Zonotrichia capensis venezuelae*].
Chapman (1940). *Bull. Amer. Mus. Nat. Hist.* **77**: 393 [*Zonotrichia capensis huancabambae*], 395 [*Zonotrichia capensis carabayae*], 396 [*Zonotrichia capensis antofagastae*], 399 [*Zonotrichia capensis tocantinsi*].
Cherrie (1891). *Auk* **8**: 62 [*Ramphocelus costaricensis*].
Cherrie (1891). *Proc. US Natl. Mus.* **14(855)**: 345 [*Arremon aurantiirostris saturatus*].
Cherrie (1916). *Bull. Amer. Mus. Nat. Hist.* **35**: 389 [*Hemithraupis flavicollis aurigularis*].
Cherrie & Reichenberger (1923). *Amer. Mus. Novit.* **58**: 1 [*Tangara cyanicollis melanogaster*].
Chubb, C. (1910). *Ibis* **Ser. 9, no. 4**: 619 [*Dacnis cayana paraguayensis*].
Chubb, C. (1918). *Ibis* **Ser. 10, no. 6**: 9, plate 1, fig. 2 [*Embernagra platensis gossei*].
Chubb, C. (1919). *Bull. Brit. Orn. Club* **39(6)**: 70 [*Sicalis olivascens salvini*].
Chubb, C. (1921). *Ann. Mag. Nat. Hist.* **Ser. 9, no. 7**: 193 [*Catamenia homochroa duncani*, *Sporophila schistacea longipennis*]; **Ser. 9, no. 8**: 444 [*Sturnella magna monticola*], 445 [*Sturnella magna praticola*], 446 [*Piranga flava macconnelli*].
Clancey (1940). *Ibis* **Ser. 14, no. 4**: 94 [*Emberiza citrinella caliginosa*].
Clancey (1963). *Durban Mus. Novit.* **6(19)**: 264 [*Emberiza capensis vinacea*].
Clancey & Winterbottom (1960). *Durban Mus. Novit.* **6(1)**: 7 [*Emberiza flaviventris princeps*].
Clark, A.H. (1902). *Auk* **19**: 265 [*Icterus nigrogularis helioeides*].

Clarke, W.E. (1904). *Bull. Brit. Orn. Club* **15(2)**: 18 [*Rowettia goughensis*].
Coale (1887). *Auk* **4**: 330 [*Junco hyemalis shufeldti*].
Cory (1883). *Quart. J. Boston Zool. Soc.* **2**: 45 [*Calyptophilus frugivorus*].
Cory (1884). *Auk* **1(1)**: 3 [*Calyptophilus*].
Cory (1886). *Auk* **3(4)**: 382 [*Melanospiza richardsoni*, *Loxigilla barbadensis*], 497 (Suppl.) [*Coereba flaveola sharpei*], 499 (Suppl.) [*Quiscalus niger caymanensis*, *Spindalis zena salvini*].
Cory (1887). *Auk* **4**: 178 [*Icterus leucopteryx lawrencii*], 245 [*Tiaris bicolor grandior*].
Cory (1892). *Cat. West Indian Birds*: 150 [*Loxigilla noctis grenadensis*, *Loxigilla noctis ridgwayi*].
Cory (1909). *Field Mus. Nat. Hist. (Orn. Ser.)* **1(5)**: 217 [*Coereba flaveola lowii*], 221 [*Coereba flaveola ferryi*, *Tiaris bicolor tortugensis*], 227 [*Quiscalus lugubris orquillensis*].
Cory (1913). *Field Mus. Nat. Hist. (Orn. Ser.)* **1(7)**: 291 [*Coereba flaveola obscura*], 292 [*Atlapetes schistaceus tamae*].
Cory (1916). *Field Mus. Nat. Hist. (Orn. Ser.)* **1(10)**: 345 [*Saltator striatipectus peruvianus*, *Tangara cyanocephala cearensis*, *Coryphospingus pileatus brevicaudus*], 346 [*Schistochlamys melanopis grisea*].
Coues (1866). *Proc. Acad. Nat. Sci. Philadelphia* **18**: 87 [*Spizella atrogularis evura*], 88 [*Spizella atrogularis cana*].
Coues (1871). *Amer. Naturalist* **5**: 366 [*Pipilo erythrophthalmus alleni*].
Coues (1872). *Key North Amer. Birds*, 1st edition: 137 [*Ammodramus savannarum perpallidus*], 143 [*Spizella passerina arizonae*].
Coues (1873). *Amer. Naturalist* **7**: 322 [*Peucaea carpalis*].
Coues (1874). *Amer. Naturalist* **8**: 563 [*Passerina caerulea eurhyncha*].
Coues (1874). *Birds Northwest* (*Misc. Publ. US Geol. Surv. Territories* **3**): 234 [*Amphispiza*].
Coues (1884). *Key North Amer. Birds*, 2nd edition: 364 [*Passerculus sanctorum*].
Cretzschmar (1827). *Atlas Reise nördl. Afrika Rüppell (Vögel)*, Part **4**: 17, plate 10, fig. b [*Emberiza caesia*].
Cretzschmar (1828). *Atlas Reise nördl. Afrika Rüppell (Vögel)*, Part **8**: 38, plate 25 [*Emberiza flaviventris flavigaster*].
Cuvier (1816). *Règne Animal* **1**: 395 [*Dacnis*].
de Dalmas (1900). *Bull. Brit. Orn. Club* **11(3)**: 36 [*Tangara johannae*].
de Dalmas (1900). *Mém. Soc. Zool. France* **13**: 136 [*Thraupis episcopus berlepschi*], 137 [*Psarocolius decumanus insularis*], 138 [*Molothrus bonariensis minimus*].
Danforth (1937). *J. Agric. Univ. Puerto Rico* **21**: 229 [*Loxigilla noctis desiradensis*].
Daudin (1800). *Traité Élément. Compl. d'Orn.* **2**: 372 [*Saltator fuliginosus*], 411 [*Loxigilla portoricensis*].
De Filippi (1847). *Mus. Mediolanense* **1**, *Anim. Vert. (Cl. 2, Aves)*: 15 [*Sturnella bellicosa*].
De Filippi (1863). *Archiv Zool. Anat. Fisiol., Genova* **2**: 383 [*Emberiza buchanani cerrutii*].
Dearborn (1907). *Field Mus. Nat. Hist. (Orn. Ser.)* **1**: 125 [*Diglossa baritula montana*].
Degland (1849). *Orn. Européenne*, 1st edition, **1**: 264 [*Emberiza schoeniclus intermedia*].
Deppe, W. (1830). *Preis-Verz. Säug. Vögel etc., Mexico*: 1 [*Dives dives*], 2 [*Amblycercus holosericeus*, *Rhodothraupis celaeno*, *Saltator coerulescens grandis*, *Thraupis abbas*].
Des Murs (1856). In: de Castelnau, *Expéd. Amér. Sud, Zool. (Part 7)* **1(3)**, Ois. (1855), Livr. **18**: 67 [*Psarocolius angustifrons alfredi*], 69 [*Arremon flavirostris devillii*].
Desmarest (1805). *Hist. Nat. Tangaras*, Livr. **1**: plate 28 and text [*Ramphocelus*].
Desmarest (1806). *Hist. Nat. Tangaras*, Livr. **9**: plate 11 and text [*Tangara peruviana*]; **10**: plate 27 and table [*Euphonia*].
Deville (1849). *Rev. Mag. Zool.* **Ser. 2, no. 1**: 57 [*Clypicterus oseryi*].
Dickerman (1963). *Occas. Pap. Minnesota Mus. Nat. Hist.* **9**: 40 [*Melospiza melodia zacapu*].
Dickerman (1965). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **31**: 1 [*Agelaius phoeniceus nelsoni*].
Dickerman (1974). *Amer. Mus. Novit.* **2538**: 8 [*Agelaius phoeniceus arthuralleni*].
Dickerman (1981). *Nemouria* **26**: 8 [*Icterus pectoralis carolynae*].
Dickerman (1981). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **59**: 4 [*Euphonia affinis olmecorum*].
Dickerman (1987). *Bull. Brit. Orn. Club* **107(1)**: 43 [*Diglossa duidae georgebarrowcloughi*].
Dickerman (1988). *Bull. Brit. Orn. Club* **108(1)**: 20 [*Euphonia rufiventris carnegiei*].
Dickerman & Phillips, A.R. (1966). *Wilson Bull.* **78**: 129 [*Quiscalus mexicanus loweryi*].
Dickerman & Phillips, A.R. (1970). *Condor* **72(3)**: 308 [*Sturnella magna saundersi*].
Dickey & van Rossem (1923). *Condor* **25**: 128 [*Aimophila ruficeps obscura*].
Dickey & van Rossem (1925). *Proc. Biol. Soc. Washington* **38**: 131 [*Agelaius phoeniceus nyaritensis*].
Dickey & van Rossem (1927). *Proc. Biol. Soc. Washington* **40**: 6 [*Aimophila rufescens pectoralis*].
Donegan (2007). *Bull. Brit. Orn. Club* **127(4)**: 257, plate 1–3 [*Atlapetes blancae*].
Donegan & Avendaño (2010). *Bull. Brit. Orn. Club* **130(1)**: 16 [*Anisognathus lacrymosus yariguierum*].
Donegan & Huertas (2006). *Bull. Brit. Orn. Club* **126(2)**: 98 [*Atlapetes latinuchus yariguierum*].
Dubois, A.J.C. (1887). *Bull. Mus. Hist. Nat. Belg.* **5**: 1, plate 1 [*Cacicus sclateri*].
Dubois, A.J.C. (1894). *Mém. Soc. Zool. France* **7**: 399 [*Sporophila ardesiaca*].
Dwight (1887). *Auk* **4**: 233 [*Ammodramus nelsoni subvirgatus*].
Dwight (1918). *Bull. Amer. Mus. Nat. Hist.* **38**: 295 [*Junco hyemalis cismontanus*].
Dwight & Griscom (1921). *Amer. Mus. Novit.* **16**: 3 [*Atlapetes albinucha fuscipygius*, *Atlapetes albinucha griseipectus*, *Atlapetes albinucha parvirostris*].
Dwight & Griscom (1924). *Amer. Mus. Novit.* **142**: 4 [*Habia atrimaxillaris*].
Dwight & Griscom (1927). *Amer. Mus. Novit.* **257**: 4 [*Passerina caerulea interfusa*].
Elliot (1865). *Nouv. Arch. Mus. Hist. Nat. Paris (Bull.)* **Ser. 1, no. 1**: 77, plate 4, fig. 2 [*Bangsia edwardsi*].
Elliot (1871). *Ibis* **Ser. 3, no. 1**: 402 [*Dolospingus*].
Fitzinger (1856). *Sitzungsber. K. Akad. Wiss. Wien (Math.-naturwiss. Cl.)* **21(2)**: 316 [*Euneornis*].
Fitzpatrick (1980). *Auk* **97**: 883 [*Atlapetes leucopterus paynteri*].
Forster, J.R. (1772). *Phil. Trans. Roy. Soc. London* **62**: 340 [*Zonotrichia leucophrys*].
Fraga (2005). *Bull. Brit. Orn. Club* **125(4)**: 287 [*Procacicus*].
Fraser (1840). *Proc. Zool. Soc. London* **1840(8)**, no. 86: 22 [*Diglossa humeralis*].
Friedmann (1942). *Proc. Biol. Soc. Washington* **55**: 85 [*Thlypopsis sordida orinocensis*].
Gabrielson & Lincoln (1951). *Condor* **53**: 251 [*Melospiza melodia maxima*].
Garrido (1970). *Poeyana* **68**: 13 [*Agelaius humeralis scopulus*].
Gervais (1834). *Mag. Zool. (Cl. 2)* **4(2)**: plate 23 and text [*Phrygilus gayi*].
Gilliard (1940). *Amer. Mus. Novit.* **1071**: 12 [*Emberizoides herbicola apurensis*].
Gilliard (1946). *Auk* **63**: 571 [*Sporophila intermedia insularis*], 572 [*Sporophila intermedia bogotensis*].
Giraud (1841). *Descr. Sixteen New Spec. North Amer. Birds*: 3 [*Icterus graduacauda audubonii*].
Gmelin, J.F. (1788). *Syst. Nat.* **1(1)**: 302 [*Cissopis leverianus*], 375 [*Quiscalus mexicanus*], 386 [*Molothrus oryzivorus*], 389 [*Xanthopsar flavus*], 391 [*Icterus jamacaii*], 394 [*Ammodramus caudacutus*].
Gmelin, J.F. (1789). *Syst. Nat.* **1(2)**: 804 [*Molothrus ater obscurus*], 850 [*Thraupis bonariensis*], 858 [*Tiaris canorus*], 859 [*Periporphyrus erythromelas*], 862 [*Oryzoborus crassirostris*], 863 [*Sporophila americana*], 872 [*Sicalis flaveola brasiliensis*, *Spiza americana*], 875 [*Passerculus sandwichensis*, *Passerella unalaschcensis*, *Zonotrichia atricapilla*], 886 [*Embernagra platensis*], 889 [*Piranga olivacea*], 894 [*Euphonia cayennensis*, *Loxigilla violacea ruficollis*], 896 [*Tangara cayana flava*], 898 [*Molothrus bonariensis*], 921 [*Ammodramus savannarum*, *Zonotrichia albicollis*], 922 [*Pooecetes gramineus*], 951 [*Coereba flaveola bananivora*], 990 [*Dacnis lineata*], 1004 [*Euphonia musica*].
Gmelin, S.G. (1771). *Nov. Comm. Acad. Sci. Imp. Petrop.* **15**: 480, plate 23, fig. 3 [*Emberiza leucocephalos*].
Gosse (1847). *Birds Jamaica*: 247 [*Loxipasser anoxanthus*].
Gould (1837). *Proc. Zool. Soc. London* **1837(5)**, no. 49: 5 [*Geospiza*, *Geospiza magnirostris*, *Geospiza fortis*, *Geospiza fuliginosa*], 6 [*Camarhynchus*, *Camarhynchus psittacula*, *Camarhynchus parvulus*, *Platyspiza crassirostris*], 7 [*Geospiza scandens*, *Certhidea*, *Certhidea olivacea*].
Gould (1839). In: Darwin, *Zool. Voy. Beagle*, Part **9**, *Birds* **3(3)**: plate 30 [*Ammodramus humeralis xanthornus*]; Part **11**, *Birds* **3(4)**: 92 [*Rhynchospiza strigiceps*].
Gould (1843). *Proc. Zool. Soc. London* **1843(11)**, no.126/127: 104 [*Pinaroloxias inornata*].
Gould (1855). *Proc. Zool. Soc. London* **1855(23)**, no. 288: 69 [*Conothraupis speculigera*], 158, footnote [*Tangara inornata*].
Gould & Gray, G.R. (1839). In: Darwin, *Zool. Voy. Beagle* **11**, *Birds* **3(4)**: 96, plate 33 [*Melanodera xanthogramma*].
Graves, G.R. (1980). *Bull. Brit. Orn. Club* **100(4)**: 230 [*Diglossa brunneiventris vuilleumieri*].
Graves, G.R. (1990). *Proc. Biol. Soc. Washington* **103(4)**: 962 [*Diglossa gloriosissima boylei*].
Graves, G.R. & Weske (1987). *Wilson Bull.* **99(1)**: 1 [*Tangara phillipsi*].
Gray, G.R. (1840). *List Gen. Birds*, 1st edition: 47 [*Coryphaspiza*].
Gray, G.R. (1844). *Gen. Birds*, Part **3** (later bound in vol. **2**): plate 89 [*Piranga rubriceps*], 363 [*Saltator coerulescens vigorsii*]; Part **6** (later bound in vol. **2**): plate 85 [*Psarocolius wagleri*].
Gray, J.E. (1831). *Zool. Misc.* **1**: 2 [*Melophus lathami*].
Grayson (1867). *California Farmer J. Useful Sci.* **28(16)**: 127 [*Pipilo maculatus socorroensis*].
Grinnell (1897). *Auk* **14**: 294 [*Pipilo maculatus clementae*].
Grinnell (1905). *Condor* **7**: 18 [*Artemisiospiza belli canescens*].
Grinnell (1909). *Univ. Calif. Publ. Zool.* **5(3)**: 265 [*Melospiza melodia maxillaris*]; **5(5)**: 276 [*Molothrus ater artemisiae*].
Grinnell (1910). *Univ. Calif. Publ. Zool.* **5(12)**: 405 [*Passerella unalaschcensis sinuosa*].
Grinnell (1911). *Proc. Biol. Soc. Washington* **24**: 163 [*Passerina caerulea salicaria*].
Grinnell (1911). *Univ. Calif. Publ. Zool.* **7(8)**: 309 [*Pipilo maculatus curtatus*].
Grinnell (1914). *Proc. Biol. Soc. Washington* **27**: 107 [*Agelaius phoeniceus nevadensis*].
Grinnell (1927). *Auk* **44**: 70 [*Icterus cucullatus trochiloides*], 71 [*Amphispiza bilineata bangsi*].
Grinnell (1928). *Condor* **30**: 187 [*Zonotrichia leucophrys pugetensis*].
Grinnell & Storer (1917). *Condor* **19**: 165 [*Passerella megarhyncha monoensis*].
Grinnell & Swarth (1926). *Condor* **28**: 131 [*Pipilo maculatus umbraticola*].
Grinnell & Swarth (1926). *Univ. Calif. Publ. Zool.* **21(18)**: 430 [*Pyrgisoma crissale petulans*], 431 [*Pyrgisoma crissale bullatum*].
Griscom (1923). *Amer. Mus. Novit.* **71**: 7 [*Coereba flaveola oblita*].
Griscom (1924). *Amer. Mus. Novit.* **141**: 9 [*Atlapetes albinucha coloratus*], 10 [*Pselliophorus luteoviridis*], 11 [*Chlorospingus tacarcunae*].
Griscom (1927). *Amer. Mus. Novit.* **280**: 18 [*Chlorothraupis carmioli lutescens*, *Chlorothraupis carmioli magnirostris*]; **282**: 9 [*Conirostrum leucogenys panamense*].
Griscom (1929). *Bull. Mus. Comp. Zool. Harvard* **69**: 184 [*Saltator maximus iungens*], 186 [*Tersina viridis grisescens*].
Griscom (1930). *Amer. Mus. Novit.* **438**: 7 [*Sporophila torqueola mutanda*], 8 [*Saltator coerulescens hesperis*], 9 [*Peucaea ruficauda connectens*], 12 [*Passerina versicolor purpurascens*, *Pipilo maculatus repetens*, *Zonotrichia capensis septentrionalis*], 15 [*Icterus pustulatus maximus*].
Griscom (1930). *Occas. Pap. Boston Soc. Nat. Hist.* **5**: 290 [*Habia rubica holobrunnea*].
Griscom (1932). *Proc. New England Zoöl. Club* **13**: 61 [*Diglossa baritula parva*].
Griscom (1934). *Bull. Mus. Comp. Zool. Harvard* **75**: 405 [*Sturnella magna subulata*], 408 [*Icterus pustulatus microstictus*], 410 [*Piranga erythrocephala candida*], 412 [*Amaurospiza concolor relicta*], 420 [*Passerina leclancherii grandior*].
Griscom (1937). *Auk* **54**: 198 [*Saltator atriceps flavicrissus*].
Griscom & Greenway (1937). *Bull. Mus. Comp. Zool. Harvard* **81**: 434 [*Molothrus bonariensis riparius*], 437 [*Habia rubica hesterna*].
Griscom & Nichols (1920). *Abstr. Proc. Linn. Soc. New York* **32**: 25 [*Ammodramus maritimus juncicola*].
Grote (1921). In: Stresemann, *Anz. Orn. Ges. Bayern* **1(5)**: 39 [*Emberiza affinis vulpecula*].
Grote (1931). *Orn. Monatsber.* **39**: 91 [*Emberiza cabanisi cognominata*].
Gyldenstolpe (1941). *Ark. Zool.* **Ser. 1, no. 33(B)**: 3 [*Poospiza erythrophrys cochabambae*, *Sporophila caerulescens yungae*], 4 [*Lampropsar tanagrinus boliviensis*].
Gyldenstolpe (1945). *Kung. Svenska Vet. Handl.* **Ser. 3, no. 22(3)**: 291 [*Cyanerpes caeruleus hellmayri*], 299 [*Lampropsar tanagrinus macropterus*].
Hagen (1952). *Results Norwegian Sci. Exp. Tristan da Cunha 1937–1938* **20**: 172 [*Nesospiza acunhae dunnei*].
Hahn (1819). *Vögel aus Asien, Africa, etc.*, Lief. **5**: plate 1 [*Icterus nigrogularis*].
Harper (1934). *Proc. Acad. Nat. Sci. Philadelphia* **86**: 1 [*Quiscalus major torreyi*].
Hartert, E.J.O. (1893). *Bull. Brit. Orn. Club* **1(7)**: 37 [*Tiaris bicolor sharpei*].
Hartert, E.J.O. (1896). *Novit. Zool.* **3**: 257 [*Melopyrrha nigra taylori*].
Hartert, E.J.O. (1900). *Bull. Brit. Orn. Club* **11(3)**: 37 [*Dacnis berlepschi*].
Hartert, E.J.O. (1901). *Novit. Zool.* **8**: 370 [*Euphonia fulvicrissa purpurascens*].
Hartert, E.J.O. (1902). *Novit. Zool.* **9**: 298 [*Ammodramus savannarum caribaeus*], 299 [*Icterus icterus ridgwayi*].
Hartert, E.J.O. (1904). *Vögel Pal. Fauna* **1(2)**: 184 [*Emberiza cia par*], 197 [*Emberiza schoeniclus pallidior*], 199 [*Emberiza schoeniclus centralasiae*, *Emberiza schoeniclus reiseri*].
Hartert, E.J.O. (1907). *Bull. Brit. Orn. Club* **19(7)**: 73 [*Ammodramus savannarum intricatus*].
Hartert, E.J.O. (1909). In: Hartert & Venturi, *Novit. Zool.* **16**: 180 [*Phrygilus alaudinus venturii*].
Hartert, E.J.O. (1913). *Bull. Brit. Orn. Club* **33(4)**: 76 [*Icterus nigrogularis trinitatis*], 77 [*Euphonia elegantissima vincens*, *Euphonia fulvicrissa omissa*], 78 [*Tangara arthus goodsoni*].
Hartlaub (1841). *Rev. Zool.* **Ser. 1, no. 4**: 305 [*Tangara velia iridina*].
Hartlaub (1847). *Rev. Zool.* **Ser. 1, no. 10**: 84 [*Cyanerpes nitidus*].
Hartlaub (1852). *Rev. Mag. Zool.* **Ser. 2, no. 4**: 2 [*Peucaea mystacalis*].
Hartlaub (1853). *J. Orn.* **1**: 33 [*Rhodinocichla*], 36 [*Amaurospiza moesta*].
Heller & Snodgrass (1901). *Condor* **3**: 75 [*Geospiza scandens rothschildi*].
Hellmayr (1904). *Verh. K. K. Zool. Bot. Gesells. Wien* **54**: 520 [*Sporophila bouvreuil saturata*], 534 [*Sporophila collaris ochrascens*].
Hellmayr (1905). *Bull. Brit. Orn. Club* **15(9)**: 90 [*Tangara velia signata*].
Hellmayr (1905). *Novit. Zool.* **12**: 277 [*Caryothraustes canadensis frontalis*], 504 [*Diglossa mystacalis unicincta*].
Hellmayr (1906). *Abh. Königl. Bayer. Akad. Wiss. (2. Kl.)* **22(3)**: 616 [*Lampropsar tanagrinus violaceus*].
Hellmayr (1906). *Bull. Brit. Orn. Club* **16(7)**: 85 [*Sicalis columbiana leopoldinae*]; **19(3)**: 28 [*Emberizoides herbicola hypochondriacus*].
Hellmayr (1906). *Novit. Zool.* **13**: 357 [*Tachyphonus surinamus insignis*].
Hellmayr (1907). *Bull. Brit. Orn. Club* **19(4)**: 43 [*Paroaria baeri*].
Hellmayr (1907). *Novit. Zool.* **14**: 350 [*Cypsnagra hirundinacea pallidigula*, *Hemithraupis flavicollis centralis*].
Hellmayr (1909). *Rev. Franç. Orn.* **1(4)**: 49 [*Tangara palmeri*].
Hellmayr (1910). *Bull. Brit. Orn. Club* **25(6)**: 88 [*Hemithraupis guira roraimae*]; **25(8)**: 111 [*Bangsia aureocincta*], 112 [*Bangsia melanochlamys*]; **27(3)**: 34 [*Tangara cayana huberi*].
Hellmayr (1910). *Novit. Zool.* **17**: 277 [*Tachyphonus cristatus madeirae*].
Hellmayr (1910). *Rev. Franç. Orn.* **1(11)**: 162 [*Tangara lavinia dalmasi*].
Hellmayr (1911). *Proc. Zool. Soc. London* **1911(4)**: 1105 [*Tangara gyrola bangsi*], 1106 [*Tangara gyrola catharinae*], 1118 [*Arremon aurantiirostris occidentalis*].
Hellmayr (1911). *Rev. Franç. Orn.* **2(22)**: 23 [*Euphonia xanthogaster chocoensis*], 24 [*Atlapetes semirufus denisei*].
Hellmayr (1912). *Abh. Königl. Bayer. Akad. Wiss. (2. Kl.)* **26(2)**: 119 [*Sporophila leucoptera mexicanae*].
Hellmayr (1912). *Verh. Orn. Ges. Bayern* **11(2)**: 190 [*Rhynchospiza strigiceps dabbenei*].
Hellmayr (1913). *Verh. Orn. Ges. Bayern* **11(4)**: 317 [*Anisognathus somptuosus venezuelanus*], 318 [*Atlapetes pallidinucha papallactae*].
Hellmayr (1917). *Verh. Orn. Ges. Bayern* **13(1)**: 106 [*Conirostrum speciosum amazonum*], 108 [*Agelaioides badius bolivianus*]; **13(2)**: 198 [*Tangara cyanotis lutleyi*].

Hellmayr (1918). *Verh. Orn. Ges. Bayern* **13(3)**: 304 [*Rhodinocichla rosea harterti*].
Hellmayr (1920). *Arch. Naturges.* **85** (Abt. A, 10): 14, footnote [*Cyanerpes caeruleus chocoanus*], 26, footnote [*Ramphocelus carbo centralis*].
Hellmayr (1921). *Anz. Orn. Ges. Bayern* **1(4)**: 28 [*Chlorospingus ophthalmicus jacqueti*], 29 [*Chlorospingus ophthalmicus bolivianus*], 30 [*Chlorospingus ophthalmicus argentinus*].
Hellmayr (1922). *Anz. Orn. Ges. Bayern* **1(6)**: 45 [*Diglossa albilatera federalis*], 46 [*Chlorophonia cyanea minuscula*].
Hellmayr (1930). *Novit. Zool.* **35**: 266 [*Diglossa glauca tyrianthina*].
Hellmayr (1932). *Field Mus. Nat. Hist. (Zool. Ser.)* **19**: 74 [*Diuca diuca crassirostris*], 79 [*Zonotrichia capensis sanborni*].
Hellmayr (1935). *Field Mus. Nat. Hist. (Zool. Ser.)* **13(8)**: 320 [*Conirostrum bicolor minus*].
Hellmayr (1936). *Field Mus. Nat. Hist. (Zool. Ser.)* **13(9)**: 63 [*Euphonia imitans*], 301 [*Habia rubica bahiae*], 432 [*Neothraupis*].
Hellmayr (1938). *Field Mus. Nat. Hist. (Zool. Ser.)* **13(11)**: 209 [*Sporophila nigricollis vivida*].
Hellmayr & Seilern (1912). *Arch. Naturges.* **78** (Abt. A, 5): 57 [*Tangara guttata bogotensis*].
Hellmayr & Seilern (1913). *Verh. Orn. Ges. Bayern* **11(3)**: 254 [*Thraupis cyanocephala buesingi*].
Hellmayr & Seilern (1914). *Verh. Orn. Ges. Bayern* **12(1)**: 87 [*Hemispingus frontalis hanieli*], 88 [*Cyanerpes cyaneus tobagensis*].
Hellmayr & Seilern (1915). *Verh. Orn. Ges. Bayern* **12(2)**: 160 [*Pheucticus chrysogaster laubmanni*].
Henry (1858). *Proc. Acad. Nat. Sci. Philadelphia* **10**: 117 [*Junco hyemalis dorsalis*].
Henshaw (1884). *Auk* **1**: 224 [*Melospiza melodia montana*].
Hermann (1783). *Tab. Affin. Anim.*: 214 [*Arremon taciturnus*].
Heuglin (1867). *J. Orn.* **15**: 297 [*Emberiza affinis*].
Holt (1931). *Auk* **48**: 570 [*Conirostrum margaritae*].
Howell, A.B. (1917). *Auk* **34**: 196 [*Agelaius phoeniceus grinnelli*].
Howell, A.H. (1913). *Proc. Biol. Soc. Washington* **26**: 202 [*Pipilo erythrophthalmus canaster*].
Howell, A.H. (1919). *Auk* **36**: 86 [*Ammodramus maritimus mirabilis*].
Howell, A.H. & van Rossem (1928). *Auk* **45**: 157 [*Agelaius phoeniceus littoralis*], 159 [*Agelaius phoeniceus mearnsi*].
Howell, T.R. (1965). *Auk* **82**: 455 [*Piranga hepatica savannarum*], 458 [*Peucaea botterii spadiconigrescens*].
Hoy (1978). *Stuttgarter Beitr. Naturk. (Ser. A, Biol.)* **305**: 2 [*Sicalis flaveola koenigi*].
Hubbard (1975). *Nemouria* **15**: 14 [*Aimophila ruficeps duponti*, *Aimophila ruficeps laybournae*], 18 [*Aimophila ruficeps suttoni*].
Hubbard & Crossin (1974). *Nemouria* **14**: 33 [*Aimophila ruficeps phillipsi*].
Huey (1940). *Trans. San Diego Soc. Nat. Hist.* **9**: 216 [*Cardinalis cardinalis seftoni*].
Ihering, H. von (1902). *Rev. Mus. Paulista* **5**: 268 [*Icterus pyrrhopterus valenciobuenoi*].
Ihering, H. von & Ihering, R. von (1907). *Cat. Fauna Brazil.* **1**: 390 [*Emberizoides ypiranganus*].
Illiger (1811). *Prodromus Syst. Mammalium Avium*: 229 [*Tersina viridis*].
Jacobi (1923). *Abh. Ber. Mus. Dresden* **16(1)**: 36 [*Emberiza cioides weigoldi*].
Jameson (1835). *Edinburgh New Philos. J.* **19**: 213 [*Spindalis nigricephala*].
Jardine (1847). *Ann. Mag. Nat. Hist.* **Ser. 1, no. 20**: 332 [*Tiaris bicolor omissus*].
Jardine (1856). *Edinburgh New Philos. J. (New Ser.)* **3**: 92 [*Atlapetes leucopterus*].
Jardine & Selby (1833). *Illustr. Orn.*, Part **9** (later bound in vol. **3**): plate 131 [*Ramphocelus flammigerus*].
Jardine & Selby (1837). *Illustr. Orn.* **4** *(New Ser.)*, Part **2**: plate 9 and text [*Spindalis*].
Jardine & Selby (1840). *Illustr. Orn.* **4** *(New Ser.)*, Part **7**: plate 36 and text [*Anisognathus igniventris erythrotus*].
Jardine & Selby (1842). *Illustr. Orn.* **4** *(New Ser.)*, Part **8**: plate 43 and text [*Buthraupis montana cucullata*].
Johansen, H.E. (1907). *Orn. Jahrb.* **18**: 202 [*Emberiza calandra buturlini*].
Johnson & Millie (1972). *Birds of Chile* (Suppl.): 6 [*Conirostrum tamarugense*].
Jordans (1923). *Falco* **19** (Suppl.): 4 [*Emberiza schoeniclus witherbyi*].
Kennard & Peters, J.L. (1927). *Proc. New England Zoöl. Club* **10(1)**: 1 [*Lanio leucothorax ictus*].
Kittlitz (1833). *Kupfer. Naturgesch. Vögel*, Part **2**: 18, plate 23, fig. 1 [*Phrygilus fruticeti*], 18, plate 23, fig. 2 [*Phrygilus alaudinus*].
Kittlitz (1858). *Reise Russ. Amer., Mikron. Kamtsch.* **1**: 199 [*Melospiza lincolnii gracilis*].
Klicka & Banks (2011). *Zootaxa* **2793**: 67 [*Artemisiospiza*].
Koelz (1939). *Proc. Biol. Soc. Washington* **52**: 121 [*Pipilo erythrophthalmus rileyi*].
Koepcke (1961). *Amer. Mus. Novit.* **2028**: 22 [*Hemispingus piurae macrophrys*].
Koepcke (1963). *Beitr. Neotrop. Fauna* **3**: 3 [*Tiaris obscurus pacificus*], 6 [*Zonotrichia capensis illescasensis*], 11 [*Phrygilus alaudinus humboldti*].
Krabbe & Stejskal (2008). *Bull. Brit. Orn. Club* **128(2)**: 126 [*Arremonops conirostris pastazae*].
La Touche (1925). *Bull. Brit. Orn. Club* **46(1)**: 23 [*Emberiza fucata kuatunensis*].
Lacépède (1799). *Tabl. Méth. Mamm. Ois*: 6 [*Cacicus*].
Lafresnaye (1837). *Mag. Zool. (Cl. 2)* **7(21)**: 2, plate 81 [*Ramphocelus dimidiatus*].
Lafresnaye (1839). *Rev. Zool.* **Ser. 1, no. 2**: 97 [*Aimophila rufescens pyrgitoides*, *Arremon brunneinucha*, *Piranga bidentata sanguinolenta*], 99 [*Sporophila cinnamomea*].
Lafresnaye (1840). *Rev. Zool.* **Ser. 1, no. 3**: 102 [*Conirostrum sitticolor*, *Diglossa cyanea*], 227 [*Chlorospingus ophthalmicus flavopectus*, *Cnemoscopus rubrirostris*, *Hemispingus superciliaris*, *Hemispingus verticalis*], 260 [*Passerina leclancherii*].
Lafresnaye (1842). *Rev. Zool.* **Ser. 1, no. 5**: 301 [*Catamblyrhynchus*, *Catamblyrhynchus diadema*, *Conirostrum albifrons*], 335 [*Hemispingus atropileus*, *Iridosornis rufivertex*], 336 [*Anisognathus somptuosus victorini*].
Lafresnaye (1843). *Mag. Zool. (Cl. 2)* **Ser. 2, no. 5(3)**: 1 [*Piezorina*], 1, plate 30 [*Piezorina cinerea*]; **5(6)**: 3 [*Conirostrum rufum*].
Lafresnaye (1843). *Rev. Zool.* **Ser. 1, no. 6**: 69 [*Tangara nigroviridis*, *Thraupis cyanocephala olivicyanea*], 97 [*Tangara parzudakii*], 98 [*Atlapetes albinucha gutturalis*], 99 [*Diglossa albilatera*], 132 [*Sericossypha albocristata*], 290 [*Cacicus uropygialis*, *Tangara arthus aurulenta*], 291 [*Sporophila luctuosa*].
Lafresnaye (1844). *Mag. Zool. (Cl. 2)* **Ser. 2, no. 6(11)**: 1, plate 52 [*Icterus pectoralis guttulatus*].
Lafresnaye (1844). *Rev. Zool.* **Ser. 1, no. 7**: 41 [*Habia rubica rubicoides*, *Saltator maximus magnoides*], 167 [*Saltator albicollis guadelupensis*].
Lafresnaye (1846). *Rev. Zool.* **Ser. 1, no. 9**: 204 [*Lanio aurantius*], 206 [*Tachyphonus surinamus brevipes*], 273 [*Paroaria nigrogenis*], 274 [*Saltator orenocensis*], 318 [*Diglossa brunneiventris*, *Diglossa mystacalis*], 319 [*Diglossa humeralis aterrima*].
Lafresnaye (1847). *Rev. Zool.* **Ser. 1, no. 10**: 71 [*Anisognathus lacrymosus palpebrosus*], 72 [*Arremon aurantiirostris*, *Tachyphonus delatrii*, *Tangara larvata fanny*], 73 [*Saltator striatipectus*], 74 [*Cyanocompsa cyanoides*], 75 [*Catamenia analis analoides*, *Catamenia inornata*], 277 [*Tangara gyrola viridissima*].
Lafresnaye (1848). *Rev. Zool.* **Ser. 1, no. 11**: 9 [*Conirostrum albifrons atrocyaneum*], 11 [*Chlorospingus canigularis*].
Lafresnaye (1852). *Rev. Mag. Zool.* **Ser. 2, no. 4**: 470 [*Conirostrum leucogenys*].
Lafresnaye (1853). *Rev. Mag. Zool.* **Ser. 2, no. 5**: 61 [*Arremonops conirostris striaticeps*], 243 [*Ramphocelus carbo magnirostris*, *Ramphocelus carbo venezuelensis*].
Lafresnaye (1854). *Rev. Mag. Zool.* **Ser. 2, no. 6**: 207 [*Tangara arthus sclateri*].
Latham (1790). *Index Orn.* **1**: 422 [*Schistochlamys melanopis*], 460 [*Melospiza georgiana*], 466 [*Zonotrichia capensis australis*].
Latham (1801). *Suppl. Index Orn.*: 57 [*Euphonia pectoralis*].
Laubmann (1934). *Verh. Orn. Ges. Bayern* **20**: 331 [*Agelasticus thilius petersii*].
Lawrence (1851). *Ann. Lyc. Nat. Hist. New York* **5** (1852): 112, plate 5, fig. 2 [*Arremonops rufivirgatus*], 122 [*Rhynchophanes mccownii*].
Lawrence (1861). *Ann. Lyc. Nat. Hist. New York* **7(20)** (1862): 297 [*Mitrospingus cassinii*].
Lawrence (1862). *Ann. Lyc. Nat. Hist. New York* **7(32)**: 464 [*Dacnis venusta*], 474 [*Sporophila schistacea*].
Lawrence (1864). *Ann. Lyc. Nat. Hist. New York* **8(4)** (1867): 41 [*Pselliophorus tibialis*], 42 [*Tachyphonus surinamus napensis*].
Lawrence (1864). *Proc. Acad. Nat. Sci. Philadelphia* **16**: 106 [*Dacnis cayana ultramarina*, *Saltator maximus intermedius*], 107 [*Cacicus cela vitellinus*].
Lawrence (1865). *Ann. Lyc. Nat. Hist. New York* **8(10)** (1867): 126 [*Pipilo ocai*]; **8(12)**: 170 [*Sporophila corvina hicksii*].
Lawrence (1865). *Proc. Acad. Nat. Sci. Philadelphia* **17**: 106 [*Heterospingus rubrifrons*].
Lawrence (1867). *Ann. Lyc. Nat. Hist. New York* **8(33)**: 467 [*Chlorospingus flavovirens*, *Parkerthraustes humeralis*]; **8(34)**: 473 [*Passerculus guttatus*], 474 [*Peucaea botterii mexicana*], 478 [*Pheucticus tibialis*], 479 [*Sporophila torqueola atriceps*].
Lawrence (1867). *Proc. Acad. Nat. Sci. Philadelphia* **19**: 94 [*Habia rubica vinacea*].
Lawrence (1868). *Ann. Lyc. Nat. Hist. New York* **9(7)** (1870): 100 [*Chlorothraupis carmioli*].
Lawrence (1868). *Proc. Acad. Nat. Sci. Philadelphia* **20**: 360 [*Quiscalus lugubris fortirostris*].
Lawrence (1871). *Ann. Lyc. Nat. Hist. New York* **10(1)** (1874): 6 [*Peucaea sumichrasti*].
Lawrence (1872). *Ann. Lyc. Nat. Hist. New York* **10(12)** (1874): 184 [*Icterus pustulatus formosus*].
Lawrence (1874). *Ann. Lyc. Nat. Hist. New York* **10(27)**: 395 [*Tachyphonus luctuosus axillaris*], 396 [*Arremon atricapillus*], 397 [*Passerina rositae*].
Lawrence (1875). *Ann. Lyc. Nat. Hist. New York* **11(5)** (1876): 70 [*Habia cristata*].
Lawrence (1875). *Ibis* **Ser. 3, no. 5**: 383, plate 9, fig. 1 [*Nesospingus speculiferus*], 384 [*Hemispingus superciliaris nigrifrons*].
Lawrence (1878). *Ann. New York Acad. Sci.* **1(5/6)** (1877): 150 [*Coereba flaveola atrata*], 152 [*Tangara cucullata versicolor*], 162 [*Quiscalus lugubris luminosus*].
Lawrence (1879). *Proc. US Natl. Mus.* **1(57)** (1878): 457 [*Quiscalus lugubris guadeloupensis*].
Lawrence (1880). *Proc. US Natl. Mus.* **3(166)**: 351 [*Icterus oberi*].
Lawrence (1883). *Ann. New York Acad. Sci.* **2(12)** (1882): 382 [*Sporophila minuta parva*].
Lawrence (1889). *Auk* **6**: 53 [*Sporophila torqueola sharpei*].
Leach (1814). *Zool. Misc.* **1**: 81 [*Amblyramphus*].
Lembeye (1850). *Aves Isla Cuba*: 64, plate 9, fig. 3 [*Agelaius assimilis*].
Lentino & Restall (2003). *Auk* **120(3)**: 601, cover plate [*Amaurospiza carrizalensis*].
Lesson (1828). *Man. d'Orn. Descr. Espèces d'Oiseaux* **1**: 340 [*Sporophila telasco*].
Lesson (1830). *Traité d'Orn.*, Livr. **4**: 303 [*Coereba flaveola aterrima*].
Lesson (1831). *Cent. Zool.*, Livr. **3**: 33, plate 7 [*Psarocolius montezuma*]; Livr. **7**: 107, plate 39 [*Ramphocelus sanguinolentus*], 111, plate 41 [*Icterus gularis mentalis*]; Livr. **8**: 122, plate 45 [*Spindalis zena pretrei*]; Livr. **12**: 184, plate 58 [*Tangara fastuosa*].
Lesson (1831). *Traité d'Orn.*, Livr. **6**: 443 [*Loxigilla*], 450 [*Sporophila bouvronides*], 460 [*Cypsnagra*, *Cypsnagra hirundinacea*], 463 [*Anisognathus somptuosus*], 465 [*Embernagra*].
Lesson (1832). *Cent. Zool.*, Livr. **13**: 204, plate 67 [*Pheucticus chrysogaster*], 208, plate 69 [*Saltator atriceps*].
Lesson (1832). *Illustr. Zool.*, Livr. **2**: plate 5 [*Rhodinocichla rosea*]; Livr. **3**: plate 9 [*Tangara arthus*].
Lesson (1834). *L'Institut (Paris)* **2(72)**: 316 [*Piranga lutea*, *Zonotrichia capensis peruviensis*].
Lesson (1837). *Oeuvres Compl. Buffon* **8**: 295 [*Gubernatrix*].
Lesson (1839). *Rev. Zool.* **Ser. 1, no. 2**: 40 [*Orchesticus abeillei*], 101 [*Icterus abeillei*], 105 [*Icterus graduacauda*].
Lesson (1842). *Rev. Zool.* **Ser. 1, no. 5**: 174 [*Passerina caerulea lazula*], 175 [*Euphonia affinis*], 209 [*Sporophila peruviana*], 210 [*Cardinalis cardinalis carneus*].
Lesson (1844). *Echo du Monde Savant* **11(4)**: col. 80 [*Iridosornis*]; **11(9)**: col. 204 [*Icterus chrysater*]; **11(13)**: col. 302 [*Sericossypha*].
Lesson (1844). *Rev. Zool.* **Ser. 1, no. 7**: 435 [*Arremon abeillei*, *Rhodospingus cruentus*].
Levaillant, J. (1850). *Expl. Sci. Algérie, Ois., Atlas*: plate 9, fig. 2 [*Emberiza sahari*].
Leverkühn (1889). *J. Orn.* **37(1)**: 104 [*Gnorimopsar chopi megistus*], 108 [*Sturnella loyca falklandica*].
Leybold (1865). *J. Orn.* **13**: 405 [*Poospiza ornata*].
Lichtenstein, M.H.C. (1819). *Abh. K. Akad. Wiss., Berlin (Phys.-Math. Kl.)* **1816/1817**: 159 [*Compsothraupis loricata*].
Lichtenstein, M.H.C. (1823). *Verz. Doubl. Zool. Mus. Berlin*: 22 [*Cyanocompsa brissonii*], 24 [*Emberiza striolata*], 25 [*Peucaea aestivalis*, *Zonotrichia capensis matutina*], 32 [*Neothraupis fasciata*], 34 [*Hemithraupis flavicollis melanoxantha*].
Lichtenstein, M.H.C. (1842). *Verz. Samml. Säug. Vögel Kaffernl.*: 16 [*Emberiza capensis cinnamomea*].
Linnaeus (1758). *Syst. Nat.*, 10th edition, **1**: 108 [*Icterus galbula*], 109 [*Quiscalus quiscula*], 118 [*Cyanerpes caeruleus*], 119 [*Coereba flaveola*], 167 [*Sturnella magna*], 172 [*Cardinalis cardinalis*, *Paroaria dominicana*], 174 [*Sporophila lineola*], 175 [*Melopyrrha nigra*, *Passerina caerulea*], 176 [*Emberiza*, *Emberiza calandra*, *Loxigilla violacea*, *Plectrophenax nivalis*, *Sporophila minuta*], 177 [*Emberiza citrinella*, *Emberiza hortulana*], 178 [*Sturnella militaris*], 179 [*Dolichonyx oryzivorus*, *Passerina ciris*], 180 [*Calcarius lapponicus*, *Pipilo erythrophthalmus*], 181 [*Piranga rubra*, *Spindalis zena*, *Tangara gyrola*], 182 [*Emberiza schoeniclus*, *Euphonia violacea*], 183 [*Junco hyemalis*], 184 [*Euneornis campestris*], 188 [*Chlorophanes spiza*, *Tangara velia*], 191 [*Cacicus cela*].
Linnaeus (1766). *Syst. Nat.*, 12th edition, **1**: 161 [*Agelaius phoeniceus*, *Cacicus haemorrhous*, *Icterus icterus*], 162 [*Gymnomystax mexicanus*, *Icterus bonana*, *Icterus spurius*], 163 [*Chrysomus icterocephalus*, *Icterus cayanensis*, *Icterus dominicensis*], 164 [*Icterus chrysocephalus*], 188 [*Cyanerpes cyaneus*], 295 [*Phaenicophilus palmarum*], 297 [*Tachyphonus surinamus*], 303 [*Oryzoborus angolensis*, *Thraupis episcopus*], 304 [*Caryothraustes canadensis*], 306 [*Pheucticus ludovicianus*], 307 [*Saltator grossus*], 309 [*Tiaris olivaceus*], 310 [*Emberiza capensis*, *Emberiza cia*], 311 [*Emberiza cirlus*], 314 [*Ramphocelus bresilius*, *Volatinia jacarina*], 315 [*Passerina cyanea*, *Tangara cayana*, *Tangara mexicana*], 316 [*Paroaria gularis*, *Tangara mexicana brasiliensis*, *Tangara punctata*, *Thraupis sayaca*], 317 [*Euphonia chlorotica*, *Tachyphonus cristatus*], 320 [*Loxigilla noctis*], 321 [*Sicalis flaveola*], 323 [*Euphonia jamaica*], 324 [*Tiaris bicolor*], 335 [*Hemithraupis guira*], 336 [*Dacnis cayana*].
Loomis (1893). *Auk* **10**: 47 [*Junco hyemalis pinosus*].
Lorenz von Liburnau & Hellmayr (1902). *Orn. Monatsber.* **10**: 55 [*Emberiza tahapisi arabica*].
Lowe, P.R. (1906). *Bull. Brit. Orn. Club* **19(1)**: 6 [*Tiaris bicolor johnstonei*].
Lowe, P.R. (1908). *Bull. Brit. Orn. Club* **21(9)**: 108 [*Coereba flaveola laurae*].
Lowe, P.R. (1912). *Bull. Brit. Orn. Club* **29(5)**: 85 [*Coereba flaveola pacifica*], 86 [*Coereba flaveola alleni*].
Lowe, P.R. (1912). *Ibis* **Ser. 9, no. 6**: 509 [*Coereba flaveola montana*].
Lowe, P.R. (1923). *Ibis* **Ser. 11, no. 5**: 512 [*Rowettia*], 515 [*Phrygilus patagonicus*], 520 [*Nesospiza questi*], 521 [*Nesospiza wilkinsi*].
Lowe, P.R. (1932). *Bull. Brit. Orn. Club* **52(9)**: 144 [*Emberiza capensis vincenti*].
Lowery (1938). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **1**: 1 [*Quiscalus mexicanus prosopidicola*].
Lowery & Newman (1949). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **22**: 8 [*Chlorospingus ophthalmicus wetmorei*].
Lowery & O'Neill (1964). *Auk* **81**: 125 [*Wetmorethraupis*], 126 [*Wetmorethraupis sterrhopteron*].
Lowery & O'Neill (1965). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **33**: 1 [*Cacicus koepckeae*].
Lowery & Tallman (1976). *Auk* **93(3)**: 416 and plate [*Nephelornis*], 420 and plate [*Nephelornis oneilli*].
Lynes (1920). *Bull. Brit. Orn. Club* **41(2)**: 34 [*Emberiza striolata jebelmarrae*].
Macdonald (1957). *Contr. Orn. Western S. Africa*: 170 [*Emberiza impetuani sloggetti*].
Mailliard (1915). *Condor* **17**: 13 [*Agelaius phoeniceus aciculatus*].
Mailliard (1918). *Condor* **20**: 139 [*Passerella megarhyncha brevicauda*].
Martens, G.H. (1906). *Orn. Monatsber.* **14**: 192 [*Latoucheornis siemsseni*].
Martens, J. (1972). *Bonn. Zool. Beitr.* **23**: 116 [*Emberiza cia flemingorum*].

Maynard (1872). *Amer. Naturalist* **6**: 637 [*Passerculus sandwichensis princeps*].
Maynard (1895). *Birds East North Amer.*, Part **40**: 698 [*Agelaius phoeniceus floridanus*].
McGregor (1899). *Bull. Cooper Orn. Club* **1**: 11 [*Pyrgisoma crissale carolae*], 87 [*Melospiza melodia cleonensis*].
McGregor (1900). *Condor* **2**: 43 [*Pipilo maculatus falcifer*].
McGregor (1901). *Condor* **3**: 8 [*Melospiza melodia sanaka*].
Mearns (1902). *Proc. US Natl. Mus.* **24(1274)**: 915 [*Ammodramus savannarum floridanus*].
Mearns (1911). *Proc. Biol. Soc. Washington* **24**: 217 [*Passerina ciris pallidior*].
Meinertzhagen, R. (1947). *Bull. Brit. Orn. Club* **67(7)**: 91 [*Emberiza calandra clanceyi*].
Ménégaux (1908). *Bull. Mus. Natl. Hist. Nat. Paris* **14(7)**: 341 [*Zonotrichia capensis pulacayensis*].
Ménétriés (1832). *Cat. Raison. Obj. Zool. Caucase*: 41 [*Emberiza schoeniclus caspia*].
Merrem (1786). *Avium. Rar. Icon. Descr.* **2**: 37, plate 10 [*Passerella iliaca*].
Meyen (1834). *Nov. Act. Acad. Leopold.-Carol. Nat. Curiosum* **16** (Suppl.): 87, plate 12, fig. 3 [*Sicalis luteola luteiventris*], 88 [*Zonotrichia capensis chilensis*].
Meyer de Schauensee (1946). *Notulae Naturae* **167**: 3 [*Dacnis cayana baudoana*], 5 [*Conirostrum albifrons centralandium*].
Meyer de Schauensee (1947). *Proc. Acad. Nat. Sci. Philadelphia* **99**: 119 [*Tangara arthus palmitae*], 123 [*Atlapetes semirufus zimmeri*].
Meyer de Schauensee (1948). *Notulae Naturae* **209**: 3 [*Chlorothraupis stolzmanni dugandi*].
Meyer de Schauensee (1950). *Proc. Acad. Nat. Sci. Philadelphia* **102**: 136 [*Ramphocelus dimidiatus molochinus*].
Meyer de Schauensee (1951). *Notulae Naturae* **232**: 5 [*Anisognathus lacrymosus intensus*].
Middendorff (1853). *Reise Norden u. Osten Sibiriens* **2(2)**: 144 [*Emberiza schoeniclus minor*], 146, plate 13, fig. 1 [*Emberiza pallasi polaris*].
Mikan (1825). *Del. Flor. Faun. Brasil.*, Livr. **4**: plate 21, figs. 1–2 [*Euphonia chalybea*].
Miller, A.H. (1929). *Condor* **31**: 206 [*Spizella atrogularis caurina*].
Miller, A.H. (1947). *Auk* **64**: 377 [*Coryphospingus pileatus rostratus*].
Miller, A.H. (1952). *Proc. Biol. Soc. Washington* **65**: 14 [*Tiaris bicolor huilae*].
Miller, A.H. & McCabe (1935). *Condor* **37**: 156 [*Melospiza lincolnii alticola*].
Miller, G.S. (1888). *Auk* **5**: 404 [*Pooecetes gramineus affinis*].
Miller, J.F. (1776). *Var. Subj. Nat. Hist.*, Part **1**: plate 2 [*Paroaria coronata*].
Miller, W. deW. & Griscom (1925). *Amer. Mus. Novit.* **184**: 2 [*Peucaea botterii vulcanica*], 4 [*Melozone leucotis nigrior*, *Icterus pustulatus alticola*].
Molina (1782). *Saggio Stor. Nat. Chile*, Libro **4**: 249 [*Diuca diuca*], 250 [*Agelasticus thilius*], 252 [*Curaeus curaeus*], 254 [*Sturnella loyca*].
Monroe (1963). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **28**: 8 [*Arremonops chloronotus twomeyi*].
Moore, F. (1856). *Proc. Zool. Soc. London* **1855(23)**, no. 297: 215 [*Emberiza cioides castaneiceps*], 215, plate 112 [*Emberiza cia stracheyi*].
Moore, R.T. (1932). *Proc. Biol. Soc. Washington* **45**: 232 [*Peucaea carpalis bangsi*].
Moore, R.T. (1934). *Amer. Mus. Novit.* **715**: 2 [*Buthraupis eximia zimmeri*], 3 [*Buthraupis eximia cyanocalyptra*].
Moore, R.T. (1934). *Auk* **51**: 2, plate 1 [*Buthraupis wetmorei*].
Moore, R.T. (1937). *Proc. Biol. Soc. Washington* **50**: 203 [*Spizella passerina atremaea*].
Moore, R.T. (1942). *Proc. Biol. Soc. Washington* **55**: 46 [*Pyrgisoma fuscum toroi*].
Moore, R.T. (1946). *Condor* **48**: 121 [*Peucaea carpalis cohaerens*].
Moore, R.T. (1949). *Proc. Biol. Soc. Washington* **62**: 101 [*Pyrgisoma fuscum campoi*].
Morrison (1947). *Bull. Brit. Orn. Club* **67(7)**: 88 [*Atlapetes forbesi*].
Naumburg (1924). *Auk* **41**: 111 [*Thraupis sayaca obscura*].
Nelson (1897). *Auk* **14(1)**: 58 [*Agelaius phoeniceus richmondi*], 59 [*Agelaius phoeniceus californicus*], 61 [*Junco phaeonotus fulvescens*], 62 [*Aimophila ruficeps fusca*], 63 [*Aimophila ruficeps australis*], 64 [*Cardinalis cardinalis littoralis*], 66 [*Habia rubica affinis*].
Nelson (1898). *Proc. Biol. Soc. Washington* **12**: 10 [*Cardinalis cardinalis mariae*], 60 [*Habia rubica rosea*], 61 [*Amphispiza bilineata grisea*, *Passerina caerulea chiapensis*].
Nelson (1899). *Auk* **16**: 28 [*Melospiza melodia adusta*], 29 [*Melospiza melodia goldmani*], 30 [*Spizella passerina mexicana*].
Nelson (1899). *Proc. Biol. Soc. Washington* **13**: 27 [*Pyrgisoma fuscum intermedium*], 28 [*Arremonops rufivirgatus sinaloae*, *Cardinalis cardinalis affinis*, *Cardinalis cardinalis sinaloensis*].
Nelson (1900). *Auk* **17**: 266 [*Molothrus aeneus assimilis*, *Sturnella magna alticola*], 267 [*Amphispiza bilineata pacifica*, *Quiscalus mexicanus obscurus*].
Nelson (1904). *Proc. Biol. Soc. Washington* **17**: 152 [*Arremonops rufivirgatus chiapensis*].
Nelson (1912). *Smithsonian Misc. Coll.* **60(3)**: 16 [*Caryothraustes canadensis simulans*, *Euphonia xanthogaster quitensis*], 17 [*Tangara fucosa*], 18 [*Chlorospingus inornatus*], 19 [*Chrysothlypis chrysomelas ocularis*, *Hemithraupis flavicollis ornata*].
Neumann (1905). *J. Orn.* **53**: 358 [*Emberiza affinis omoensis*].
Nordmann (1835). In: Erdman, *Reise um die Erde. Atlas*: 10 [*Poospiza lateralis*], 10, plate 4, fig. 1 [*Poospiza thoracica*].
Nores (1986). *Hornero* **12**: 270 [*Embernagra platensis catamarcana*].
Nores & Yzurieta (1979). *Acad. Nac. Cienc. Córdoba Misc.* **61**: 6 [*Sturnella loyca obscura*].
Nores & Yzurieta (1983). *Hornero* **12** (Suppl.): 95 [*Catamenia inornata cordobensis*], 96 [*Phrygilus unicolor cyaneus*], 97 [*Phrygilus plebejus naroskyi*].
Nuttall (1840). *Man. Orn. US Canada*, 2nd edition, **1**: 555 [*Zonotrichia querula*], 556 [*Zonotrichia leucophrys gambelii*].
Oberholser (1899). *Auk* **16**: 32 [*Cyanerpes*], 183 [*Melospiza melodia morphna*].
Oberholser (1901). *Proc. Biol. Soc. Washington* **14**: 188 [*Cyanocompsa brissonii sterea*].
Oberholser (1905). *Smithsonian Misc. Coll.* **48(1)**: 67 [*Charitospiza, Charitospiza eucosma*].
Oberholser (1907). *Auk* **24**: 332 [*Agelaius phoeniceus arctolegus*].
Oberholser (1918). *Proc. Biol. Soc. Washington* **31**: 126 [*Euphonia chlorotica cynophora*, *Euphonia laniirostris zopholega*].
Oberholser (1919). *Condor* **21**: 119 [*Junco hyemalis pontilis*], 210 [*Pyrgisoma crissale aripolium*].
Oberholser (1919). *Wilson Bull.* **31**: 20 [*Agelaius phoeniceus megapotamus*].
Oberholser (1930). *Sci. Publ. Cleveland Mus. Nat. Hist* **1**: 103, plate 18 [*Sturnella lilianae*].
Oberholser (1932). *Sci. Publ. Cleveland Mus. Nat. Hist.* **4**: 12 [*Zonotrichia leucophrys oriantha*].
Oberholser (1937). *Proc. Biol. Soc. Washington* **50**: 118 [*Pyrgisoma fuscum mesatum*].
Oberholser (1938). *Louisiana Dept. Conserv. Bull.* **28**: 675 [*Melospiza georgiana ericrypta*].
Oberholser (1942). *Proc. Biol. Soc. Washington* **55**: 15 [*Ammodramus savannarum ammolegus*].
Oberholser (1946). *J. Washington Acad. Sci.* **36**: 388 [*Passerella iliaca zaboria*].
Ogilvie-Grant & Forbes, H.O. (1899). *Bull. Liverpool Mus.* **2(1)**: 2 [*Emberiza tahapisi insularis*, *Emberiza socotrana*].
Olson (1980). *Proc. Biol. Soc. Washington* **93(3)**: 758 [*Ammodramus savannarum beatriceae*].
Olson (1981). *Proc. Biol. Soc. Washington* **94(1)**: 47 [*Oryzoborus funereus ochrogyne*], 102 [*Euphonia xanthogaster oressinoma*], 105 [*Euphonia xanthogaster badissima*]; **94(2)**: 368 [*Chrysothlypis chrysomelas titanota*].
Olson (1983). *Proc. Biol. Soc. Washington* **96(1)**: 107 [*Chlorospingus ophthalmicus trudis*], 108 [*Chlorospingus ophthalmicus exitelus*].
O'Neill & Parker, T.A. (1981). *Bull. Brit. Orn. Club* **101(2)**: 296 [*Chlorospingus ophthalmicus hiaticolus*].
O'Neill & Parker, T.A. (1997). *Orn. Monogr.* **48**: 489 [*Phrygilus alaudinus bracki*].
d'Orbigny (1839). In: Sagra, *Hist. Phys. Pol. Nat. Cuba. Orn.*: 121, plate 19 [*Ptiloxena atroviolacea*].
d'Orbigny (1839). *Voy. Amér. Mérid., Oiseaux*, Part **4** (later bound in vol. **4(3)**): 285 [*Embernagra platensis olivascens*], 287 [*Saltator coerulescens azarae*].
d'Orbigny & Lafresnaye (1837). *Mag. Zool. (Cl. 2)* **7(3)**: 20 [*Thlypopsis ruficeps*, *Xenospingus concolor*], 21 [*Dacnis flaviventer*], 28 [*Lanio versicolor*, *Thlypopsis sordida*], 29 [*Anisognathus flavinucha*, *Paroaria capitata*, *Tachyphonus luctuosus*], 30 [*Euphonia chlorotica serrirostris*, *Euphonia laniirostris*, *Euphonia xanthogaster ruficeps*], 32 [*Anisognathus igniventris*, *Buthraupis montana*, *Thraupis cyanocephala*]; **7(4)**: 33 [*Eucometis penicillata albicollis*, *Tangara cyanicollis*], 34 [*Arremon torquatus*, *Ramphocelus carbo atrosericeus*], 35 [*Atlapetes rufinucha*, *Saltator rufiventris*], 36 [*Saltator similis*]; **7(6)**: 74 [*Sicalis lutea*, *Sicalis luteocephala*], 75 [*Sicalis uropigyalis*, *Sicalis olivascens*], 76 [*Phrygilus atriceps*], 77 [*Atlapetes fulviceps*], 78 [*Diuca speculifera*], 79 [*Lophospingus griseocristatus*, *Phrygilus carbonarius*, *Phrygilus unicolor*], 80 [*Poospiza hypocondria*]; **7(7)**: 81 [*Poospiza nigrorufa*, *Tiaris obscurus*], 82 [*Poospiza torquata*, *Poospiza melanoleuca*], 83 [*Catamenia analis*], 84 [*Phenicticus aureoventris*], 85 [*Cyanoloxia glaucocaerulea*], 86 [*Sporophila leucoptera bicolor*], 87 [*Sporophila nigrorufa*].
d'Orbigny & Lafresnaye (1838). *Mag. Zool. (Cl. 2)* **8(9)**: 1 [*Psarocolius atrovirens*], 2 [*Psarocolius yuracares*], 3 [*Cacicus chrysonotus*]; **8(10)**: 25 [*Diglossa carbonaria*, *Diglossa sittoides*, *Conirostrum*, *Conirostrum cinereum*].
d'Orbigny & Lafresnaye (1838). *Rev. Zool.* **Ser. 1, no. 1**: 165 [*Atlapetes albinucha*].
Osburn (1859). *Zoologist (London)* **Ser. 1, no. 17**: 6662 [*Nesopsar nigerrimus*].
Oustalet (1883). In: Salvin & Godman, *Biol. Centr.-Amer., Aves* **1**: 246, plate 15A, fig. 3 [*Dacnis viguieri*].
Oustalet (1891). *Mission Sci. Cap Horn* **6(1)**: B.98 [*Sicalis lebruni*].
Oustalet (1904). *Bull. Mus. Natl. Hist. Nat. Paris* **10**: 43 [*Compsospiza baeri*].
Pallas (1764). In: Vroeg, *Cat. Raison. Coll. Supér. Ois., Adumbratiunculae*: 2 [*Ramphocelus carbo*].
Pallas (1769). *Spicilegia Zool.* **6**: 1, plate 1 [*Psarocolius decumanus*].
Pallas (1771). *Reise versch. Prov. Russ. Reichs* **1**: 456 [*Emberiza schoeniclus passerina*].
Pallas (1773). *Reise versch. Prov. Russ. Reichs* **2**: 711 [*Emberiza aureola*].
Pallas (1776). *Reise versch. Prov. Russ. Reichs* **3**: 697 [*Emberiza pusilla*], 698 [*Emberiza chrysophrys*, *Emberiza fucata*, *Emberiza spodocephala*, *Emberiza rustica*, *Emberiza rutila*].
Pallas (1811). *Zoogr. Rosso-Asiat.* **2**: 49 [*Emberiza schoeniclus pyrrhuloides*].
Parkes (1954). *Condor* **56**: 132 [*Arremon brunneinucha suttoni*], 133 [*Arremon brunneinucha macrourus*], 134 [*Arremon brunneinucha alleni*], 135 [*Arremon brunneinucha elsae*].
Parkes (1959). *Noved. Colombianas* **1(4)**: 200 [*Saltator striatipectus perstriatus*].
Parkes (1966). *Proc. Biol. Soc. Washington* **79**: 7 [*Agelasticus cyanopus beniensis*], 8 [*Agelasticus cyanopus xenicus*].
Parkes (1969). *Bull. Brit. Orn. Club* **89(1)**: 17 [*Euphonia xanthogaster cyanonota*], 18 [*Euphonia chlorotica amazonica*], 19 [*Tangara ruficervix inca*]; **89(3)**: 82 [*Piranga lutea toddi*], 83 [*Habia rubica crissalis*], 84 [*Habia rubica mesopotamia*].
Parkes (1969). *Proc. Biol. Soc. Washington* **82**: 238 [*Habia fuscicauda willisi*].
Parkes (1974). *Condor* **76**: 459 [*Pyrgisoma albicolle marshalli*].
Parkes (1974). *Wilson Bull.* **86**: 293 [*Arremonops rufivirgatus rhyptothorax*].
Parkes (1977). *Bull. Brit. Orn. Club* **97(2)**: 67 [*Cyanerpes cyaneus holti*].
Parkes (1997). In: Dickerman, *The Era of Allan R. Phillips: A Festschrift*: 133 [*Cardinalis cardinalis phillipsi*].
Parkes & Blake (1965). *Fieldiana Zool.* **44**: 212 [*Molothrus aeneus loyei*].
Parkes & Humphrey (1963). *Proc. Biol. Soc. Washington* **76**: 83 [*Hemithraupis flavicollis obidensis*].
Paynter (1950). *Postilla Yale Peabody Mus.* **4**: 1 [*Piranga roseogularis tincta*].
Paynter (1970). In: Paynter & Storer, *Check-list Birds World (Peters')* **13**: 13 [*Emberiza buchanani neobscura*].
Peale (1848). *US Expl. Exped.*, 1st edition, **8**: 115 [*Volatinia jacarina peruviensis*].
Pelzeln (1856). *Sitzungsber. K. Akad. Wiss. Wien (Math.-naturwiss. Cl.)* **20(1)**: 154, plate 1, figs. 1–2 [*Dacnis nigripes*].
Pelzeln (1870). *Orn. Brasil. Natterers Reisen* **3**: 328 [*Tachyphonus cristatus nattereri*], 329 [*Dolospingus fringilloides*], 332 [*Sporophila melanogaster*], 333 [*Sicalis citrina*].
Pelzeln (1877). *Ibis* **Ser. 4, no. 1**: 337 [*Tangara gyrola albertinae*].
Penard, T.E. (1919). *Auk* **36**: 539 [*Bangsia*].
Penard, T.E. (1919). *Proc. New England Zoöl. Club* **7(8)**: 30 [*Euphonia violacea rodwayi*].
Penard, T.E. (1923). *Occas. Pap. Boston Soc. Nat. Hist.* **5**: 63 [*Euphonia chrysopasta nitida*].
Peters, J.L. (1913). *Auk* **30**: 380 [*Cardinalis cardinalis flammiger*].
Peters, J.L. (1917). *Proc. Biol. Soc. Washington* **30**: 95 [*Ammodramus savannarum borinquensis*].
Peters, J.L. (1921). *Auk* **38**: 442 [*Quiscalus niger bangsi*].
Peters, J.L. (1925). *Occas. Pap. Boston Soc. Nat. Hist.* **5**:175 [*Quiscalus lugubris contrusus*].
Peters, J.L. (1929). *Bull. Mus. Comp. Zool. Harvard* **69**: 470 [*Euphonia gouldi praetermissa*].
Peters, J.L. (1929). *Proc. Biol. Soc. Washington* **42**: 123 [*Molothrus oryzivorus impacifus*].
Phelps, Jr & Aveledo (1966). *Amer. Mus. Novit.* **2270**: 4 [*Icterus icterus metae*].
Phelps, Sr & Gilliard (1940). *Amer. Mus. Novit.* **1100**: 6 [*Arremon perijanus*], 7 [*Atlapetes latinuchus nigrifrons*].
Phelps, Sr & Gilliard (1941). *Amer. Mus. Novit.* **1153**: 12 [*Anisognathus lacrymosus tamae*], 13 [*Chlorospingus ophthalmicus falconensis*], 14 [*Catamenia inornata mucuchiesi*], 16 [*Atlapetes semirufus benedettii*], 17 [*Ammodramus aurifrons apurensis*].
Phelps, Sr & Phelps, Jr (1946). *Bol. Soc. Venez. Cienc. Nat.* **10(65/66)**: 158 [*Coereba flaveola frailensis*]; **10(67)**: 237 [*Atlapetes personatus paraquensis*].
Phelps, Sr & Phelps, Jr (1947). *Proc. Biol. Soc. Washington* **60**: 160 [*Diglossa major chimantae*].
Phelps, Sr & Phelps, Jr (1948). *Bol. Soc. Venez. Cienc. Nat.* **11(71)** (1947): 69 [*Diglossa duidae hitchcocki*].
Phelps, Sr & Phelps, Jr (1949). *Proc. Biol. Soc. Washington* **62**: 119 [*Conirostrum speciosum guaricola*], 120 [*Arremon brunneinucha allinornatus*], 121 [*Arremon assimilis larensis*], 190 [*Anisognathus somptuosus virididorsalis*], 191 [*Rhodinocichla rosea beebei*].
Phelps, Sr & Phelps, Jr (1950). *Proc. Biol. Soc. Washington* **63**: 46 [*Atlapetes personatus parui*], 122 [*Oryzoborus maximiliani magnirostris*].
Phelps, Sr & Phelps, Jr (1952). *Proc. Biol. Soc. Washington* **65**: 97 [*Diglossa caerulescens ginesi*], 98 [*Diglossa cyanea obscura*], 99 [*Anisognathus lacrymosus pallididorsalis*], 101 [*Chlorospingus ophthalmicus ponsi*].
Phelps, Sr & Phelps, Jr (1953). *Proc. Biol. Soc. Washington* **66**: 136 [*Diglossa sittoides coelestis*], 139 [*Thlypopsis fulviceps obscuriceps*], 140 [*Hemispingus frontalis flavidorsalis*], 141 [*Catamblyrhynchus diadema federalis*].
Phelps, Sr & Phelps, Jr (1954). *Proc. Biol. Soc. Washington* **67**: 112 [*Coereba flaveola melanornis*].
Phelps, Sr & Phelps, Jr (1955). *Proc. Biol. Soc. Washington* **68**: 121 [*Atlapetes personatus jugularis*], 122 [*Zonotrichia capensis inaccessibilis*].
Phelps, Sr & Phelps, Jr (1957). *Proc. Biol. Soc. Washington* **70**: 125 [*Tangara schrankii venezuelana*], 126 [*Habia rubica perijana*].
Phelps, Sr & Phelps, Jr (1962). *Proc. Biol. Soc. Washington* **75**: 203 [*Thlypopsis fulviceps meridensis*].
Philippi [Bañados], R.A. & Goodall (1957). In: Goodall, Johnson & Philippi, *Aves Chile*, 2nd edition (Suppl. **1**): 351 [*Phrygilus gayi minor*].
Philippi [Bañados], R.A. & Peña (1964). *Aves Chile*, 2nd edition (Suppl. **2**): 447 [*Diuca diuca chiloensis*].
Philippi [Krumwiede], R.A. & Landbeck (1861). *An. Univ. Chile* **19**: 610 [*Phrygilus erythronotus*], 611 [*Saltator aurantiirostris albociliaris*], 616 [*Sturnella bellicosa albipes*].
Philippi [Krumwiede], R.A. & Landbeck (1864). *Arch. Naturges.* **30(1)**: 49 [*Sicalis auriventris*].
Phillips, A.R. (1943). *Auk* **60**: 242 [*Peucaea botterii texana*], 243 [*Peucaea botterii goldmani*].
Phillips, A.R. (1950). *Condor* **52**: 78 [*Quiscalus mexicanus monsoni*].
Phillips, A.R. (1966). *Bull. Brit. Orn. Club* **86(7)**: 130 [*Icterus gularis flavescens*]; **86(8)**: 155 [*Aimophila ruficeps extima*], 156 [*Aimophila ruficeps pallidissima*].
Phillips, A.R. & Dickerman (1957). *Auk* **74**: 380 [*Melospiza melodia villai*].

Phillips, A.R. & Dickerman (1965). *Wilson Bull.* **77**: 298 [*Icterus prosthemelas praecox*].
Pinto & Camargo (1952). *Pap. Avuls. Dept. Zool. São Paulo* **10**: 218 [*Schistochlamys ruficapillus sicki*].
Plowes (1951). *Ostrich* **22**: 35 [*Emberiza capensis smithersii*].
Portenko (1929). *Ann. Mus. Zool. Acad. Sci. Union Républ. (Leningrad)* **29** (1928): 66 [*Emberiza schoeniclus zaidamensis*], 78 [*Emberiza pallasi lydiae*].
Portenko (1930). *Auk* **47**: 206 [*Emberiza rustica latifascia*].
Portenko (1937). *Vsesoiuznyi Ark. Inst., Problemy Ark. (Leningrad)* **3**: 124 [*Plectrophenax nivalis vlasowae*].
Prévost & Des Murs (1846). *Voy. Vénus, Atlas. Ois.*: plate 5, fig. 1 [*Tangara ruficervix*], plate 6 [*Melozone biarcuata*].
Quoy & Gaimard (1824). In: Freycinet, *Voy. Uranie et Physicienne, Zool.* **1**, Livr. **3**: 109 [*Melanodera melanodera*].
Raposo (1997). *Ararajuba* **5(1)**: 4, frontispiece [*Arremon franciscanus*].
Regalado Ruiz (1981). *Centro Agrícola (Cuba)* **8(2)**: 91 [*Torreornis inexpectata varonai*].
Reichenbach (1850). *Av. Syst. Nat.*, Part **6**: plate 73 [*Gymnomystax*], plate 77 [*Amisognathus, Chlorornis, Periporphyrus, Schistochlamys*], plate 78 [*Caryothraustes, Diuca, Pheucticus*], plate 79 [*Melozone, Volatinia*].
Reichenbach (1853). *Handb. Spec. Orn.*, Part **11** (Scansoriae B. Tenuirostres): 233 [*Chlorophanes*], 252, plate 561, fig. 3824 [*Coereba flaveola martinicana*], 253 [*Coereba flaveola bahamensis*].
Reichenow (1875). *J. Orn.* **23**: 233, plate 2, figs. 2–3 [*Emberiza cabanisi*].
Reichenow (1915). *Orn. Monatsber.* **23(10)**: 154 [*Thraupis episcopus ehrenreichi*].
Reiser & Almásy (1898). *Aquila* **5**: 122 [*Emberiza schoeniclus tschusii*].
Remsen (1993). *Proc. Biol. Soc. Washington* **106**: 429 [*Atlapetes terborghi*].
Remsen (1997). *Orn. Monogr.* **48**: 89 [*Parkerthraustes*].
Richmond (1896). *Proc. US Natl. Mus.* **18(1093)** (1895): 675 [*Quiscalus lugubris insularis*].
Richmond (1898). *Auk* **15**: 327 [*Psarocolius cassini*].
Richmond (1908). *Proc. US Natl. Mus.* **35(1656)**: 584 [*Gnorimopsar*].
Richmond (1915). *Proc. Biol. Soc. Washington* **28**: 180 [*Compsothraupis*].
Richmond & Swales (1924). *Proc. Biol. Soc. Washington* **37**: 106 [*Calyptophilus tertius abbotti*], 107 [*Phaenicophilus poliocephalus coryi*].
Ridgway (1869). *Proc. Acad. Nat. Sci. Philadelphia* **21**: 130 [*Piranga rubra cooperi*].
Ridgway (1873). *Amer. J. Sci.* **Ser. 3, no. 5**: 39 [*Cardinalis cardinalis coccineus*].
Ridgway (1873). *Amer. Naturalist* **7**: 615 [*Junco hyemalis aikeni, Peucaea botterii arizonae*].
Ridgway (1874). *Bull. Essex Inst.* **5** (1873): 191 [*Artemisiospiza nevadensis*].
Ridgway (1874). In: Baird, Brewer & Ridgway, *Hist. North Amer. Birds* **2**: 18 [*Melospiza melodia mexicana*].
Ridgway (1876). *Bull. US Geol. & Geogr. Survey Territ.* **2(2)**: 188 [*Junco hyemalis insularis*].
Ridgway (1878). *Proc. US Natl. Mus.* **1(38)**: 247 [*Rhodinocichla rosea schistacea*], 248 [*Arremonops rufivirgatus crassirostris, Arremonops rufivirgatus verticalis*].
Ridgway (1879). *Bull. Nuttall Orn. Club* **4**: 219 [*Peucaea aestivalis illinoensis*].
Ridgway (1879). *Proc. US Natl. Mus.* **1(60)** (1878): 484 [*Chlorophanes pulcherrimus aureiuncha*].
Ridgway (1882). *Proc. US Natl. Mus.* **4(235)**: 335 [*Acanthidops*], 336 [*Acanthidops bairdi*]; **5(295)**: 392 [*Icterus pectoralis espinachi*].
Ridgway (1883). *Proc. US Natl. Mus.* **6(360)**: 155 [*Junco phaeonotus bairdi*].
Ridgway (1884). *Proc. US Natl. Mus.* **6(391)**: 401 [*Oryzoborus funereus salvini, Oryzoborus nuttingi*]; **7(412)**: 68 [*Plectrophenax hyperboreus*]; **7(420)**: 174 [*Icterus nigrogularis curasoensis*], 178 [*Coereba flaveola tricolor*]; **7(432)**: 259 [*Spizella wortheni*].
Ridgway (1885). *Auk* **2**: 344 [*Cardinalis cardinalis superbus*], 364 [*Junco phaeonotus palliatus*].
Ridgway (1885). *Proc. Biol. Soc. Washington* **3**: 22 [*Spindalis zena benedicti, Tiaris olivaceus intermedius*], 24 [*Cardinalis cardinalis saturatus*].
Ridgway (1885). *Proc. US Natl. Mus.* **7(457)** (1884): 516 [*Passerculus guttatus beldingi*]; **8(472)**: 19 [*Icterus cucullatus igneus, Icterus cucullatus nelsoni*].
Ridgway (1887). *Auk* **4**: 347 [*Cardinalis sinuatus peninsulae*].
Ridgway (1887). *Man. North Amer. Birds*, 1st edition: 370 [*Agelaius phoeniceus bryanti, Agelaius phoeniceus sonoriensis*], 403 [*Plectrophenax nivalis townsendi*], 443 [*Cardinalis cardinalis yucatanicus*], 447 [*Cyanocompsa parellina indigotica*], 448 [*Passerina versicolor pulchra*], 457 [*Piranga bidentata flammea, Piranga leucoptera latifasciata*].
Ridgway (1887). *Proc. US Natl. Mus.* **10(600)**: 3 [*Spindalis zena townsendi*]; **10(646)**: 434 [*Phrygilus punensis*].
Ridgway (1888). *Proc. US Natl. Mus.* **10(665)**: 586 [*Caryothraustes poliogaster scapularis*], 587 [*Aimophila rufescens discolor, Sturnella magna inexspectata*].
Ridgway (1890). *Proc. US Natl. Mus.* **12(767)** (1889): 105 [*Certhidea fusca cinerascens*], 106 [*Geospiza conirostris*], 111 [*Camarhynchus pauper*].
Ridgway (1893). *Proc. US Natl. Mus.* **16(956)**: 609 [*Bangsia arcaei caeruleigularis*].
Ridgway (1894). *Proc. US Natl. Mus.* **17(1007)**: 359 [*Certhidea fusca bifasciata, Certhidea fusca mentalis*], 360 [*Certhidea fusca luteola*], 361 [*Geospiza conirostris propinqua, Geospiza scandens intermedia*], 363 [*Geospiza difficilis debilirostris*], 364 [*Camarhynchus pallidus productus, Camarhynchus parvulus salvini*], 365 [*Camarhynchus psittacula affinis*].
Ridgway (1896). *Man. North Amer. Birds*, 2nd edition: 605 [*Arremonops*], 606 [*Cardinalis cardinalis floridanus*].
Ridgway (1897). *Auk* **14**: 94 [*Junco hyemalis mearnsi*].
Ridgway (1897). *Proc. US Natl. Mus.* **19(1116)** (1896): 466, footnote [*Melanospiza*], 545 [*Platyspiza*].
Ridgway (1898). *Auk* **15**: 224 [*Incaspiza, Rhynchospiza*], 225 [*Heterospingus, Mitrospingus, Pselliophorus*], 226 [*Aimophila ruficeps sororia, Rhodothraupis*], 228 [*Arremonops conirostris richmondi, Atlapetes pileatus dilutus*], 229 [*Amphispiza bilineata deserticola*], 230 [*Artemisiospiza belli clementeae*], 320 [*Calcarius lapponicus alascensis, Calcarius lapponicus coloratus*], 321 [*Junco hyemalis montanus, Zonotrichia capensis insularis*], 322 [*Loxigilla violacea affinis, Tiaris olivaceus bryanti*], 323 [*Loxigilla noctis coryi, Loxigilla noctis crissalis, Loxigilla noctis dominicana*].
Ridgway (1899). *Auk* **16**: 35 [*Melospiza melodia pusillula*], 36 [*Melospiza melodia caurina, Passerella unalaschcensis fuliginosa, Zonotrichia leucophrys nuttalli*], 37 [*Sicalis luteola chapmani*], 254 [*Pyrgisoma fuscum potosinum*].
Ridgway (1900). *Auk* **17**: 29 [*Melospiza melodia kenaiensis*], 30 [*Passerella unalaschcensis annectens, Passerella unalaschcensis insularis*].
Ridgway (1901). *Proc. Washington Acad. Sci.* **3**: 149 [*Piranga roseogularis cozumelae*], 150 [*Habia fuscicauda discolor*], 151 [*Quiscalus mexicanus nelsoni*], 152 [*Icterus cucullatus sennetti*], 153 [*Agelaius phoeniceus caurinus, Agelaius phoeniceus fortis, Agelaius phoeniceus neutralis, Icterus mesomelas taczanowskii*], 155 [*Xanthopsar*].
Ridgway (1902). *Bull. US Natl. Mus.* **50(2)**: 145 [*Habia rubica nelsoni*], 770 [*Rhodinocichla rosea eximia*].
Ridgway (1905). *Proc. Biol. Soc. Washington* **18**: 212 [*Habia rubica alfaroana*].
Riley (1905). *Proc. Biol. Soc. Washington* **18**: 220 [*Pheucticus aureoventris meridensis*].
Riley (1911). *Proc. Biol. Soc. Washington* **24**: 234 [*Passerella schistacea altivagans*].
Riley (1912). *Proc. Biol. Soc. Washington* **25**: 185 [*Thraupis episcopus nesophila*].
Riley (1914). *Proc. Biol. Soc. Washington* **27**: 213 [*Sporophila schistacea incerta*].
Riley (1916). *Smithsonian Misc. Coll.* **66(15)**: 2 [*Zonotrichia capensis antillarum*].
Ripley (1950). *Postilla Yale Peabody Mus.* **3**: 10 [*Phrygilus unicolor ultimus*].
Roberts (1924). *Ann. Transvaal Mus.* **10**: 187 [*Emberiza capensis limpopoensis*].
Roberts (1928). *Ann. Transvaal Mus.* **12**: 318 [*Emberiza capensis bradfieldi*].
van Rossem (1926). *Condor* **28**: 223 [*Agelaius phoeniceus mailliardorum*].
van Rossem (1927). *Condor* **29**: 76 [*Icterus pustulatus pustuloides*].
van Rossem (1930). *Trans. San Diego Soc. Nat. Hist.* **6(14)**: 218 [*Passerculus rostratus atratus*], 222 [*Amphispiza bilineata tortugae*], 223 [*Amphispiza bilineata cana*].
van Rossem (1931). *Trans. San Diego Soc. Nat. Hist.* **6(22)**: 329 [*Junco hyemalis mutabilis*]; **7(3)**: 22 [*Saltator coerulescens brevicaudus*].
van Rossem (1932). *Trans. San Diego Soc. Nat. Hist.* **7(12)**: 142 [*Cardinalis cardinalis townsendi*].
van Rossem (1933). *Trans. San Diego Soc. Nat. Hist.* **7(23)**: 283 [*Pyrgisoma kieneri grisius*].
van Rossem (1934). *Bull. Mus. Comp. Zool. Harvard* **77**: 405 [*Psarocolius wagleri ridgwayi*], 479 [*Pheucticus chrysopeplus dilutus*], 482 [*Pipilo maculatus griseipygius*], 483 [*Pyrgisoma fuscum perpallidum*], 485 [*Amphispiza quinquestriata septentrionalis*], 486 [*Aimophila ruficeps simulans*].
van Rossem (1934). *Trans. San Diego Soc. Nat. Hist.* **7(30)**: 356 [*Cardinalis sinuatus fulvescens*]; **7(33)**: 367 [*Piranga bidentata citrea*], 369 [*Passerina versicolor dickeyae*], 371 [*Pyrgisoma fuscum texanum*].
van Rossem (1935). *Trans. San Diego Soc. Nat. Hist.* **8(11)**: 70 [*Pyrgisoma crissale eremophilum*].
van Rossem (1938). *Bull. Brit. Orn. Club* **58(9)**: 127 [*Oriturus superciliosus palliatus*], 130 [*Pipilo maculatus chiapensis*], 131 [*Pipilo ocai brunnescens, Pipilo ocai guerrerensis*], 133 [*Passerina caerulea deltarhyncha*], 136 [*Icterus chrysater mayensis*], 137 [*Icterus graduacauda dickeyae, Icterus graduacauda nayaritensis*].
van Rossem (1942). *Trans. San Diego Soc. Nat. Hist.* **9(17)**: 384 [*Euphonia elegantissima rileyi*]; **9(20)**: 436 [*Aimophila rufescens antonensis*].
van Rossem (1945). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **21**: 237 [*Icterus bullockii parvus*].
van Rossem (1946). *Auk* **63**: 562 [*Aimophila ruficeps rupicola*].
van Rossem (1946). *Condor* **48**: 81 [*Pyrgisoma aberti dumeticolus*].
van Rossem (1947). *Proc. Biol. Soc. Washington* **60**: 55 [*Aimophila ruficeps sanctorum*].
Rothschild (1898). *Bull. Brit. Orn. Club* **7(8)**: 53 [*Certhidea fusca becki*].
Rothschild (1921). *Novit. Zool.* **28**: 60 [*Emberiza godlewskii omissa*].
Rothschild & Hartert, E.J.O. (1899). *Novit. Zool.* **6**: 149 [*Certhidea fusca ridgwayi*], 158 [*Geospiza conirostris darwini*], 165 [*Geospiza difficilis septentrionalis*].
Rudebeck (1958). *Bull. Brit. Orn. Club* **78(7)**: 129 [*Emberiza capensis nebularum*].
Rüppell (1837). *Neue Wirbelth. Fauna Abyss. Vög.*, Part **10**: 86, plate 30, fig. 2 [*Emberiza tahapisi septemstriata*].
Ryan (2008). *Bird Conserv. Int.* **18**: 25 [*Nesospiza acunhae fraseri*].
Salomonsen (1931). *Ibis* **Ser. 13, no. 1**: 64 [*Plectrophenax nivalis insulae*].
Salvadori (1873). *Atti R. Accad. Sci. Torino* **8**: 193 [*Euphonia mesochrysa*].
Salvadori (1888). *Ann. Mus. Civ. Storia Nat. Genova* **Ser. 2, no. 6(17)**: 269 [*Emberiza poliopleura*].
Salvadori (1897). *Boll. Mus. Zool. Anat. Comp. Univ. Torino* **12**: 6 [*Arremon torquatus borellii*].
Salvadori & Festa (1899). *Bol. Mus. Zool. Anat. Comp. Torino* **14**: 13 [*Coereba flaveola intermedia*].
Salvin (1861). *Proc. Zool. Soc. London* **1861(2)**: 202 [*Arremonops chloronotus*].
Salvin (1863). *Proc. Zool. Soc. London* **1863(2)**: 168 [*Tangara dowii*], 189 [*Junco phaeonotus alticola, Peucaea botterii petenica, Spizella passerina pinetorum*].
Salvin (1865). *Proc. Zool. Soc. London* **1864(3)**: 581 [*Chlorospingus pileatus, Lanio leucothorax*], 582 [*Arremonops rufivirgatus superciliosus*].
Salvin (1866). *Proc. Zool. Soc. London* **1866(1)**: 71, plate 7 [*Euphonia anneae rufivertex*].
Salvin (1870). *Proc. Zool. Soc. London* **1870(2)**: 188 [*Tachyphonus luctuosus nitidissimus*].
Salvin (1878). *Ibis* **Ser. 4, no. 2**: 446 [*Melozone leucotis occipitalis*].
Salvin (1886). *Ibis* **Ser. 5, no. 4**: 500 [*Mitrospingus oleagineus*].
Salvin (1888). *Ibis* **Ser. 5, no. 6**: 259 [*Habia fuscicauda insularis*].
Salvin (1895). *Novit. Zool.* **2**: 5, plate 1, fig. 1 [*Atlapetes latinuchus baroni*], 5, plate 1, fig. 2 [*Atlapetes rufigenis*], 7 [*Poospiza alticola*], 8 [*Incaspiza laeta, Incaspiza personata, Poospiza rubecula*].
Salvin & Godman (1880). *Ibis* **Ser. 4, no. 4**: 120, plate 3 [*Anisognathus melanogenys*], 121 [*Atlapetes melanocephalus*].
Salvin & Godman (1883). *Biol. Centr.-Amer., Aves* **1**: 293 [*Piranga hepatica figlina*], 297 [*Chlorothraupis*], 300 [*Habia rubica rhodinolaema*], 305 [*Lanio leucothorax melanopygius*].
Salvin & Godman (1883). *Ibis* **Ser. 5, no. 1**: 205 [*Piranga lutea haemalea*].
Salvin & Godman (1884). *Ibis* **Ser. 5, no. 2**: 444 [*Chlorophonia cyanea roraimae*], 445, plate 13 [*Tangara cyanoptera whitelyi*].
Salvin & Godman (1886). *Biol. Centr.-Amer., Aves* **1**: 397 [*Peucaea ruficauda acuminata, Peucaea ruficauda lawrencii*].
Salvin & Godman (1889). *Ibis* **Ser. 6, no. 1**: 237 [*Chlorospingus ophthalmicus albifrons*], 381 [*Pipilo ocai alticola, Pipilo ocai nigrescens*].
Salvin & Godman (1891). *Ibis* **Ser. 6, no. 3**: 272 [*Pheucticus chrysopeplus aurantiacus*], 612 [*Quiscalus nicaraguensis*].
Saunders, G.B. (1934). *Auk* **51**: 42 [*Sturnella magna auropectoralis*].
Say (1822). In: James, *Acc. Exped. Pittsburgh Rocky Mountains Comm. Long* **1**, Philadelphia edition: 139 [*Chondestes grammacus*]; **2**, Philadelphia edition: 47 [*Passerina amoena*].
Schulenberg & Binford (1985). *Wilson Bull.* **97(4)**: 413 [*Tangara meyerdeschauenseei*].
Sclater, P.L. (1851). In: Jardine, *Contrib. Orn.* **1851(1)**: 23 [*Tangara xanthogastra*], 24, plate 69, fig. 2 [*Tangara guttata chrysophrys*]; **1851(2)**: 51 [*Tangara chilensis caelicolor*], 58 [*Tangara ruficervix leucotis*], 61 [*Delothraupis castaneoventris*], 65 [*Tangara xanthocephala lamprotis*], 65, plate 70, fig. 2 [*Tangara parzudakii lunigera*]; **1851(3)**: 86 [*Euphonia laniirostris melanura*], 89 [*Chlorophonia cyanea frontalis*], 89, plate 75, fig. 2 [*Chlorophonia pyrrhophrys*], 106 [*Dacnis cayana coerebicolor*].
Sclater, P.L. (1852). *Rev. Mag. Zool.* **Ser. 2, no. 4**: 8 [*Chlorospingus flavigularis, Dacnis albiventris*].
Sclater, P.L. (1853). *Rev. Mag. Zool.* **Ser. 2, no. 5**: 480 [*Chlorophanes pulcherrimus*].
Sclater, P.L. (1854). *Ann. Mag. Nat. Hist.* **Ser. 2, no. 13**: 25 [*Habia gutturalis*].
Sclater, P.L. (1854). *Tanagrarum Cat. Specificus*: 16 [*Euphonia musica sclateri*].
Sclater, P.L. (1855). *Proc. Zool. Soc. London* **1854(22)**, no. 266: 97 [*Arremon taciturnus axillaris, Ramphocelus bresilius dorsalis*], 97, plate 64 [*Buthraupis eximia chloronota*], 98, plate 65, fig. 2 [*Euphonia concinna*], 114, plate 67 [*Arremon aurantiirostris spectabilis*]; **1854(22)**, no. 269: 157, plate 68 [*Hemispingus melanotis*], 158, plate 69 [*Heterospingus xanthopygius*]; **1854(22)**, no. 275: 248 [*Tangara xanthocephala venusta*], 249 [*Tersina viridis occidentalis*], 251 [*Dacnis egregia, Dacnis hartlaubi*]; **1855(23)**, no. 289: 74, plate 85 [*Conirostrum ferrugineiventre*], 83, plate 89 [*Arremon aurantiirostris erythrorhynchus*], 84, plate 91 [*Anisognathus notabilis*], 84, plate 92 [*Oreothraupis arremonops*]; **1855(23)**, no. 291: 109, plate 99 [*Hemithraupis flavicollis albigularis*].
Sclater, P.L. (1856). *Ann. Mag. Nat. Hist.* **Ser. 2, no. 17**: 467 [*Diglossa caerulescens, Diglossa indigotica*].
Sclater, P.L. (1856). *Proc. Zool. Soc. London* **1855(23)**, no. 298: 227 [*Thraupis cyanocephala auricrissa*], 227, plate 110 [*Iridosornis porphyrocephalus*]; **1856(24)**, no. 305: 72 [*Saltator coerulescens mutus*], 80 [*Oreothraupis*], 81 [*Arremon flavirostris dorbignii*]; **1856(24)**, no. 306: 85 [*Arremon phaeopleurus*], 91 [*Tachyphonus luctuosus flaviventris*]; **1856(24)**, no. 307: 110 [*Hemithraupis flavicollis insignis, Hemithraupis guira guirina*]; **1856(24)**, no. 308: 117 [*Eucometis*], 128 [*Ramphocelus carbo unicolor*]; **1856(24)**, no. 309: 142 [*Tangara larvata franciscae*].
Sclater, P.L. (1857). *Proc. Acad. Nat. Sci. Philadelphia* **8(6)** (1856): 261 [*Saltator atripennis*].
Sclater, P.L. (1857). *Proc. Zool. Soc. London* **1856(24)**, no. 315: 235 [*Thraupis palmarum melanoptera*]; **1856(24)**, no. 317: 257 [*Tangara mexicana vieilloti*], 260 [*Tangara nigroviridis cyanescens*], 265 [*Pipraeidea melanonota venezuelensis*]; **1856(24)**, no. 318: 276 [*Euphonia fulvicrissa*], 277 [*Euphonia laniirostris crassirostris*], 286 [*Coereba flaveola mexicana*]; **1856(24)**, no. 320: 311 [*Tangara rufigenis*]; **1857(25)**, no. 327: 7 [*Icterus wagleri*]; **1857(25)**, no. 331: 66, plate 24 [*Euphonia gouldi*].
Sclater, P.L. (1858). *Proc. Zool. Soc. London* **1857(25)**, no. 340: 214 [*Peucaea botterii*]; **1858(26)**, no. 351: 73 [*Creurgops*], 73, plate 132, fig. 1 [*Calochaetes coccineus*], 73, plate 132, fig. 2 [*Creurgops verticalis*]; **1858(26)**, no. 365: 293 [*Hemispingus melanotis castaneicollis*], 294 [*Tangara cyanotis*], 304 [*Pyrgisoma albicolle*].
Sclater, P.L. (1859). *Ibis* **Ser. 1, no. 1**: 457 [*Nesopsar*].

Sclater, P.L. (1859). *Proc. Zool. Soc. London* **1858(26)**, no. 375: 452 [*Conirostrum cinereum fraseri*], 454, plate 145 [*Phrygilus plebejus ocularis*]; **1858(26)**, no. 381: 552 [*Catamenia homochroa*]; **1859(2)**: 138 [*Thlypopsis ornata*].
Sclater, P.L. (1860). *Proc. Zool. Soc. London* **1859(3)**: 376 [*Cyanerpes cyaneus carneipes*], 378 [*Oryzoborus funereus*], 379 [*Sporophila corvina*], 441 [*Arremon castaneiceps*]; **1860(1)**: 75 [*Oreomanes*], 75, plate 159 [*Oreomanes fraseri*], 88 [*Oryzoborus funereus aethiops*]; **1860(2)**: 274 [*Saltator striatipectus flavidicollis*], 276 [*Cacicus cela flavicrissus*, *Oryzoborus crassirostris occidentalis*, *Sporophila corvina ophthalmica*].
Sclater, P.L. (1861). *Ibis* **Ser. 1, no. 3**: 179 [*Sturnella magna meridionalis*, *Sturnella magna mexicana*].
Sclater, P.L. (1861). *Proc. Zool. Soc. London* **1861(2)**: 129 [*Chlorophanes spiza guatemalensis*, *Chlorophonia flavirostris*, *Thraupis cyanocephala subcinerea*], 130 [*Saltator striatipectus isthmicus*].
Sclater, P.L. (1862). *Cat. Coll. Amer. Birds*: 83 [*Habia fuscicauda erythrolaema*], 86 [*Tachyphonus cristatus cristatellus*], 108 [*Paroaria gularis cervicalis*], 131 [*Agelaius xanthomus*], 137 [*Pseudoleistes*], 139 [*Curaeus*].
Sclater, P.L. (1862). *Proc. Zool. Soc. London* **1861(3)**: 376 [*Sicalis luteola chrysops*], 379 [*Hemispingus frontalis ignobilis*].
Sclater, P.L. (1865). *Ibis* **Ser. 2, no. 1**: 495, plate 11 [*Iridosornis reinhardti*].
Sclater, P.L. (1865). *Proc. Zool. Soc. London* **1864(3)**: 607 [*Schistochlamys melanopis olivina*, *Sporophila bouvreuil pileata*].
Sclater, P.L. (1867). *Proc. Zool. Soc. London* **1867(1)**: 1, plate 1 [*Aimophila ruficeps boucardi*].
Sclater, P.L. (1868). *Ibis* **Ser. 2, no. 4**: 71, plate 3 [*Tangara cabanisi*].
Sclater, P.L. (1871). *Proc. Zool. Soc. London* **1871(2)**: 270, plate 21 [*Icterus laudabilis*].
Sclater, P.L. (1872). *Ibis* **Ser. 3, no. 2**: 42 [*Sicalis flaveola pelzelni*].
Sclater, P.L. (1874). *Proc. Zool. Soc. London* **1873(3)**: 728 [*Chlorochrysa nitidissima*].
Sclater, P.L. (1879). *Ibis* **Ser. 4, no. 3**: 388 [*Calochaetes*].
Sclater, P.L. (1880). *Ibis* **Ser. 4, no. 4**: 252 [*Conothraupis*].
Sclater, P.L. (1881). *Ibis* **Ser. 4, no. 5**: 599, plate 17, fig. 1 [*Poospiza erythrophrys*].
Sclater, P.L. (1881). *Proc. Zool. Soc. London* **1881(1)**: 213 [*Macroagelaius imthurni*]; **1881(2)**: 485, plate 46 [*Atlapetes nationi*].
Sclater, P.L. (1883). *Ibis* **Ser. 5, no. 1**: 153, plate 6 [*Psarocolius angustifrons salmoni*], 154, plate 7 [*Psarocolius angustifrons oleagineus*].
Sclater, P.L. (1883). *Proc. Zool. Soc. London* **1883(1)**: 43, plate 9 [*Poospiza nigrorufa whitii*].
Sclater, P.L. (1884). *Ibis* **Ser. 5, no. 2**: 157 [*Quiscalus mexicanus graysoni*].
Sclater, P.L. (1885). *Ibis* **Ser. 5, no. 3**: 273 [*Nesospingus*].
Sclater, P.L. (1886). *Cat. Birds Brit. Mus.* **11**: 27, plate 2, fig. 2 [*Erythrothlypis salmoni*], 61 [*Euphonia cyanocephala pelzelni*], 65 [*Euphonia chlorotica taczanowskii*], 142 [*Delothraupis*], 154 [*Thraupis episcopus leucoptera*], 276 [*Arremon taciturnus nigrirostris*], 345 [*Curaeus forbesi*].
Sclater, P.L. (1886). *Ibis* **Ser. 5, no. 4**: 259, plate 8 [*Incaspiza pulchra*].
Sclater, P.L. (1891). *Proc. Zool. Soc. London* **1891(1)**: 133, plate 13 [*Phrygilus fruticeti coracinus*].
Sclater, P.L. & Salvin (1859). *Ibis* **Ser. 1, no. 1**: 14 [*Cyanerpes lucidus*].
Sclater, P.L. & Salvin (1865). *Proc. Zool. Soc. London* **1864(3)**: 353 [*Cacicus microrhynchus*].
Sclater, P.L. & Salvin (1868). *Proc. Zool. Soc. London* **1868(2)**: 322 [*Aimophila notosticta*], 323 [*Amphispiza quinquestriata*], 324 [*Melozone biarcuata cabanisi*], 388 [*Piranga lutea testacea*], 389 [*Chlorospingus flavigularis hypophaeus*].
Sclater, P.L. & Salvin (1869). *Proc. Zool. Soc. London* **1869(1)**: 152, plate 13 [*Poospiza caesar*]; **1869(2)**: 416, plate 28 [*Tangara florida*], 438, plate 30, figs. 1–2 [*Euphonia chrysopasta*], 439, plate 31 [*Bangsia arcaei*], 440 [*Chlorospingus ophthalmicus punctulatus*], 440, plate 32 [*Chrysothlypis chrysomelas*].
Sclater, P.L. & Salvin (1870). *Proc. Zool. Soc. London* **1870(2)**: 324 [*Certhidea fusca*], 325 [*Camarhynchus psittacula habeli*], 326 [*Geospiza scandens abingdoni*], 327 [*Camarhynchus pallidus*].
Sclater, P.L. & Salvin (1871). *Proc. Zool. Soc. London* **1870(3)**: 784, plate 46, fig. 1 [*Hemispingus goeringi*], 784, plate 46, fig. 1 [=2] [*Diglossa gloriosa*], 785 [*Atlapetes albofrenatus meridae*], 840 [*Pheucticus aureoventris uropygialis*].
Sclater, P.L. & Salvin (1873). *Nomen. Aves Neotrop.*: 155 [*Porphyrospiza*], 157 [*Chlorospingus semifuscus*, *Haplospiza rustica uniformis*].
Sclater, P.L. & Salvin (1875). *Proc. Zool. Soc. London* **1875(2)**: 235 [*Hemispingus superciliaris chrysophrys*], 235, plate 35, fig. 1 [*Atlapetes schistaceus castaneifrons*], 236, plate 35, fig. 2 [*Atlapetes schistaceus taczanowskii*].
Sclater, P.L. & Salvin (1876). *Proc. Zool. Soc. London* **1876(1)**: 253 [*Diglossa glauca*]; **1876(2)**: 353 [*Creurgops dentatus*, *Tangara punctata punctulata*], 354 [*Hemispingus calophrys*], 354, plate 30, fig. 1 [*Tangara ruficervix fulvicervix*], 354, plate 30, fig. 2 [*Tangara argyrofenges*].
Sclater, P.L. & Salvin (1877). *Proc. Zool. Soc. London* **1877(1)**: 19 [*Euphonia finschi*, *Pheucticus aureoventris crissalis*]; **1877(3)**: 521, plate 52, fig. 1 [*Euphonia cyanocephala insignis*], 521, plate 52, fig. 2 [*Chlorospingus ophthalmicus phaeocephalus*].
Sclater, P.L. & Salvin (1878). *Proc. Zool. Soc. London* **1878(1)**: 136 [*Oryzoborus atrirostris*]; **1878(2)**: 439 [*Atlapetes leucopis*].
Sclater, P.L. & Salvin (1879). *Ibis* **Ser. 4, no. 3**: 425 [*Atlapetes latinuchus spodionotus*], 425, plate 10, fig. 2 [*Atlapetes melanolaemus*], 426 [*Atlapetes latinuchus comptus*], 427 [*Arremon brunneinucha inornatus*].
Sclater, P.L. & Salvin (1879). *Proc. Zool. Soc. London* **1879(3)**: 504 [*Atlapetes latinuchus elaeoprorus*].
Sclater, P.L. & Salvin (1880). *Proc. Zool. Soc. London* **1880(2)**: 155 [*Thlypopsis sordida chrysopis*].
Sclater, W.L. (1939). *Ibis* **Ser. 14, no. 3**: 143 [*Curaeus curaeus reynoldsi*], 144 [*Oreopsar*, *Oreopsar bolivianus*].
Scopoli (1769). *Ann. I Hist.-Nat. (Descr. Avium)*: 140 [*Oryzoborus angolensis torridus*], 142 [*Emberiza melanocephala*].
Scopoli (1786). *Deliciae Florae Faunae Insubricae*, Part **2**: 88 [*Amblyramphus holosericeus*].
Scott, W.E.D. (1900). *Bull. Brit. Orn. Club* **10(7)**: 64 [*Melanodera melanodera princetoniana*].
Sennett (1888). *Auk* **5**: 42 [*Aimophila ruficeps scottii*].
Sharpe (1885). *Cat. Birds Brit. Mus.* **10**: 52 [*Pinaroloxias*].
Sharpe (1888). *Cat. Birds Brit. Mus.* **12**: 12 [*Geospiza difficilis*], 73 [*Cyanocompsa brissonii argentina*], 98 [*Sporophila plumbea whiteleyana*], 99 [*Sporophila plumbea colombiana*], 157 [*Amaurospiza concolor aequatorialis*], 385 [*Sicalis taczanowskii*], 494 [*Emberiza fucata arcuata*], 635, plate 14 [*Poospiza boliviana*], 762 [*Arremonops rufivirgatus sumichrasti*], 778 [*Sicalis olivascens mendozae*], 808 [*Rhodospingus*].
Sharpe (1900). *Bull. Brit. Orn. Club* **11(1)**: 2 [*Atlapetes pallidiceps*, *Atlapetes seebohmi simonsi*].
Sharpe (1900). *Trans. Linn. Soc. London (Zool.)* **Ser. 2, no. 8**: 53, plate 4, fig. 1 [*Zonotrichia capensis macconnelli*].
Sharpe (1901). *Bull. Brit. Orn. Club* **11(4)**: 47 [*Emberiza striolata saturatior*].
Sharpe (1902). *Bull. Brit. Orn. Club* **13(1)**: 12 [*Emberiza godlewskii yunnanensis*].
Sharpe (1905). *Bull. Brit. Orn. Club* **15(9)**: 96 [*Hemithraupis guira fosteri*].
Shelley (1882). *Proc. Zool. Soc. London* **1882(2)**: 308 [*Emberiza cabanisi orientalis*].
Shelley (1902). *Birds Afr.* **3**: 158 [*Emberiza capensis reidi*].
Short (1969). *Occas. Pap. Mus. Zool. Louisiana State Univ.* **36**: 1 [*Agelasticus xanthophthalmus*].
Shulpin (1928). *Ann. Mus. Zool. Acad. Sci. Union Républ. (Leningrad)* **28** (1927): 401 [*Emberiza aureola ornata*].
Sibley (1950). *Univ. Calif. Publ. Zool.* **50(2)**: 128 [*Pipilo maculatus orientalis*], 134 [*Pipilo maculatus oaxacae*], 140 [*Pipilo maculatus vulcanorum*].
Sick (1950). *Rev. Brasil. Biol.* **10**: 465 [*Paroaria baeri xinguensis*].
Sick (1967). *J. Orn.* **108**: 219 [*Coryphaspiza melanotis marajoara*].
Sick (1968). *Beitr. Neotrop. Fauna* **5**: 153 [*Sporophila bouvreuil crypta*].
Smith, A. (1836). *Rep. Exped. Explor. Central Africa*: 48 [*Emberiza impetuani*, *Emberiza tahapisi*].
Snethlage, E. (1925). *J. Orn.* **73**: 265 [*Psarocolius yuracares neivae*].
Snodgrass & Heller (1901). *Condor* **3**: 96 [*Camarhynchus heliobates*].
Sparrman (1788). *Mus. Carlsonianum*, Part **3**: plate 57 [*Coereba flaveola bartholemica*].
Sparrman (1789). *Mus. Carlsonianum*, Part **4**: plate 92 [*Euphonia musica flavifrons*], plate 93 [*Sicalis luteola*], plate 95 [*Thraupis ornata*].
Spence & Smith, B.L. (1961). *Auk* **78**: 95 [*Torreornis inexpectata sigmani*].
Spix (1824). *Aves Spec. Nov. Brasil.* **1**: 65, plate 61 [*Psarocolius bifasciatus*], 66, plate 62 [*Psarocolius angustifrons*], 67, plate 64, fig. 1 [*Lampropsar tanagrinus*], 67, plate 64, fig. 2 [*Gnorimopsar chopi sulcirostris*], 67, plate 65 [*Agelaioides fringillarius*].
Spix (1825). *Aves Spec. Nov. Brasil.* **2**: 35, plate 47 [*Ramphocelus nigrogularis*], 35, plate 48, fig. 1 [*Piranga flava saira*], 36, plate 49, fig. 1 [*Eucometis penicillata*], 37, plate 49, fig. 2 [*Tachyphonus cristatus brunneus*], 37, plate 50, fig. 1 [*Tachyphonus rufiventer*], 38, plate 50, fig. 2 [*Ammodramus aurifrons*], 38, plate 51, figs. 1–2 [*Tangara schrankii*], 42, plate 55, fig. 1 [*Thraupis episcopus coelestis*], 44, plate 57 [*Saltator coerulescens superciliaris*], 46, plate 60, fig. 1 [*Sporophila albogularis*].
Sprunt (1934). *Charleston Mus. Leaflet* **6**: 4 [*Quiscalus major westoni*].
Statius Müller (1776). *Vollst. Natursystem*, Part 7 (Suppl.): 87 [*Psarocolius viridis*], 140 [*Euphagus carolinus*], 154 [*Sporophila bouvreuil*], 158 [*Tangara seledon*, *Tangara varia*], 159 [*Tangara cyanocephala*, *Saltator maximus*], 165 [*Zonotrichia capensis*], 166 [*Coryphospingus cucullatus*].
Steinbacher, F. (1930). *J. Orn.* **78**: 481 [*Emberiza schoeniclus stresemanni*], 482 [*Emberiza schoeniclus lusitanica*].
Stejneger (1882). *Proc. US Natl. Mus.* **5(261)**: 33 [*Plectrophenax*].
Stejneger (1885). *Auk* **2**: 49 [*Calamospiza melanocorys*].
Stephens (1815). In: Shaw, *Gen. Zool.* **9(2)**: 374 [*Emberiza flaviventris*].
Stevenson (1978). *Proc. Biol. Soc. Washington* **91**: 40 [*Quiscalus major alabamensis*].
Stolzmann (1926). *Ann. Zool. Mus. Polonici Hist. Nat.* **5**: 231 [*Poospiza nigrorufa wagneri*], 233 [*Hemithraupis guira huambina*].
Stone (1891). *Auk* **8**: 347 [*Molothrus bonariensis venezuelensis*].
Stone (1897). *Proc. Acad. Nat. Sci. Philadelphia* **49(1)**: 149 [*Sturnella magna hoopesi*].
Stresemann (1930). *Orn. Monatsber.* **38**: 90 [*Emberiza leucocephalos fronto*].
Strickland (1841). *Proc. Zool. Soc. London* **1841(9)**, no. 99: 30 [*Stephanophorus*].
Strickland (1844). *Ann. Mag. Nat. Hist.* **Ser. 1, no. 13**: 419 [*Pyrrhocoma ruficeps*], 420 [*Embernagra longicauda*], 421 [*Orthogonys*].
Strickland (1850). In: Jardine, *Contrib. Orn.* **1850(6)**: 120, plate 62 [*Icterus prosthemelas*].
Strickland (1851). In: Jardine, *Contrib. Orn.* **1851(2)**: 72 [*Euphonia trinitatis*]; **1851(3)**: 104 [*Phaenicophilus*].
Sundevall (1834). *Kung. Svenska Vetensk. Handl.* **55** (1833): 310, plate 10, fig. 1 [*Euphonia xanthogaster*].
Sundevall (1870). *Öfver. Kongl. Vet. Akad. Förhandl.* **26** (1869): 621 [*Coereba flaveola sanctithomae*].
Sushkin (1906). *Bull. Brit. Orn. Club* **16(5)**: 56 [*Emberiza schoeniclus harterti*].
Sushkin (1925). *List Distrib. Birds Russian Altai and NW Mongolia*: 67 [*Emberiza cioides tarbagataica*].
Sushkin (1925). *Proc. Boston Soc. Nat. Hist.* **38**: 24 [*Emberiza godlewskii decolorata*], 26 [*Emberiza godlewskii khamensis*], 29 [*Emberiza elegans ticehursti*].
Sutton & Burleigh (1939). *Auk* **56**: 71 [*Cyanocompsa parellina lucida*].
Sutton & Burleigh (1941). *Ann. Carnegie Mus.* **28**: 184 [*Arremonops rufivirgatus ridgwayi*].
Swainson (1825). *Quart. J. Sci. Litt. Arts Roy. Inst. London* **20(39)**: 64 [*Coryphospingus cucullatus rubescens*].
Swainson (1827). *Philos. Mag. (New Ser.)* **1**: 434 [*Aimophila rufescens*, *Pipilo maculatus*, *Pipilo maculatus macronyx*, *Pyrgisoma fuscum*], 435 [*Ammodramus*, *Ammodramus savannarum bimaculatus*, *Chondestes*, *Chondestes grammacus strigatus*, *Dolichonyx*], 436 [*Cassiculus*, *Icterus bullockii*, *Icterus cucullatus*], 437 [*Piranga erythrocephala*], 438 [*Piranga bidentata*, *Piranga hepatica*, *Pheucticus melanocephalus*, *Tiaris*, *Tiaris olivaceus pusillus*].
Swainson (1827). *Zool. J.* **3**: 173 [*Pipraeidea*].
Swainson (1832). In: Swainson & Richardson, *Fauna Bor.-Amer.* **2** (1831): 250, plate 49 [*Calcarius pictus*], 251 [*Spizella pallida*], 260, plates 51–52 [*Pipilo maculatus arcticus*], 277 [*Molothrus*], 493 [*Zonotrichia*].
Swainson (1834). *Orn. Drawings*, Part **1**: plate 2 [*Cacicus haemorrhous affinis*], plate 7 [*Tangara cucullata*], plate 8 [*Tangara cyanoptera*]; Part **3**: plate 37 [*Thraupis episcopus cana*].
Swainson (1837). *Classif. Birds* **2**: 274 [*Chrysomus*], 286 [*Tangara chilensis paradisea*], 287 [*Aimophila*], 288 [*Passerella*, *Zonotrichia capensis subtorquata*], 290 [*Melophus*].
Swainson (1838). *Anim. in Menag.*: 299, fig. 50c [=54c] [*Quiscalus lugubris*], 300, fig. 52 [*Quiscalus lugubris inflexirostris*], 302 [*Icterus pyrrhopterus tibialis*], 311 [*Tachyphonus phoenicius*], 314 [*Oriturus superciliosus*], 347 [*Arremon flavirostris*], 354 [*Quiscalus mexicanus peruvianus*], 355 [*Quiscalus niger crassirostris*], 356 [*Tangara cyanicollis caeruleocephala*], 357 [*Arremon semitorquatus*], 358 [*Ocyalus latirostris*], 359 [*Ramphocelus melanogaster*].
Swarth (1905). *Condor* **7**: 172 [*Pipilo maculatus montanus*].
Swarth (1913). *Condor* **15**: 172 [*Pipilo maculatus falcinellus*].
Swarth (1918). *Proc. Biol. Soc. Washington* **31**: 162 [*Passerella schistacea fulva*], 163 [*Passerella schistacea canescens*].
Swarth (1931). *Occas. Pap. Calif. Acad. Sci.* **18**: 245 [*Camarhynchus pallidus striatipecta*].
Swarth & Brooks, A.C. (1925). *Condor* **27**: 67 [*Spizella breweri taverneri*].
Swinhoe (1870). *Proc. Zool. Soc. London* **1870(1)**: 134 [*Emberiza elegans elegantula*]; **1870(2)**: 441 [*Emberiza tristrami*].
Swinhoe (1874). *Ibis* **Ser. 3, no. 4**: 161 [*Emberiza yessoensis*].
Swinhoe (1876). *Ibis* **Ser. 3, no. 6**: 333, plate 8, fig. 2 [*Emberiza schoeniclus pyrrhulina*].
Taczanowski (1874). *J. Orn.* **22**: 330 [*Emberiza godlewskii*].
Taczanowski (1874). *Proc. Zool. Soc. London* **1874(1)**: 131 [*Hemispingus xanthophthalmus*], 131, plate 19, fig. 2 [*Hemispingus superciliaris leucogastrus*], 132 [*Chlorospingus ophthalmicus cinereocephalus*, *Sporophila simplex*], 132, plate 19, fig. 1 [*Hemispingus trifasciatus*], 133 [*Sicalis raimondii*].
Taczanowski (1875). *Proc. Zool. Soc. London* **1874(4)**: 512 [*Conirostrum sitticolor cyaneum*], 516, plate 65 [*Atlapetes tricolor*], 517 [*Cnemoscopus rubrirostris chrysogaster*].
Taczanowski (1877). *Proc. Zool. Soc. London* **1877(2)**: 322 [*Rhynchospiza stolzmanni*].
Taczanowski (1879). *Proc. Zool. Soc. London* **1879(2)**: 228 [*Thlypopsis inornata*].
Taczanowski (1880). *Proc. Zool. Soc. London* **1880(2)**: 193 [*Coereba flaveola magnirostris*], 195 [*Hemispingus melanotis berlepschi*], 196 [*Arremon abeillei nigriceps*].
Taczanowski (1882). *Proc. Zool. Soc. London* **1882(1)**: 10, plate 1, fig. 2 [*Tangara vassorii branickii*].
Taczanowski (1883). *Proc. Zool. Soc. London* **1883(1)**: 70 [*Atlapetes leucopterus dresseri*, *Atlapetes seebohmi*].
Taczanowski (1884). *Orn. Pérou* **2**: 468 [*Tangara viridicollis*], 469 [*Tangara nigroviridis berlepschi*], 498 [*Habia rubica peruviana*], 508 [*Thlypopsis pectoralis*], 533 [*Atlapetes albiceps*].
Taczanowski (1888). *Ibis* **Ser. 5, no. 6**: 317, plate 8 [*Emberiza jankowskii*].
Taczanowski & Berlepsch (1885). *Proc. Zool. Soc. London* **1885(1)**: 75 [*Tangara arthus aequatorialis*], 78 [*Tangara ruficervix taylori*], 80 [*Anisognathus lacrymosus caerulescens*], 82 [*Chlorospingus canigularis signatus*], 83 [*Urothraupis*, *Urothraupis stolzmanni*].
de Tarragon (1847). *Rev. Zool.* **Ser. 1, no. 10**: 252 [*Hypopyrrhus pyrohypogaster*].
Temminck (1820). *Planches Color.*, Livr. **2**: plate 11, fig. 1 [*Sporophila leucoptera cinereola*], plate 11, fig. 2 [*Sporophila falcirostris*].
Temminck (1822). *Planches Color.*, Livr. **19**: plate 114 [*Emberizoides*], plate 114, fig. 2 [*Coryphaspiza melanotis*].
Temminck (1823). *Planches Color.*, Livr. **41**: plate 243 and text [*Stephanophorus diadematus*].

Temminck (1824). *Planches Color.*, Livr. **49**: plate 293, fig. 2 and text [*Conirostrum speciosum*].
Temminck (1836). *Planches Color.*, Livr. **98**: plate 580 and text [*Emberiza spodocephala personata*], plate 583, fig. 1 and text [*Emberiza elegans*], plate 583, fig. 2 and text [*Emberiza variabilis*].
Temminck & Schlegel (1848). In: Siebold, *Fauna Jap., Aves*, Part **4–8**: 100, plate 60 [*Emberiza sulphurata*].
Thayer & Bangs (1905). *Bull. Mus. Comp. Zool. Harvard* **46**: 96 [*Cyanerpes cyaneus gigas*], 97 [*Coereba flaveola gorgonae*].
Thunberg (1822). *Mém. Acad. Imp. Sci. St. Pétersbourg* **Ser. 1, no. 8**: 284, plate 8, fig. 1 [*Chlorophonia cyanea*].
Todd (1912). *Ann. Carnegie Mus.* **8**: 198 [*Arremonops tocuyensis*], 200 [*Tiaris obscurus haplochroma*], 201 [*Saltator orenocensis rufescens*], 202 [*Tangara guttata eusticta*], 203 [*Tangara guttata trinitatis*, *Schistochlamys melanopis aterrima*].
Todd (1913). *Proc. Biol. Soc. Washington* **26**: 169 [*Catamenia homochroa oreophila*].
Todd (1915). *Proc. Biol. Soc. Washington* **28**: 79 [*Sporophila hypochroma*, *Zonotrichia capensis hypoleuca*].
Todd (1916). *Ann. Carnegie Mus.* **10(1/2)**: erratum opp. 276 [*Quiscalus niger caribaeus*].
Todd (1916). *Proc. Biol. Soc. Washington* **29**: 95 [*Nemosia pileata hypoleuca*].
Todd (1917). *Proc. Biol. Soc. Washington* **30**: 3 [*Psarocolius decumanus melanterus*], 4 [*Icterus mesomelas carrikeri*], 128 [*Diglossa caerulescens saturata*, *Thlypopsis fulviceps intensa*, *Tachyphonus luctuosus panamensis*, *Thraupis cyanocephala hypophaea*].
Todd (1919). *Proc. Biol. Soc. Washington* **32**: 113 [*Atlapetes semirufus majusculus*, *Habia rubica coccinea*].
Todd (1922). *Condor* **24**: 126 [*Aimophila ruficeps canescens*].
Todd (1922). *Proc. Biol. Soc. Washington* **35**: 89 [*Poospiza torquata pectoralis*], 90 [*Arremon aurantiirostris strictocollaris*, *Sicalis luteola flavissima*, *Sporophila americana dispar*], 91 [*Saltator grossus saturatus*], 92 [*Piranga flava rosacea*, *Tangara cayana fulvescens*, *Thraupis palmarum atripennis*], 93 [*Chlorospingus canigularis conspicillatus*, *Mitrospingus cassinii costaricensis*].
Todd (1923). *Auk* **40**: 61 [*Cyanocompsa cyanoides caerulescens*].
Todd (1923). *Proc. Biol. Soc. Washington* **36**: 38 [*Arremonops conirostris umbrinus*].
Todd (1924). *Auk* **41**: 147 [*Melospiza melodia atlantica*].
Todd (1924). *Proc. Biol. Soc. Washington* **37**: 122 [*Chlorophanes spiza subtropicalis*, *Conirostrum leucogenys cyanochroum*, *Icterus croconotus strictifrons*].
Todd (1932). *Proc. Biol. Soc. Washington* **45**: 218 [*Conirostrum albifrons cyanonotum*], 219 [*Agelasticus thilius alticola*].
Todd (1938). *Auk* **55**: 117 [*Ammodramus nelsoni alter*].
Townsend, C.H. (1890). *Proc. US Natl. Mus.* **13(799)**: 136 [*Artemisiospiza belli cinerea*], 139 [*Melospiza melodia graminea*].
Townsend, C.H. (1923). *Bull. Amer. Mus. Nat. Hist.* **48**: 20 [*Pyrgisoma fuscum jamesi*].
Townsend, J.K. (1837). *J. Acad. Nat. Sci. Philadelphia* **7**: 188 [*Junco hyemalis oreganus*], 189 [*Calcarius ornatus*].
Traylor (1950). *Nat. Hist. Misc.* **64**: 1 [*Tangara cyanicollis albotibialis*].
Trudeau (1839). *J. Acad. Nat. Sci. Philadelphia* **8**: 160 [*Piranga leucoptera*].
Tschudi (1844). *Arch. Naturges.* **10(1)**: 284 [*Hemispingus frontalis*], 285 [*Tangara arthus pulchra*, *Tangara vassorii atrocoerulea*, *Tangara xanthocephala*], 286 [*Chlorochrysa calliparaea*], 287 [*Iridosornis analis*, *Piranga leucoptera ardens*], 288 [*Chlorornis riefferii elegans*], 289 [*Arremon brunneinucha frontalis*], 290 [*Haplospiza rustica*, *Phrygilus plebejus*], 294 [*Diglossa cyanea melanopis*].
Tschudi (1846). *Unters. Faun. Peru, Aves*: 216 [*Sicalis olivascens chloris*].
Underdown (1931). *Auk* **48**: 612 [*Chlorospingus ophthalmicus dwighti*].
Underwood (1898). *Bull. Brit. Orn. Club* **7(9)**: 59 [*Chlorospingus canigularis olivaceiceps*].
Valqui & Fjeldså (2002). *Ibis* **144**: 347 [*Atlapetes melanopsis*].
Van Tyne & Sutton (1937). *Misc. Publ. Univ. Mich. Mus. Zool.* **37**: 102 [*Pipilo maculatus gaigei*].
Van Tyne & Trautman (1941). *Occas. Pap. Mus. Zool. Univ. Mich.* **439**: 7 [*Sturnella magna griscomi*].
Van Tyne & Trautman (1946). *Occas. Pap. Mus. Zool. Univ. Mich.* **496**: 1 [*Agelaius phoeniceus pallidulus*].
Verreaux, J. (1852). *Rev. Mag. Zool.* **Ser. 2, no. 4**: 314 [*Sporophila peruviana devronis*].
Verreaux, J. (1869). *Nouv. Arch. Mus. Hist. Nat. Paris (Bull.)* **Ser. 1, no. 5**: 15, plate 1, fig. 1 [*Sporophila frontalis*].
Vieillot (1807). *Hist. Nat. Ois. Amér. Septentrionale* **1**: 4 [*Piranga*].
Vieillot (1809). *Hist. Nat. Ois. Amér. Septentrionale* **2** (1807): 32, plate 90 [*Conirostrum bicolor*], 70 [*Coereba*].
Vieillot (1816). *Analyse Nouv. Orn. Elément.*: 30 [*Passerina*], 32 [*Arremon*, *Nemosia*, *Pipilo*, *Saltator*], 33 [*Agelaius*, *Tachyphonus*], 34 [*Sturnella*], 36 [*Quiscalus*], 40 [*Cissopis*, *Lanio*].
Vieillot (1816). *Nouv. Dict. Hist. Nat.*, 2nd edition, **5**: 364 [*Procacicus solitarius*].
Vieillot (1817). *Nouv. Dict. Hist. Nat.*, 2nd edition, **11**: 192 [*Emberizoides herbicola*], 276 [*Donacospiza albifrons*]; **12**: 173 [*Volatinia jacarina splendens*]; **13**: 521 [*Sporophila leucoptera*], 531 [*Gubernatrix cristata*], 542 [*Sporophila collaris melanocephala*]; **14**: 103 [*Saltator aurantiirostris*], 104 [*Saltator atricollis*, *Thraupis cyanoptera*], 105 [*Lamprospiza melanoleuca*, *Saltator coerulescens*], 107 [*Habia rubica*, *Saltator albicollis*], 108 [*Schistochlamys ruficapillus*].
Vieillot (1818). *Nouv. Dict. Hist. Nat.*, 2nd edition, **21**: 452 [*Trichothraupis melanops*]; **22**: 491 [*Hemithraupis flavicollis*], 493 [*Hemithraupis ruficapilla*]; **25**: 24 [*Ammodramus savannarum pratensis*], 25 [*Emberizoides herbicola sphenurus*].
Vieillot (1819). *Nouv. Dict. Hist. Nat.*, 2nd edition, **28**: 290 [*Cyanicterus cyanicterus*], 487 [*Quiscalus major*], 488 [*Quiscalus quiscula versicolor*]; **32**: 359 [*Habia rubica rubra*], 360 [*Orthogonys chloricterus*], 407 [*Pipraeidea melanonota*, *Tangara cayana chloroptera*], 410 [*Tangara desmaresti*], 425 [*Euphonia cyanocephala*], 426 [*Euphonia rufiventris*, *Tangara cyanoventris*]; **33**: 401 [*Tersina*]; **34**: 535 [*Agelaioides badius*], 556 [=536] [*Chrysomus ruficapillus*], 537 [*Gnorimopsar chopi*], 543 [*Icterus pyrrhopterus*, *Pseudoleistes virescens*], 545 [*Chrysomus ruficapillus frontalis*, *Pseudoleistes guirahuro*], 552 [*Agelasticus cyanopus*].
Vieillot (1822). In: Bonnaterre & Vieillot, *Tabl. Encyc. Méth. Orn.* **2**, Livr. **91**: 711 [*Tachyphonus coronatus*], 791 [*Piranga flava*].
Vieillot (1823). In: Bonnaterre & Vieillot, *Tabl. Encyc. Méth. Orn.* **3**, Livr. **93**: 1023 [*Sporophila caerulescens*], 1027 [*Sporophila nigricollis*].
Vigors (1825). *Zool. J. (London)* **2**: 190 [*Cacicus chrysopterus*].
Vigors (1827). *Zool. J. (London)* **3**: 442 [*Agelaius humeralis*].
Vigors (1832). *Proc. Zool. Soc. London* **1832(2)**, no. 15: 3 [*Tangara chilensis*], 4 [*Pheucticus chrysopeplus*].
Vigors (1839). In: Beechey, *Zool. Voy. 'Blossom'*: 19 [*Pyrgisoma crissale*].
Vincent (1950). *Bull. Brit. Orn. Club* **70(2)**: 14 [*Emberiza capensis basutoensis*], 15 [*Emberiza capensis plowesi*].
Voous (1955). *Stud. Fauna Curaçao Caribbean Islands* **6**: 83 [*Coereba flaveola bonairensis*].
Wagler (1827). *Systema Avium* **1** (sign. 22): 1 [*Psarocolius*], 10 (*Psarocolius* spec. 16) [*Icterus leucopteryx*].
Wagler (1829). *Isis (Oken)* **22(7)**: col. 754 [*Icterus gularis*], col. 755 [*Icterus mesomelas*, *Icterus pectoralis*], col. 757 [*Icterus croconotus*, *Icterus pustulatus*], col. 758 [*Euphagus cyanocephalus*, *Molothrus aeneus*], col. 759 [*Icterus melanopsis*].
Wagler (1831). *Isis (Oken)* **24(5)**: col. 526 [*Atlapetes*, *Atlapetes pileatus*, *Junco phaeonotus*].
Wagler (1832). *Isis (Oken)* **25(3)**: col. 280 [*Diglossa*], col. 281 [*Diglossa baritula*, *Agelaius phoeniceus gubernator*, *Sturnella magna hippocrepis*].
Waterhouse (1841). *Proc. Zool. Soc. London* **1840(8)**, no. 95: 183 [*Ocyalus*].
Webster (1959). *Condor* **61**: 143 [*Peucaea botterii vantynei*].
Webster (1983). *Proc. Biol. Soc. Washington* **96**: 664 [*Passerella unalaschcensis chilcatensis*].
Webster & Orr (1954). *Condor* **56**: 159 [*Spizella wortheni browni*].
Weske & Terborgh (1974). *Wilson Bull.* **86(2)**: 97 [*Hemispingus parodii*].
Wetmore (1922). *Proc. Biol. Soc. Washington* **35**: 39 [*Zonotrichia capensis mellea*].
Wetmore (1929). *Proc. Biol. Soc. Washington* **42**: 118 [*Coereba flaveola nectarea*].
Wetmore (1929). *Smithsonian Misc. Coll.* **81(13)**: 2 [*Calyptophilus tertius*], 4 [*Loxigilla violacea maurella*].
Wetmore (1941). *Proc. Biol. Soc. Washington* **54**: 209 [*Cyanerpes cyaneus gemmeus*].
Wetmore (1942). *Proc. Biol. Soc. Washington* **55**: 105 [*Saltator atriceps suffuscus*], 108 [*Arremon brunneinucha apertus*].
Wetmore (1946). *Smithsonian Misc. Coll.* **106(16)**: 11 [*Dubusia taeniata carrikeri*], 13 [*Arremon schlegeli fratruelis*].
Wetmore (1949). *Proc. Biol. Soc. Washington* **62**: 161 [*Ammodramus humeralis pallidulus*].
Wetmore (1951). *Smithsonian Misc. Coll.* **117(2)**: 9 [*Zonotrichia capensis orestera*].
Wetmore (1952). *Smithsonian Misc. Coll.* **121(2)**: 29 [*Saltator striatipectus melicus*].
Wetmore (1953). *Smithsonian Misc. Coll.* **122(8)**: 9 [*Sicalis luteola eisenmanni*].
Wetmore (1957). *Smithsonian Misc. Coll.* **134(9)**: 94 [*Thraupis episcopus cumatilis*], 97 [*Ramphocelus dimidiatus arestus*], 98 [*Saltator striatipectus scotinus*], 100 [*Tiaris olivaceus ravidus*], 104 [*Arremonops conirostris viridicatus*].
Wetmore (1959). *Smithsonian Misc. Coll.* **139(2)**: 23 [*Thraupis episcopus caesitia*].
Wetmore (1962). *Smithsonian Misc. Coll.* **145(1)**: 9 [*Tangara icterocephala oresbia*].
Wetmore (1963). *Smithsonian Misc. Coll.* **145(6)**: 9 [*Tangara inornata rava*].
Wetmore (1966). *Oiseau et RFO (Nouv. Sér.)* **35** (Suppl.): 158 [*Heterospingus xanthopygius berliozi*].
Wetmore & Lincoln (1932). *Auk* **49**: 36 [*Phaenicophilus poliocephalus tetraopes*].
Wetmore & Peters, J.L. (1922). *Proc. Biol. Soc. Washington* **35**: 44 [*Zonotrichia capensis choraules*], 45 [*Saltator aurantiirostris nasica*].
Wetmore & Phelps, Jr (1949). *Proc. Biol. Soc. Washington* **39**: 378 [*Haplospiza rustica arcana*].
Wetmore & Phelps, Jr (1953). *Proc. Biol. Soc. Washington* **66**: 13 [*Atlapetes schistaceus fumidus*].
Wied (1821). *Reise nach Brasilien* **2**: 76 [*Thraupis palmarum*], 160 [*Coryphospingus pileatus*], 179 [*Schistochlamys ruficapillus capistrata*].
Wied (1830). *Beitr. Naturgesch. Brasilien* **3(1)**: 453 [*Tangara velia cyanomelas*], 541 [*Porphyrospiza caerulescens*], 579 [*Sporophila plumbea*], 628 [*Tiaris fuliginosus*].
Wied (1831). *Beitr. Naturgesch. Brasilien* **3(2)**: 731 [*Nemosia pileata caerulea*], 1216 [*Agelasticus cyanopus atroolivaceus*].
Wilson, A. (1810). *Amer. Orn.* **2**: 121, plate 16, fig. 2 [*Spizella pusilla*], 123, plate 16, fig. 3 [*Passerella arborea*], 125, plate 16, fig. 4 [*Melospiza melodia*].
Wilson, A. (1811). *Amer. Orn.* **3**: 27, plate 20, fig. 1 [*Piranga ludoviciana*]; **4**: 68, plate 34, fig. 2 [*Ammodramus maritimus*].
Winterbottom (1965). *Cimbebasia* **9** (1964): 73 [*Emberiza tahapisi nivenorum*].
Witherby (1913). *Bull. Brit. Orn. Club* **31(7)**: 74 [*Emberiza yessoensis continentalis*].
Wolters (1939). *Orn. Monatsber.* **47**: 152 [*Sporophila caerulescens hellmayri*].
Woodhouse (1852). *Proc. Acad. Nat. Sci. Philadelphia* **6(4)**: 60 [*Peucaea cassinii*].
Woodhouse (1853). *Proc. Acad. Nat. Sci. Philadelphia* **6(6)** (1852): 202 [*Junco hyemalis caniceps*].
Zarudny (1904). *Orn. Jahrb.* **15(5/6)**: 217 [*Emberiza cineracea semenowi*].
Zarudny (1907). *Orn. Monatsber.* **15**: 83 [*Emberiza schoeniclus korejewi*].
Zarudny (1917). *Mess. Orn.* **8**: 40 [*Emberiza schoeniclus ukrainae*], 41 [*Emberiza schoeniclus incognita*].
Zimmer, J.T. (1924). *Field Mus. Nat. Hist. (Zool. Ser.)* **12(4)**: 61 [*Phrygilus alaudinus bipartitus*], 63 [*Phrygilus fruticeti peruvianus*], 66 [*Cacicus leucoramphus peruvianus*].
Zimmer, J.T. (1929). *Field Mus. Nat. Hist. (Zool. Ser.)* **17(5)**: 205 [*Piranga hepatica albifacies*].
Zimmer, J.T. (1929). *Proc. Biol. Soc. Washington* **42**: 88 [*Phrygilus unicolor inca*], 90 [*Chlorophanes spiza axillaris*], 91 [*Tangara chilensis chlorocorys*], 94 [*Thraupis episcopus caerulea*], 95 [*Ramphocelus melanogaster transitus*].
Zimmer, J.T. (1930). *Field Mus. Nat. Hist. (Zool. Ser.)* **17(7)**: 416 [*Diglossa sittoides decorata*], 452 [*Thlypopsis ornata media*], 460 [*Catamenia analis insignis*].
Zimmer, J.T. (1941). *Proc. Biol. Soc. Washington* **54**: 133 [*Arremon schlegeli canidorsum*].
Zimmer, J.T. (1942). *Amer. Mus. Novit.* **1193**: 4 [*Coereba flaveola dispar*]; **1203**: 4 [*Diglossa albilatera affinis*], 6 [*Diglossa caerulescens mentalis*, *Diglossa cyanea dispar*], 8 [*Cyanerpes cyaneus violaceus*], 10 [*Cyanerpes cyaneus dispar*].
Zimmer, J.T. (1943). *Amer. Mus. Novit.* **1225**: 3 [*Chlorophonia cyanea intensa*], 6 [*Euphonia xanthogaster dilutior*], 19 [*Euphonia mesochrysa media*]; **1245**: 3 [*Tangara punctata annectens*], 5 [*Tangara xanthogastra phelpsi*], 10 [*Tangara parzudakii urubambae*]; **1246**: 1 [*Tangara ruficervix amabilis*], 6 [*Tangara gyrola parva*].
Zimmer, J.T. (1943). *Proc. Biol. Soc. Washington* **56**: 33 [*Saltator cinctus*].
Zimmer, J.T. (1944). *Amer. Mus. Novit.* **1262**: 1 [*Iridosornis rufivertex subsimilis*], 10 [*Thraupis episcopus mediana*], 13 [*Thraupis episcopus urubambae*], 17 [*Thraupis cyanocephala annectens*], 20 [*Thraupis bonariensis composita*].
Zimmer, J.T. (1945). *Amer. Mus. Novit.* **1304**: 18 [*Tachyphonus cristatus fallax*, *Tachyphonus cristatus pallidigula*].
Zimmer, J.T. (1946). *J. Washington Acad. Sci.* **36**: 389 [*Chlorospingus ophthalmicus eminens*].
Zimmer, J.T. (1947). *Amer. Mus. Novit.* **1345**: 4 [*Nemosia pileata interna*], 5 [*Nemosia pileata surinamensis*], 9 [*Hemithraupis guira amazonica*], 10 [*Hemithraupis guira boliviana*], 13 [*Hemithraupis ruficapilla bahiae*], 15 [*Hemithraupis flavicollis sororia*], 21 [*Piranga leucoptera venezuelae*]; **1367**: 4 [*Chlorospingus ophthalmicus macarenae*], 8 [*Chlorospingus parvirostris medianus*], 11 [*Chlorospingus canigularis paulus*], 13 [*Hemispingus superciliaris maculifrons*], 15 [*Hemispingus superciliaris insignis*, *Hemispingus superciliaris urubambae*], 20 [*Chlorornis riefferii dilutus*], 21 [*Chlorornis riefferii celatus*], 24 [*Schistochlamys melanopis amazonica*].
Zimmer, J.T. (1952). *J. Washington Acad. Sci.* **42**: 103 [*Incaspiza ortizi*].
Zimmer, J.T. & Phelps, Sr (1944). *Amer. Mus. Novit.* **1270**: 15 [*Diglossa major disjuncta*].
Zimmer, J.T. & Phelps, Sr (1945). *Amer. Mus. Novit.* **1274**: 7 [*Tachyphonus cristatus orinocensis*], 9 [*Mitrospingus oleagineus obscuripectus*].
Zimmer, J.T. & Phelps, Sr (1946). *Amer. Mus. Novit.* **1312**: 20 [*Coereba flaveola bolivari*], 21 [*Atlapetes semirufus albigula*].
Zimmer, J.T. & Phelps, Sr (1949). *Amer. Mus. Novit.* **1395**: 8 [*Ammodramus aurifrons tenebrosus*].
Zimmer, J.T. & Phelps, Sr (1952). *Amer. Mus. Novit.* **1603**: 1 [*Diglossa cyanea tovarensis*].
Zotta (1937). *Hornero* **6**: 449 [*Sturnella loyca catamarcana*].

GENERAL LIST OF REFERENCES

Abbott, I. (1978). The significance of morphological variation in the finch species on Gough, Inaccessible and Nightingale Islands, South Atlantic Ocean. *J. Zool., London* **184**: 119–125.

Abbott, I., Abbott, L.K. & Grant, P.R. (1977). Comparative ecology of Galápagos ground finches (*Geospiza* Gould): evaluation of the importance of floristic diversity and interspecific competition. *Ecol. Monogr.* **47**: 151–184.

Abe, L.M. (1996). Registro de *Psarocolius decumanus* Pallas, 1969 [*sic*: (Pallas, 1769)], no Parque Estadual de Campinhos, Tunas do Paraná, PR (Aves: Passeriformes, Icteridae). *Atualidades Orn.* **74(11/12)**: 12. In Portuguese.

Abe, M. (1968). [Notes on the zoogeographical distribution of the Snow Bunting, *Plectrophenax nivalis pallidior* Salmonsen in Japan]. *Tori* **18**: 252–259. In Japanese.

Able, K.P. (1990). Comparison of vanishing bearings, orientation directions and ringing recoveries of spring migrant White-throated Sparrows (*Zonotrichia albicollis*). *J. Orn.* **131(3)**: 317–323.

Able, K.P., Bingman, V.P., Kerlinger, P. & Gergits, W. (1982). Field studies of avian nocturnal migratory orientation. 2. Experimental manipulation of orientation in White-throated Sparrows (*Zonotrichia albicollis*) released aloft. *Anim. Behav.* **30(3)**: 768–773.

Abzhanov, A. ed. (2010). Darwin's Galápagos finches in modern evolutionary biology: papers of a theme issue. *Phil. Trans. Roy. Soc. London (Ser. B)* **1543**: 999–1147.

Abzhanov, A., Protas, M., Grant, B.R., Grant, P.R. & Tabin, C.J. (2004). Bmp4 and morphological variation of beaks in Darwin's finches. *Science (Washington, D.C.)* **305**: 1462–1465.

Acosta, M. & Mugica, L. (1990). Evidencia reproductiva del Pájaro Vaquero en el Jardín Botánico Nacional de La Habana. *Rev. Biol. (Cuba)* **4**: 81–82. In Spanish.

Acosta, M., Mugica, L. & Rodríguez, A. (2003). Unusual distribution of Western Stripe-headed Tanager (*Spindalis zena*). *J. Caribb. Orn.* **16(1)**: 62.

Acosta Broche, L. (2005). First record of leucism at Yellow-faced Grassquit in Cuba. *Huitzil* **6(2)**: 14–15.

Acosta Broche, L. (2007). Three cases of leucism in *Tiaris olivaceus*: a rare coincidence in the avifauna of Camaguey, Cuba. *Orn. Colombiana* **5**, 81–82.

Adams, A.A.Y., Skagen, S.K. & Adams, R.D. (2001). Movements and survival of Lark Bunting fledglings. *Condor* **103(3)**: 643–647.

Adams, A.A.Y., Skagen, S.K. & Savidge, J.A. (2007). Population-specific demographic estimates provide insights into declines of Lark Buntings (*Calamospiza melanocorys*). *Auk* **124(2)**: 578–593.

Adams, J.S., Knight, R.L., McEwen, L.C. & George, T.L. (1994). Survival and growth of nestling Vesper Sparrows exposed to experimental food reductions. *Condor* **96(3)**: 739–748.

d'Agincourt, L.G. & Falls, J.B. (1983). Variation of repertoire use in the Eastern Meadowlark, *Sturnella magna*. *Can. J. Zool.* **61(5)**: 1086–1093.

Agostani, G. (2008). Ogsservazione di Zigolo Boschereccio, *Emberiza rustica*, in canto in Alta Val Chiavenna (Sondrio). *Riv. Ital. Orn.* **78(1)**: 47–48. In Italian.

Agostini, K. (2004). *Ecologia da Polinização de* Mucuna *sp. nov. (Fabaceae) no Litoral Norte de São Paulo, Brasil*. PhD thesis, Universidade Estadual de Campinas, Campinas, Brazil. 97 pp. In Portuguese. [Portuguese and English summaries: *Biota Neotropica* **4(2)**: 263].

Agostini, K. & Sazima, M. (2006). Bird pollination of explosive flowers while foraging for nectar and caterpillars. *Biotropica* **38(5)**: 674–678.

Agreda, A., Krabbe, N. & Rodríguez, O. (1999). Pale-headed Brush-finch *Atlapetes pallidiceps* is not extinct. *Cotinga* **11**: 50–54.

Aguilar, T.M., Dias, R.I., Oliveira, A.C. & Macedo, R.H. (2008). Nest-site selection by Blue-black Grassquits in a Neotropical savanna: do choices influence nest success? *J. Field Orn.* **79(1)**: 24–31.

Ahlering, M.A., Johnson, D.H. & Faaborg, J. (2006). Conspecific attraction in a grassland bird, the Baird's Sparrow. *J. Field Orn.* **77(4)**: 365–371.

Ahlering, M.A., Johnson, D.H. & Faaborg, J. (2009). Factors associated with arrival densities of Grasshopper Sparrow (*Ammodramus savannarum*) and Baird's Sparrow (*A. bairdii*) in the upper Great Plains. *Auk* **126(4)**: 799–808.

Ahola, M.P., Laaksonen, T., Eeva, T. & Lehikoinen, E. (2007). Climate change can alter competitive relationships between resident and migratory birds. *J. Anim. Ecol.* **76**: 1045–1052.

Ahola, M.P., Laaksonen, T., Sippola, K., Eeva, T., Rainio, K. & Lehikoinen, E. (2004). Variation in climate warming along the migration route uncouples arrival and breeding dates. *Global Change Biol.* **10**: 1610–1617.

Airola, D.A. (1986). Brown-headed Cowbird parasitism & habitat disturbance in the Sierra Nevada. *J. Wildl. Management* **50**: 571–575.

Akashi, M. & Yamagishi, S. (1987). [Analysis of song organisation and singing activity in the Siberian Meadow Bunting *Emberiza cioides*]. *Jap. J. Orn.* **36(1)**: 19–45. In Japanese.

Akcakaya, H.R., Franklin, J., Syphard, A.D. & Stephenson, J.R. (2005). Viability of Bell's Sage Sparrow (*Amphispiza belli* ssp. *belli*): altered fire regimes. *Ecol. Appl.* **15(2)**: 521–531.

Akcay, C., Wood, W.E., Searcy, W.A., Templeton, C.N., Campbell, S.E. & Beecher, M.D. (2009). Good neighbour, bad neighbour: Song Sparrows retaliate against aggressive rivals. *Anim. Behav.* **78(1)**: 97–102.

Akiko, F. (1996). Retention time of seeds in bird guts: costs and benefits for fruiting plants and frugivorous birds. *Plant Species Biol.* **11(2/3)**: 141–147.

Alabarce, E.A. (1987). Notas sobre la biología de algunos Passeriformes del noroeste argentino. Part 1. *Acta Zool. Lilloana* **39(1)**: 23–27. In Spanish with English summary.

Alabarce, E.A. & Lucero, M.M. (1977). Observaciones sobre el paso de migraciones en el alto Pilcomayo. *Hornero* **11**: 410–412. In Spanish.

Albano, C. (2004). Audio recordings of *Schistoclamys ruficapillus* from Araripe National Forest, Crato, Ceará, Brazil. Xeno-Canto XC5211. Unpubl.

Albano, C. (2006). Audio recordings of *Conirostrum speciosum* from Parambu, Ceará, Brazil. Xeno-Canto XC5553. Unpubl.

Albegger, E. (2007). Erste Brutnachweise der Zaunammer (*Emberiza cirlus*) für Kärnten. *Carinthia* **117**: 323–326. In German with English summary.

Albers, P.H. (1978). Habitat selection by breeding Red-winged Blackbirds. *Wilson Bull.* **90**: 619–634.

Albrecht, D.J. & Oring, L.W. (1995). Song in Chipping Sparrows, *Spizella passerina*: structure and function. *Anim. Behav.* **50(5)**: 1233–1241.

Alcock, J. (1972). The evolution of the use of tools by feeding animals. *Evolution* **26(3)**: 464–473.

Alcock, J. (1973). Cues used in searching for food by Red-winged Blackbirds. Parts 1/2. *Behaviour* **46**: 174–188.

Alden, P. (1969). *Finding the Birds in Western Mexico*. University of Arizona Press, Tucson, Arizona.

Alderfer, J. ed. (2006). *National Geographic Complete Birds of North America*. National Geographic Society, Washington, D.C.

Alderson, G.W., Gibbs, H.L. & Sealy, S.G. (1999). Parentage and kinship studies in an obligate brood parasitic bird, the Brown-headed Cowbird (*Molothrus ater*), using microsatellite DNA markers. *J. Heredity* **90**: 182–190.

Alderton, C.C. (1961). The breeding cycle of the Yellow-bellied Seedeater in Panama. *Condor* **63**: 390–398.

Alderton, C.G. (1963). The breeding behavior of the Blue-black Grassquit. *Condor* **65**: 154–162.

Aldrich, J.W. (1943). A new fox sparrow from the northwestern United States. *Proc. Biol. Soc. Washington* **56**: 163–166.

Aldrich, J.W. (1948). The breeding distribution of the Dickcissel. *Audubon Field Notes* **2**: 12–13.

Aldrich, J.W. (1984). Ecogeographical variation in size and proportions of Song Sparrows (*Melospiza melodia*). *Orn. Monogr.* **35**: 1–134.

Aldrovandi, U. (1600). De *Coccothrauste indica cristata*. Capitel XXI in: Aldrovandi, U. (1600). *Ornithologiae hoc Est, de Avibus Historiae*. Tomus Alter. Franciscus de Franciscis Senensem, Bononia [Bologna]. In Latin.

Alessio, V.G., Beltzer, A.H., Lajmanovich, R.C. & Quiroga, M.A. (2005). Ecología alimentaria de algunas especies de Passeriformes (Furnariidae, Tyrannidae, Icteridae y Emberizidae): consideraciones sobre algunos aspectos del nicho ecológico. *Inst. Sup. Correl. Geol. Misc.* **14**: 441–482. In Spanish with English summary.

Ali, S. (1949). *Indian Hill Birds*. Oxford University Press, Bombay, India.

Ali, S. (1962). *The Birds of Sikkim*. Oxford University Press, London & Delhi.

Ali, S. & Ripley, S.D. (1974). *Handbook of the Birds of India and Pakistan, together with those of Nepal, Sikkim, Bhutan and Ceylon*. Vol. 10. Oxford University Press, Bombay.

Aliabadian, M., Kaboli, M., Nijman, V. & Vences, M. (2009). Molecular identification of birds: performance of distance-based DNA barcoding in three genes to delimit parapatric species. *PLoS One* **4(1)**: e4119.

Alker, P.J. (1997). Black-faced Bunting: new to Britain and Ireland. *British Birds* **90(12)**: 549–561.

Allaire, P.N. (1972). Field Sparrow uses abandoned nest for August brood. *Auk* **89(4)**: 886.

Allen, E.S. & Omland, K.E. (2003). Novel intron phylogeny supports plumage convergence in orioles (*Icterus*). *Auk* **120(4)**: 961–969.

Allen, J.A. (1891). On a collection of birds from Chapada, Matto Grosso, Brazil, made by Mr. Herbert H. Smith. Part 1. Oscines. *Bull. Amer. Mus. Nat. Hist.* **3**: 337–380.

Allen, J.A. (1905). Supplementary notes on birds collected in the Santa Marta District, Colombia, by Herbert H. Smith, with descriptions of nests and eggs. *Bull. Amer. Mus. Nat. Hist.* **21**: 275–295.

Allen, R. (1961). *Birds of the Caribbean*. The Viking Press, New York.

Allen, R. (1967). A Lincoln's Sparrow nest. *Mass. Audubon* **51**: 178–184.

Almario, B.S., Marra, P.P., Gates, J.E. & Mitchell, L. (2009). Effects of prescribed fire on depredation rates of natural and artificial Seaside Sparrow nests. *Wilson J. Orn.* **121(4)**: 770–777.

Almeida, E.M., Costa, P.F., Buckeridge, M.S. & Alves, M.A.S. (2006). Potential bird dispersers of *Psychotria* in a [*sic*] area of Atlantic forest on Ilha Grande, RJ, southeastern Brazil: a biochemical analysis of the fruits. *Braz. J. Biol.* **66(1a)**: 1–8.

Almeida, J.B. & Macedo, R.H.F. (2001). Lek-like mating system of the monogamous Blue-black Grassquit. *Auk* **118(2)**: 404–411.

Almeida Accordi, I. & Barcellos-Silveira, A. (2005). Distribuição atual do Cavalaria *Paroaria capitata* (Passeriformes: Emberizidae) no Rio Grande do Sul, extensão natural de distribuição ou ação humana? *Atualidades Orn.* **123**: 5–6. In Portuguese.

Almonte, J. & Fernández, E. (2002). Eastern *Calyptophilus frugivorus* and Western Chat-tanagers *C. tertius*. *Cotinga* **17**: 95–96.

Alsop, F.J. (1978). Savannah Sparrow (*Passerculus sandwichensis*) nesting in upper east Tennessee. *Migrant* **49(1)**: 1–4.

Alsop, F.J. (1979). Mantids selected as prey by Blue Grosbeaks. *Wilson Bull.* **91**: 131–132.

Alström, P. & Olsson, U. (1994). Identification of Pallas's Reed Bunting. *Birding World* **7(1)**: 15–20.

Alström, P., Olsson, U., Lei Fumin, Wang Haitao, Gao Wei & Sundberg, P. (2008). Phylogeny and classification of the Old World Emberizini (Aves, Passeriformes). *Mol. Phylogen. Evol.* **47**: 960–973.

Alvarado, Q., Ghesselle, M. & Biamonte, E. (2003). Expansión del ámbito de distribución del Cacique Amarillo *Icterus dominicensis* (Aves: Icteridae) en Costa Rica. *Brenesia* **59/60**: 93. In Spanish.

Álvarez del Toro, M. (1950). A Summer Tanager, *Piranga rubra*, annihilates a wasp nest. *Auk* **67**: 397.

Álvarez del Toro, M. (1952). Contribución al conocimiento de la oología y nidología de las aves chiapanecas. *Ateneo (Tuxtla Gutiérrez)* **4**: 11–21. In Spanish.

Álvarez del Toro, M. (1964). *Lista de las Aves de Chiapas*. Instituto de Ciencias y Artes de Chiapas, Tuxtla Gutiérrez, Mexico. In Spanish.

Álvarez-Rebolledo, M. & Córdoba-Córdoba, S. (2002). *Guía Sonora de las Aves del Departamento de Caldas*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyeva, Colombia. In Spanish.

Álvarez-Rebolledo, M., Caro, V., Laverde, O. & Cuervo, A.M. (2007). *Guía Sonora de las Aves de los Andes Colombianos*. CD 6/7. Instituto Alexander von Humboldt & Cornell Laboratory of Ornithology, Villa de Leyeva & Ithaca. In Spanish.

Álvarez-Rebolledo, M., Córdoba-Córdoba, S. & López, J.A. (2003). *Guía Sonora de las Aves del Departamento del Valle del Cauca*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyeva, Colombia. In Spanish.

Alves, A.C.F., de Vasconcelos, M.F. & Loures-Ribeiro, A. (2009). Novo registro de *Embernagra longicauda* na Serra do Jacroá, leste de Minas Gerais, reforça a hipótese de conexões paleoecológicas entre as montanhas do sudeste do Brasil. *Atualidades Orn.* **148**: 10–11. In Portuguese.

Alves, M.A.S. (1990). Social system and helping behavior in the White-banded Tanager (*Neothraupis fasciata*). *Condor* **92(2)**: 470–474.

Alves, M.A.S. (1991). Dieta e táticas de forrageamento de *Neothraupis fasciata* em cerrado no Distrito Federal, Brasil (Passeriformes: Emberizidae). *Ararajuba* **2**: 25–29. In Portuguese.

Alves, M.A.S. & Cavalcanti, R.B. (1996). Sentinel behavior, seasonality, and the structure of bird flocks in a Brazilian savanna. *Orn. Neotropical* **7(1)**: 43–51.

Alves, R., Nogueira, E., Araujo, H. & Brooks, S. (2010). Bird-keeping in the Caatinga, NE Brazil. *Human Ecology* **38(1)**: 147–156.

Amadon, D. (1967). Galápagos finches grooming marine iguanas. *Condor* **69**: 311.

Amadon, D. & Eckelberry, D.R. (1955). Observations on Mexican birds. *Condor* **57(2)**: 65–80.

Amaral, P.P. & Ragusa-Netto, J. (2008). Bird mixed-flocks and nuclear species in a *Tecoma* savanna in the Pantanal. *Braz. J. Biol.* **68(3)**: 511–518.

Amaya-Espinel, J.D. & Renjifo, L.M. (2002). *Macroagelaius subalaris*. Pp. 470–472 in: Renjifo *et al.* (2002).

Ambrosini, R., Rubolini, D., Møller, A.P., and 7 other authors (2011). Climate change and the long-term northward shift in the African wintering range of Barn Swallows *Hirundo rustica*. MS.

Ammer, F.K. & Capp, M.S. (1999). Song versatility and social context in the Bobolink. *Condor* **101**: 686–688.

Ammon, E.M. (1995). Lincoln's Sparrow (*Melospiza lincolnii*). No. **191** in: Poole, A. & Gill, F. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Amorim, J.F. & Piacentini, V.Q. (2007). New sites for the distributional range of three Passeriformes in southern Brazil. Novas áreas de ocorrência de três Passeriformes no sul do Brasil. *Lundiana* **8(1)**: 69–73. In Portuguese with English summary.

Ananin, A.A. & Ananina, T.L. (1983). [Breeding success of Yellow-backed Wagtail and Yellow-breasted Bunting]. Pp. 163–164 in: Bolotnikov, A.M., Irisov, N.L., Kuchin, A.P., Malkov, N.P., Moskvitin, S.S., Ravkin, Y.S. & Smekhova, G.E. eds. (1983). [*Birds of Siberia. Papers & Theses from the Second Siberian Ornithological Conference*]. Akademiya nauk SSSR, Gorno-Altaisk. In Russian.

Anderegg, W.R.L., Prall, J.W., Harold, J. & Schneider, S.H. (2010). Expert credibility in climate change. *Proc. Natl. Acad. Sci. USA* **107**: 12107–12109.

Anderson, A.H. (1965). Notes on the behavior of the Rufous-winged Sparrow. *Condor* **67**: 188–190.

Anderson, A.H. & Anderson, A. (1946). Late nesting of the Pyrrhuloxia at Tucson, Arizona. *Condor* **48**: 246.

Anderson, B.W. & Daugherty, R.J. (1974). Characteristics and reproductive biology of grosbeaks (*Pheucticus*) in the hybrid zone in South Dakota. *Wilson Bull.* **86(1)**: 1–11.

Anderson, D.L., Bonta, M. & Thorn, P. (1998). New and noteworthy bird records from Honduras. *Bull. Brit. Orn. Club* **118(3)**: 178–183.

Anderson, J.F., Johnson, R.C., Magnarelli, L.A. & Hyde, F.W. (1986). Involvement of birds in the epidemiology of the Lyme disease agent *Borrelia burgdorferi*. *Infect. Immun.* **51(2)**: 394–396.

Anderson, J.R. & Merritt, R.W. (1977). The impact of foraging Meadowlarks, *Sturnella neglecta*, on the degradation of cattle dung pads. *J. Appl. Ecol.* **14**: 355–362.

Anderson, M.E. & Conner, R.N. (1985). Northern Cardinal song in three forest habitats in eastern Texas. *Wilson Bull.* **97**: 436–449.

Anderson, R.C. (2009). Operant conditioning and copulation solicitation display assays reveal a stable preference for local song by female Swamp Sparrows *Melospiza georgiana*. *Behav. Ecol. Sociobiol.* **64(2)**: 215–223.

Anderson, R.C., Searcy, W.A. & Nowicki, S. (2005). Partial song matching in an eastern population of Song Sparrows, *Melospiza melodia*. *Anim. Behav.* **69(1)**: 189–196.

Anderson, R.C., Searcy, W.A. & Nowicki, S. (2008). Testing the function of song-matching in birds: responses of eastern male Song Sparrows *Melospiza melodia* to partial song-matching. *Behaviour* **145(3)**: 347–363.

Andersson, G., Gerell, R., Kallander, H. & Larsson, T. (1968). Antecknings om dvärgsparvens (*Emberiza pusilla*) biotopval. *Vår Fågelvärld* **27**: 136–141. In Swedish.

de Andrade, M.A. & de Andrade, M.V.G. (1997). A Cigarra-bambu (*Haplospiza unicolor*). *Atualidades Orn.* **78**: 11. In Portuguese.

Andrle, R.F. (1967). Birds of the Sierra de Tuxtla in Veracruz, Mexico. *Wilson Bull.* **79**: 163–187.

Angehr, G.R., Christian, D.G. & Aparicio, K.M. (2004). A survey of the Serrania de Jungurudó, an isolated mountain range in eastern Panama. *Bull. Brit. Orn. Club* **124(1)**: 51–62.

dos Anjos, L. & Schuchmann, K.L. (1999). Notes on the reproductive behaviour and the nest of the Chestnut-bellied Euphonia (*Euphonia pectoralis*). *Bull. Brit. Orn. Club* **119(2)**: 133–135.

Ankney, C.D. & Scott, D.M. (1980). Changes in nutrient reserves and diet of breeding Brown-headed Cowbirds. *Auk* **97**: 684–696.

Ankney, C.D. & Scott, D.M. (1982). On the mating system of Brown-headed Cowbirds. *Wilson Bull.* **94**: 260–268.

Anon. (1983). *Check-list of North American Birds*. 6th edition. American Ornithologists' Union, Washington, D.C.

Anon. (1986). Eine neue Tangarenart in Süd-Peru entdeckt. *Trochilus* **7(3)**: 84. In German.

Anon. (1993). Some canaries and buntings. *Honeyguide* **39**: 54.

Anon. (1995). Recent reports: The Gambia. *Bull. Afr. Bird Club* **2**: 123–124.

Anon. (1998). *Check-list of North American Birds*. 7th edition. American Ornithologists' Union & University Press of Kansas, Washington, D.C. & Lawrence.

Anon. (1999). *Field Guide to the Birds of North America*. National Geographic Society, Washington, D.C.

Anon. (2000). *Aves de la Sabana de Bogotá: Guía de Campo*. Asociación Bogotana de Ornitología, Bogotá, Colombia. In Spanish.

Anon. (2002). Interesting bird observations at Phinda. *CC. Afr. Ecol. J.* **4**: 179–181.

Anon. (2003). Florida's breeding bird atlas: a collaborative study of Florida's birdlife. Florida Fish and Wildlife Conservation Commission. URL: http://www.myfwc.com/bba (download 25 August 2010).

Anon. (2004). *Proposal for the Inclusion of* Passerina ciris *in Appendix II, in Accordance with Article II, Paragraph 2(a), of the Convention and Resolution Conf. 9.24 (Rev. CoP12), Annex 2a, Paragraph B(i)*. United State Fish & Wildlife Service & Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Geneva, Switzerland.

Anon. (2007a). *Actualización de la Lista Oficial de las Aves de Costa Rica 2007* [Comité Científico, Asociación Ornitológica de Costa Rica]. *Zeledonia* **11(2)**: 26–34. In Spanish.

Anon. (2007b). The 2007 Audubon WatchList. National Audubon Society. URL: http://birds.audubon.org/2007-audubon-watchlist (download 20 December 2010).

Anon. (2007c). *Climate Change 2007. Impacts, Adaptation and Vulnerability*. Working Group II contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge.

Anon. (2008). Record glacier thinning means no time to waste on agreeing new international climate regime. UN Environment Programme, New York. URL: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=530&ArticleID=5760 (download 20 July 2011).

Anon. (2009a). Reserva Natural la Planada, Colombia. Important Bird Area factsheets, BirdLife International, Cambridge, UK. URL: http://www.birdlife.org/datazone/sites/index.html (download 13 May 2010).

Anon. (2009b). Fiftieth supplement to the American Ornithologists' Union check-list of North American Birds. *Auk* **126(3)**: 705–714.

Anon. (2010a). Globally threatened birds – family Thraupidae (tanagers). Species factsheets, BirdLife International, Cambridge, UK. URL: http://www.birdlife.org/datazone/species/index.html (download 10 October 2010).

Anon. (2010b). Globally threatened birds – family Cardinalidae (grosbeaks, saltators and allies). Species factsheets, BirdLife International, Cambridge, UK, URL: http://www.birdlife.org/datazone/species/index.html (download 28 July 2010).

Anon. (2010c). Globally threatened birds – family Emberizidae (buntings, American sparrows and allies). Species factsheets, BirdLife International, Cambridge, UK, URL: http://www.birdlife.org/datazone/species/index.html (download 28 July 2010).

Anon. (2010d). Globally threatened birds – family Icteridae (New World blackbirds). Species factsheets, BirdLife International, Cambridge, UK, URL: http://www.birdlife.org/datazone/species/index.html (download 5 December 2010).

Anon. (2010e). El Rey del Bosque. URL: http://www.minifauna.com/2010/01/06/el-rey-del-bosque (download 24 August 2010). In Spanish.

Anon. (2010f). *Passerina rositae* (Lawrence, 1874). European *Passerina* Study Group. URL: http://www.passerina.eu/e-rositea.htm (download 14 August 2010).

Anon. (2010g). Dickcissel conservation in Venezuela. George Miksch Sutton Avian Research Center. URL: http://www.suttoncenter.org/pages/dickcissel_conservation_in_venezuela (download 16 August 2010).

Anon. (2010h). Dickcissel (*Spiza americana*). National Audubon Society. URL: http://audubon2.org/watchlist/viewSpecies.jsp?id=72 (download 16 August 2010).

Anon. (2010i). *Passerina ciris* – Painted Bunting. IUCN Red List of Threatened Species. Version 2010.4. URL: http://www.iucnredlist.org/apps/redlist/details/150339/0 (download 20 December 2010).

Anon. (2010j). *Passerina rositae* – Rose-bellied Bunting. IUCN Red List of Threatened Species. Version 2010.4. URL: http://www.iucnredlist.org/apps/redlist/details/150340/0 (download 20 December 2010).

Anon. (2010k). *Saltator cinctus* – Masked Saltator. IUCN Red List of Threatened Species. Version 2010.4. URL: http://www.iucnredlist.org/apps/redlist/details/150327/0 (download 20 December 2010).

Anon. (2010m). *Saltator rufiventris* – Rufous-bellied Saltator. IUCN Red List of Threatened Species. Version 2010.4. URL: http://www.iucnredlist.org/apps/redlist/details/150329/0 (download 20 December 2010).

Anon. (2011a). Recently recategorised species. BirdLife International, Cambridge, UK. URL: http://www.birdlife.org/action/science/species/global_species_programme/whats_new.html (download 15 June 2011).

Anon. (2011b). National Weather Service – Environmental Modeling Center. URL: http://www.emc.ncep.noaa.gov/ (download 28 July 2011).

Antevs, A. (1947). Towhee helps Cardinals feed their fledglings. *Condor* **49**: 209.

Anthony, A.W. (1906). Where does the Large-billed Sparrow spend the summer? *Auk* **23**: 149–152.

Antoniazzi, L. (2007). Registro de Cachilo Corona Castaña (*Aimophila strigiceps*) y Loica Pampeana (*Sturnella defilippi*) en el sudeste de Corrientes, Argentina. *Nuestras Aves* **52**: 32–33. In Spanish.

Antonov, A., Stokke, B.G., Moksnes, A. & Rosfakt, E. (2008). Unusually high losses to nest collapse in Black-headed Buntings *Emberiza melanocephala* nesting on a preferred plant species. *Bird Study* **55(2)**: 233–235.

Anufriev, V.M. & Vartapetov, L.G. (1998). [The case of early arrival of the Yellow-breasted Bunting (*Emberiza aureola*) to northern taiga of Taz River area, West Siberia]. *Ornitologiya* **28**: 236. In Russian.

Aono, Y. & Kazui, K. (2008). Phenological data series of cherry tree flowering in Kyoto, Japan, and its application to reconstruction of springtime temperatures since the 9th century. *Int. J. Climatol.* **28**: 905–914.

Aplin, O.V. (1894). On the birds of Uruguay. *Ibis* **Ser. 6, no. 6**: 149–215.

Aquila, C., Almendinger, T. & Sileo, M. (2007). Breeding Henslow's Sparrows at Duke Farms, Hillsborough, New Jersey. *New Jersey Birds* **33(3)**: 38–40.

Araújo, M.B. & New, M. (2007). Ensemble forecasting of species distributions. *Trends Ecol. Evol.* **22**: 42–47.

Araújo, M.B., Pearson, R.G., Thuiller, W. & Erhard, M. (2005). Validation of species-climate impact models under climate change. *Global Change Biol.* **11**: 1504–1513.

Aravena, R.O. (1928). Notas sobre la alimentación de las aves. *Hornero* **4**: 153–166. In Spanish.

Arbeláez-Cortés, E. & Baena-Tovar, S. (2006). Primer registro del Azulejo de Wetmore (*Buthraupis wetmorei*, Thraupinae) para El Quindío, Andes centrales de Colombia. *Orn. Colombiana* **4**: 78–81. In Spanish.

Arbour, D. & Wood, D.R. (2006). Henslow's Sparrow wintering in McCurtain County, Oklahoma. *Bull. Okla. Orn. Soc.* **39(4)**: 25–26.

Arcese, P., Sogge, M.K., Marr, A.B. & Patten, M.A. (2002). Song Sparrow (*Melospiza melodia*). No. **704** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.

Archer, G.F. & Godman, E.M. (1961). *The Birds of British Somaliland and the Gulf of Aden – Their Life Histories, Breeding Habits, and Eggs*. Vol. 4. Oliver and Boyd, Edinburgh & London.

Arcos-Torres, A. & Solano-Ugalde, A. (2007). Notas sobre la anidación de tres especies del género *Tangara* (Thraupidae: Aves) en el noroccidente de Ecuador. *Bol. Soc. Antioqueña Orn.* **17(2)**: 133–137. In Spanish with English summary.

Arellano-Guillermo, A., Glendinning, J.I., Anderson, J.B. & Brower, L.P. (1993). Interspecific comparisons of the foraging dynamics of Black-backed Orioles and Black-headed Grosbeaks on overwintering monarch butterflies in Mexico. Pp. 315–322 in: Malcom, S.B. & Zalucki, M.P. eds. (1993). *Biology and Conservation of the Monarch Butterfly*. Science Series **38**. Publications of the Natural History Museum of Los Angeles County, Los Angeles, California. xi, 418 pp.

Arendt, W.J. & Tórrez, M.A. (2009). First documented record of Red-breasted Blackbird *Sturnella militaris* in Nicaragua. *Cotinga* **31**: 119–120.

Arendt, W.J. & Vargas Mora, T.A. (1984). Range expansion of the Shiny Cowbird in the Dominican Republic. *J. Field Orn.* **55**: 104–107.

Arendt, W.J., Faaborg, J., Wallace, G.E. & Garrido, O.H. (2004). Biometrics of birds throughout the Greater Caribbean Basin. *Proc. West. Found. Vert. Zool.* **8(1)**: 1–33, CD-ROM.

Arendt, W.J., Gibbons, D.W. & Gray, G. (1999). Status of the volcanically threatened Montserrat Oriole *Icterus oberi* and other forest birds in Montserrat, West Indies. *Bird Conserv. Int.* **9**: 351–372.

Areta, J.I. (2008). The Entre Ríos Seedeater (*Sporophila zelichi*): a species that never was. *J. Field Orn.* **79**: 352–363.

Areta, J.I. (2009a). Paedomorphosis in *Sporophila* seedeaters. *Bull. Brit. Orn. Club* **129(2)**: 98–103.

Areta, J.I. (2009b). Sound recordings of Venezuelan icterids. Unpubl.

Areta, J.I. & Almirón, D. (2009). Comentarios sobre la presencia, voces y alimentación del Corbatita Overo *Sporophila lineola* a orillas de los ríos Paraná e Iguazú en Misiones, Argentina. *Cotinga* **31**: 59–62. In Spanish with English summary.

Areta, J.I. & Bodrati, A. (2008). Comportamiento, identificación y relación con la floración de cañas del Espiguero Negro (*Tiaris fuliginosa*) en Misiones, Argentina. *Hornero* **23(2)**: 77–86. In Spanish with English summary.

Areta, J.I. & Bodrati, A. (2010). Un sistema migratorio longitudinal dentro de la selva atlántica: movimientos estacionales y taxonomía del Tangará Cabeza Celeste (*Euphonia cyanocephala*) en Misiones (Argentina) y Paraguay. *Orn. Neotropical* **21(1)**: 71–86. In Spanish with English summary.

Areta, J.I. & Repenning, M. (2011a). Systematics of the Tawny-bellied Seedeater (*Sporophila hypoxantha*). I. Geographic variation, ecology, and evolution of vocalizations. *Condor* **113(3)**: 664–677.
Areta, J.I. & Repenning, M. (2011b). Systematics of the Tawny-bellied Seedeater (*Sporophila hypoxantha*). II. Taxonomy and evolutionary implications of the existence of a new tawny morph. *Condor* **113(3)**: 678–690.
Areta, J.I., Bodrati, A. & Cockle, K. (2009). Specialization on guadua bamboo seeds by three bird species in the Atlantic forest of Argentina. *Biotropica* **41**: 66–73.
Areta, J.I., Noriega, J.I., Pagano, L. & Roesler, I. (2011). Unravelling the ecological radiation of the capuchinos: systematics of Dark-throated Seedeater *Sporophila ruficollis* and description of a new dark-collared form. *Bull. Brit. Orn. Club* **131(1)**: 4–23.
Argel-de-Oliveira, M.M. & Figueiredo, R.A. (1996). Aves que visitam uma figueira isolada em ambiente aberto, Espírito Santo, Brasil. *Iheringia (Sér. Zool.)* **80**: 127–134. In Portuguese.
Arguedas-Negrini, N. (2001). Distribution, habitat and behavior of Grasshopper Sparrows, *Ammodramus savannarum* (Passeriformes: Emberizidae) in northeastern Nicaragua. *Rev. Biol. Trop. (Univ. Costa Rica)* **49(2)**: 703–708.
Arizaga, J., Alonso, D., Mendiburu, A. & Vilches, A. (2008). Winter roosts of Yellowhammers *Emberiza citrinella* in northern Iberia: population dynamics and biometry. *Rev. Catalana Orn.* **23**: 18–26.
Armani, G.C. (1983). *Guide des Passeraux Granivores*. Delachoix et Niestlé, Neuchâtel-Paris. In French.
Armani, G.C. (1985). *Guide des Passereaux Granivores. Embérizinés*. Société Nouvelle des Editions Boubée, Paris. In French.
Armstrong, T.A. (1995). Patterns of vocalization use by female Red-winged Blackbirds (Aves: Emberizidae, Icterini): variation and context. *Ethology* **100**: 331–351.
Arnold, K.A. (1980). Rufous-capped Warbler and White-collared Seedeater from Webb County, Texas. *Bull. Texas Orn. Soc.* **13(1)**: 27.
Arnold, K.A. (1983). *Quiscalus mexicanus* (Zanate, Great-tailed Grackle). Pp. 601–603 in: Janzen, D.H. ed. (1983). *Costa Rican Natural History*. University of Chicago Press, Chicago, Illinois.
Arnold, T.W. (1992). Variation in laying date, clutch size, egg size, and egg composition of Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*): a supplemental feeding experiment. *Can. J. Zool.* **70**: 1904–1911.
Ascanio, D. (2009). Notes on tanagers in eastern Venezuela. Unpubl.
Ascanio, D. (2010). Field notes and observations on the Martinique Oriole *Icterus bonana*. Unpubl.
Ascanio, S.J. (1997). *Biología Reproductiva del Turpial (*Icterus icterus*) en la Península de Macanao, Edo. Nueva Esparta*. MSc thesis, La Universidad Central de Venezuela, Caracas, Venezuela. In Spanish.
Ash, J.S. & Miskell, J.E. eds. (1998). *Birds of Somalia*. Pica Press, Mountfield, East Sussex, UK.
Askins, R.A., Ercolino, K.M. & Waller, J.D. (1987). Flower destruction and nectar depletion by avian nectar robbers on a tropical tree, *Cordia sebestena*. *J. Field Orn.* **58(3)**: 345–349.
Aspinall, S. (1996). *Status and Conservation of the Breeding Birds of the United Arab Emirates*. Hobby Publications, Liverpool.
Aspinwall, D.R. (1981). Comments on Cinnamon-breasted Rock Bunting. *Zambian Orn. Soc. Newsl.* **11**: 88–91.
Assis, C.P., Raposo, M.A. & Parrini, R. (2007). Validação de *Poospiza cabanisi* Bonaparte, 1850 (Passeriformes: Emberizidae). *Rev. Bras. Orn.* **15**: 103–112. In Portuguese.
Astié, A. & Reboreda, J.C. (2006). Cost of egg punctures and parasitism by Shiny Cowbirds (*Molothrus bonariensis*) at Creamy-bellied Thrushes (*Turdus amaurochalinus*) nests. *Auk* **123**: 32–33.
Åstrom, G. & Stolt, B.O. (1993). Regional song dialects of the Ortolan Bunting *Emberiza hortulana* L. in Sweden. *Ornis Svecica* **3(1)**: 1–10.
Athanas, N. (2004). Audio recordings of *Chrysothlypis chrysomelas*, from Cerro Jefe, Panama. Xeno-Canto, XC3456. Unpubl.
Athanas, N. (2005). Audio recording of *Erythrothlypis salmoni* from northwestern Ecuador. Xeno-Canto, 7212, 11927. Unpubl.
Athanas, N. (2006). Audio recordings of *Hemispingus reyi* from Sierra Nevada National Park, Mérida, Venezuela. Xeno-Canto, 6864. Unpubl.
Athanas, N. (2007). Audio recordings of *Diglossa gloriosissima* from Páramo Frontino, Colombia. Xeno-Canto, XC10762. Unpubl.
Athanas, N. (2008). Audio recordings of *Diglossa glauca* from Abra Patricia-Alto Nieve, San Martín, Peru. Xeno-Canto XC20771. Unpubl.
Athanas, N. (2010a). Photo gallery: tanagers – Thraupidae. Part 3. URL: http://antpitta.com/images/photos/tanagers/gallery_tanagers3.htm (download 02 November 2010).
Athanas, N. (2010b). Photo gallery: tanagers – Thraupidae. Part 4. URL: http://antpitta.com/images/photos/tanagers/gallery_tanagers4.htm (download 02 November 2010).
Atienza, J.C., Copete, J.L., Piñeiro, X., Martínez, E. & Torralvo, C. (2003). El Escribano Palustre, en peligro de extinción en España. *Garcilla* **117**: 14–17. In Spanish.
Atkinson, P. & Gibbons, D. (1998). Status of the Montserrat Oriole *Icterus oberi* since the start of a volcanic eruption in July 1995. *Bird Conserv. Int.* **8(3)**: 309.
Audubon, J.J. (1831). *Ornithological Biography, or an Account of the Habits of the Birds of the United States of America, Accompanied by Descriptions of the Objects Represented in the Work Entitled The Birds of America, and Interspersed with Delineations of American Scenery and Manners*. Judah Dobson, Philadelphia, Pennsylvania.
Auer, S.K., Bassar, R.D., Fontaine, J.J. & Martin, T.E. (2007). Breeding biology of songbirds in a subtropical montane forest in northwestern Argentina. *Condor* **109**: 321–333.
Austin, G.T. & Ricklefs, R.E. (1977). Growth and development of the Rufous-winged Sparrow (*Aimophila carpalis*). *Condor* **79(1)**: 37–50.
Austin, G.T. & Smith, E.L. (1974). Use of burrows by Brown Towhees and Black-throated Sparrows. *Auk* **91(1)**: 167.
Austin, O.L. & Kuroda, N. (1953). The birds of Japan: their status and distribution. *Bull. Mus. Comp. Zool. Harvard* **109(4)**: 279–613.
Aveledo Hostos, R. & Pérez Chinchilla, L.A. (1989). Tres nuevas subespecies de aves (Picidae, Parulidae, Thraupidae) de La Sierra de Perijá, Venezuela, y lista hipotética para la avifauna colombiana de Perijá. *Bol. Soc. Venez. Cienc. Nat.* **146**: 8–26. In Spanish.
Aveledo Hostos, R. & Pérez Chinchilla, L.A. (1994). Descripción de nueve subespecies nuevas y comentarios sobre dos especies de aves de Venezuela. *Bol. Soc. Venez. Cienc. Nat.* **44**: 229–257. In Spanish.
Avelino, M.F. & Vielliard, J.M.E. (2004). Comparative analysis of the song of the Rufous-collared Sparrow *Zonotrichia capensis* (Emberizidae) between Campinas and Botucatu, Rio Paulo State, Brazil. *An. Acad. Bras. Ciênc.* **76(2)**: 345–349.
Avery, M. (1995). Rusty Blackbird (*Euphagus carolinensis*). No. **200** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Avery, M. & Oring, L.W. (1977). Song dialects in the Bobolink (*Dolichonyx oryzivorus*). *Condor* **79**: 113–118.
Avery, M., Tillman, E.A. & Laukert, C.C. (2001). Evaluation of chemical repellents for reducing crop damage by Dickcissels in Venezuela. *Int. J. Pest Manag.* **47(4)**: 311–314.
Avise, J.C. & Nelson, W.S. (1989). Molecular genetic relationships of the extinct Dusky Seaside Sparrow. *Science (Washington, D.C.)* **243**: 646–648.
Avise, J.C. & Zink, R.M. (1988). Molecular genetic divergence between avian sibling species: King and Clapper Rails, Long-billed and Short-billed Dowitchers, Boat-tailed and Great-tailed Grackles, and Tufted and Black-crested Titmice. *Auk* **105**: 516–528.
Aweida, M.K. (1995). Repertoires, territory size and mate attraction in Western Meadowlarks. *Condor* **97**: 1080–1083.
Ayé, R. & Schweizer, M. (2003). Wintering hybrids Pine Bunting × Yellowhammer in northern Iran. *Dutch Birding* **25(1)**: 40–43.
Ayerbe-Quiñones, F. & Ramírez-Chaves, H. (2008). Primeros registros de *Ammodramus savannarum caucae* (Emberizidae) en el valle alto del Patía, suroccidente de Colombia. *Orn. Colombiana* **6**: 82–85. In Spanish with English summary.
Aymí, R. (1994). Sex- and age-related differences in the biometrics of a wintering population of Yellowhammers *Emberiza citrinella*. *Butll. Grup Català d'Anellament* **10**: 1–7.
Azara, F. de (1802–1805). *Apuntamientos para la Historia Natural de los Pájaros del Paraguay y Río de la Plata*. 3 vols. Imprenta Viuda de Ibarra, Madrid. In Spanish.
Azpiroz, A.B. (1997). *Aves del Uruguay*. Programa de Conservación de la Biodiversidad y Desarrollo Sustentable en los Humedales del Este, Rocha, Uruguay. In Spanish.
Azpiroz, A.B. (2000). *Biología y Conservación del Dragón (*Xanthopsar flavus*, Icteridae) en la Reserva de Biosfera Bañados del Este*. Documento de Trabajo **29**. Programa de Conservación de la Biodiversidad y Desarrollo Sustentable en los Humedales del Este, Rocha, Uruguay. In Spanish.
Azpiroz, A.B. (2003a). *Aves del Uruguay. Lista e Introducción a su Biología y Conservación*. Aves Uruguay – Grupo Uruguayo para el Estudio y la Conservación de Estos Animales, Montevideo, Uruguay. In Spanish.
Azpiroz, A.B. (2003b). Primeros registros del Capuchino de Collar (*Sporophila zelichi*) en Uruguay. *Orn. Neotropical* **14(1)**: 117–119. In Spanish.
Azpiroz, A.B. (2005). Conservation of the Pampas Meadowlark *Sturnella defilippii* in Uruguay. *Cotinga* **23**: 71–73.
Azpiroz, A.B. & Menéndez, J.L. (2008). Three new species and novel distributional data for birds in Uruguay. *Bull. Brit. Orn. Club* **128**: 38–56.
Babarskas, M. & López Lanús, B. (1993). Nidos nuevos o poco conocidos para la provincia de Buenos Aires. *Nuestras Aves* **28**: 27–28. In Spanish.
Babbs, S., Ling, S., Robertson, P. & Wood, P. (1987). *Report of the 1986 University of East Anglia-ICBP Martinique Oriole Expedition*. ICBP Study Report **23**. International Council for Bird Preservation, Cambridge, UK. 52 pp.
Babbs, S., Ling, S., Robertson, P. & Wood, P. (1988). *Report of the 1987 University of East Anglia-ICBP Saint Lucia Oriole Expedition*. ICBP Study Report **33**. International Council for Bird Preservation, Cambridge, UK.
Babko, V.M. (1983). [Biology of the Rustic Bunting in the Desna River Valley]. *Ornitologiya* **18**: 186. In Russian.
Backhurst, G.C. & Pearson, D.J. (1977). Ethiopian region birds attracted to the lights of Ngulia Safari Lodge, Kenya. *Scopus* **1**: 98–103.
Baepler, D.H. (1962). The avifauna of the Soloma region in Huehuetenango, Guatemala. *Condor* **64**: 140–153.
Bai Haisi, Gao Wei & Zhou Daowei (2003). The breeding habits of the Jankowski's Bunting (*Emberiza jankowskii*). *Chinese J. Zool.* **38(2)**: 36–40.
Baicich, P.J. & Harrison, C.J.O. (2005). *Nests, Eggs and Nestlings of North American Birds*. 2nd edition. Princeton University Press, Princeton, New Jersey.
Bailey, A.M. & Niedrach, R.J. (1938). The Chestnut-collared Longspur in Colorado. *Wilson Bull.* **50**: 243–246.
Bain, M. (1993). Ontario bird records committee report for 1992. *Ontario Birds* **11(2)**: 46–63.
Baird, J. (1964). Hostile displays of Rose-breasted Grosbeak towards a red squirrel. *Wilson Bull.* **76**: 286–289.
Bairlein, F. & Hüppop, O. (2004). Migratory fuelling and global climate change. Pp. 33–47 in: Møller *et al.* (2004).
Bajema, R.A. & Lima, S.L. (2001). Landscape-level analyses of Henslow's Sparrow (*Ammodramus henslowii*) abundance in reclaimed coal mine grasslands. *Amer. Midl. Nat.* **145(2)**: 288–298.
Bajema, R.A., DeVault, T.L., Scott, P.E. & Lima, S.L. (2001). Reclaimed coal mine grasslands and their significance for Henslow's Sparrows in the American Midwest. *Auk* **118(2)**: 422–431.
Bakaev, S.B. & Holboev, F.R. (2003). *Emberiza bruniceps* in Bukhara sand lands. Pp. 149–152 in: Dorzhiev (2003).
Baker, H.G., Cruden, R.W. & Baker, I. (1971). Minor parasitism in pollination biology and its community function. The case of *Ceiba acuminata*. *Bioscience* **21**: 1127–1129.
Baker, J.M., López-Medrano, E., Navarro-Sigüenza, A.G., Rojas-Soto, O.R. & Omland, K.E. (2003). Recent speciation in the Orchard Oriole group: divergence of *Icterus spurius spurius* and *Icterus spurius fuertesi*. *Auk* **120**: 848–859.
Baker, M.C. (1975). Song dialects and genetic differences in White-crowned Sparrows (*Zonotrichia leucophrys*). *Evolution* **29(2)**: 226–241.
Baker, M.C. (1991). Response of male Indigo and Lazuli Buntings and their hybrids to song playback in allopatric and sympatric populations. *Behaviour* **119**: 225–242.
Baker, M.C. (1994). Does exposure to heterospecific males affect sexual preferences of female buntings (*Passerina*)? *Anim. Behav.* **48**: 1349–1355.
Baker, M.C. (1996). Female buntings from hybridizing populations prefer conspecific males. *Wilson Bull.* **108**: 771–775.
Baker, M.C. & Baker, A.E.M. (1988). Vocal and visual stimuli enabling copulation behavior in female buntings. *Behav. Ecol. Sociobiol.* **23**: 105–108.
Baker, M.C. & Baker, A.E.M. (1990). Reproductive behavior of female buntings: isolating mechanisms in a hybridizing pair of species. *Evolution* **44**: 332–338.
Baker, M.C. & Boylan, J.T. (1995). A catalog of song syllables of Indigo and Lazuli Buntings. *Condor* **97**: 1028–1040.
Baker, M.C. & Boylan, J.T. (1999). Singing behavior, mating associations and reproductive success in a population of hybridizing Lazuli and Indigo Buntings. *Condor* **101**: 493–504.
Baker, M.C. & Fox, S.F. (1978). Differential survival in Common Grackles sprayed with Turgitol. *Amer. Naturalist* **112**: 675–682.
Baker, M.C. & Johnson, M.S. (1998). Allozymic and morphometric comparisons among Indigo and Lazuli Buntings and their hybrids. *Auk* **115**: 537–542.
Baker, M.C. & Mewaldt, L.R. (1979). Song dialects as barriers to dispersal in White-crowned Sparrows, *Zonotrichia leucophrys nuttalli*. *Evolution* **32(4)**: 712–722.
Baker, M.C., Medwaldt, L.R. & Stewart, R.M. (1981). Demography of White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*). *Ecology* **62(3)**: 636–644.
Bakker, A., Withrow, K. & Thompson, N.S. (1983). Levels of organization in the song of the Bobolink (Icteridae: Dolichonyinae). *Z. Tierpsychol.* **62**: 105–114.
Balaban, E. (1988a). Cultural and genetic variation in Swamp Sparrows (*Melospiza georgiana*). 1. Song variation, genetic variation, and their relationship. *Behaviour* **105(3/4)**: 250–291.
Balaban, E. (1988b). Cultural and genetic variation in Swamp Sparrows (*Melospiza georgiana*). 2. Behavioral salience of geographic song variants. *Behaviour* **105(3/4)**: 292–322.
Balát, F. (1963). [Remarks on vocal performances in certain Bulgarian birds]. *Larus* **25**: 141–144. In Croato-Serbian.
Balát, F. & González, H. (1982). Concrete data on the breeding of Cuban birds. *Acta Sci. Nat. Acad. Sci. Brno* **16**: 1–46.
Balatsky, N.N. (1992). [Cases of closely relative hybridization of buntings, finches and wagtails in the forest-steppe of the Western Siberia]. Pp. 273–275 in: Kurochkin, E.N. ed. (1992). *Modern Ornithology 1991*. Nauka, Moscow. In Russian.
Balbontín, J., Møller, A.P., Hermosell, I.G., Marzal, A., Reviriego, M. & de Lope, F. (2009a). Divergent patterns of impact of environmental conditions on life history traits in two populations of a long-distance migratory bird. *Oecologia (Berlin)* **159(4)**: 859–872.

Balbontín, J., Møller, A.P., Hermosell, I.G., Marzal, A., Reviriego, M. & de Lope, F. (2009b). Individual responses in spring arrival date to ecological conditions during winter and migration in a migratory bird. *J. Anim. Ecol.* **78**: 981–989.

Balderrama, J.A. (2006). Diversidad, endemismo y conservación de la ornitofauna del Parque Nacional Tunari (Cochabamba, Bolivia). *Ecol. Bolivia* **41(2)**: 149–170. In Spanish with English summary.

Balderrama, J.A. (2009). Range extension for the endangered Cochabamba Mountain-finch (*Compsospiza garleppi*) in Bolivia and new avifaunal records for Potosí department. *Ecol. Bolivia* **44(1)**: 67–69.

Baldwin, S.P. & Kendeigh, S.C. (1938). Variations in the weights of birds. *Auk* **55**: 416–467.

Balent, K.L. & Norment, C.J. (2003). Demographic characteristics of a Grasshopper Sparrow population in a highly fragmented landscape of western New York State. *J. Field Orn.* **74(4)**: 341–348.

Ball, R.M., James, F.C., Freeman, S., Bermingham, E. & Avise, J.C. (1988). Phylogeographic population structure of Red-winged Blackbirds assessed by mitochondrial DNA. *Proc. Natl. Acad. Sci. USA* **85**: 1558–1562.

Ballentine, B. (2009). The ability to perform physically challenging songs predicts age and size in male Swamp Sparrows, *Melospiza georgiana*. *Anim. Behav.* **77(4)**: 973–978.

Ballentine, B. & Hill, G.E. (2003). Female mate choice in relation to structural plumage coloration in Blue Grosbeaks. *Condor* **105(3)**: 593–598.

Ballentine, B., Badyaev, A. & Hill, G.E. (2003). Changes in song complexity correspond to periods of female fertility in Blue Grosbeaks (*Guiraca caerulea*). *Ethology* **109(1)**: 55–66.

Ballentine, B., Searcy, W.A. & Nowicki, S. (2008). Reliable aggressive signalling in Swamp Sparrows. *Anim. Behav.* **75(2)**: 693–703.

Balph, M.H. (1975). Development of young Brewer's Blackbirds. *Wilson Bull.* **87**: 207–230.

Baltz, M.E. (1996). The distribution and status of Shiny Cowbirds on Andros Island. *Bahamas J. Sci.* **3**: 2–6.

Bancroft, G.T. (1984a). Growth and sexual dimorphism of the Boat-tailed Grackle. *Condor* **86**: 423–432.

Bancroft, G.T. (1984b). Patterns of variation in size of Boat-tailed Grackle *Quiscalus major* eggs. *Ibis* **126(4)**: 496–509.

Bancroft, G.T. (1985). The influence of total nest failures and partial losses on the evolution of asynchronous hatching. *Amer. Naturalist* **126**: 495–504.

Bancroft, G.T. (1987). Mating system and nesting phenology of the Boat-tailed Grackle in central Florida. *Florida Field Nat.* **15**: 1–18.

Bancroft, J. (1982). Nesting observations of the Red-crested Cardinal on Oahu. *Elepaio* **42(7)**: 63–64.

Bancroft, J. (1983). Nesting Rose-breasted Grosbeaks. *Blue Jay* **41(4)**: 214–215.

Bangs, O. (1931). A genus for *Junco siemsseni* Martens. *Proc. New England Zoöl. Club* **12**: 89–91.

Bangs, O. & Barbour, T. (1922). Birds from Darien. *Bull. Mus. Comp. Zool. Harvard* **65**: 191–229.

Bangs, O. & Bradlee, T.S. (1901). The resident land birds of Bermuda. *Auk* **18**: 249–257.

Bangs, O. & Griscom, L. (1932). New or little known birds from Costa Rica. *Proc. New England Zool. Club* **13**: 47–53.

Bangs, O. & Noble, G.K. (1918). List of birds collected on the Harvard Peruvian expedition of 1916. *Auk* **35**: 442–463.

Bangs, O. & Penard, T.E. (1919). Some critical notes on birds. *Bull. Mus. Comp. Zool. Harvard* **63**: 21–40.

Bankovics, A. (2003). Distribution data of some bird species observed in Baturite Mountains, Ceara, Brasil [Brazil]. *Aquila* **109/110**: 23–32.

Banks, K.W., Clark, H., Mackay, I.R.K., Mackay, S.G. & Sellers, R.M. (1989). Biometrics and premigratory fattening in the Snow Bunting *Plectrophenax nivalis*. *Ringing & Migration* **10(3)**: 141–157.

Banks, K.W., Clark, H., Mackay, I.R.K., Mackay, S.G. & Sellers, R.M. (1991). Origins, population structure and movements of Snow Buntings *Plectrophenax nivalis* wintering in Highland Region, Scotland. *Bird Study* **38(1)**: 10–19.

Banks, R.C. (1963). Geographic variation in the White-crowned Sparrow *Zonotrichia leucophrys*. *Univ. Calif. Publ. Zool.* **70**: 1–123.

Banks, R.C. (1968). *Amphispiza bilineata*. Pp. 990–1004 in: Bent & Austin (1968).

Banks, R.C. & Gibson, D.D. (2007). The correct type locality of *Spizella breweri*. *Auk* **124(3)**: 1083–1085.

Bannerman, D.A. (1953). *The Birds of West and Equatorial Africa*. Vol. 2. Oliver and Boyd, Edinburgh & London.

Bannerman, D.A. & Priestly, J. (1952). An ornithological journey in Morocco in 1951. *Ibis* **94**: 654–682.

Bannon, J.K. & Richardson, C. (1993). White-capped Buntings *Emberiza stewarti* in the United Arab Emirates. A new bird for Arabia. *Emirates Bird Rep.* **17**: 3–5.

Baptista, L.F. (1976). Song dialects and demes in sedentary populations of the White-crowned Sparrow (*Zonotrichia leucophrys nuttalli*). *Univ. Calif. Publ. Zool.* **105**: 1–52.

Baptista, L.F. (1978). Territorial, courtship and duet songs of the Cuban Grassquit (*Tiaris canora*). *J. Orn.* **119(1)**: 91–101.

Barajas, L., Flor, C. & Phillips, A.R. (1994). A *Haplospiza* finch in western Mexico; the lessons of an enigma. *Bull. Brit. Orn. Club* **114(1)**: 36–46.

Baranovski, K.V. (2006). [Nesting of Reed Bunting (*Emberiza schoeniclus* L.) on meadows of Belarus]. *Vest. Belorus. Gosudarstv. Univ. (Ser. 2 Khim. Biol. Geograf.)* **1**: 107–108, 113. In Russian.

Barat, G. (1980). Le Tangara des Montagnes à ventre rouge. *J. Oiseaux* **137**: 19–20. In French.

Barba, E. & López, J.A. (1990). Estación de nidificación, tamaño de puesta y éxito reproductor del Escribano Soteño, *Emberiza cirlus*. *Mediterránea (Ser. Biol.)* **12**: 79–88. In Spanish.

Barber, C.A. & Evans, R.M. (1995). Clutch-size manipulations in the Yellow-headed Blackbird: a test of the individual optimization hypothesis. *Condor* **97**: 352–360.

Barber, D.R. & Martin, T.E. (1997). Influence of alternate host densities on Brown-headed Cowbird parasitism rates in Black-capped Vireos. *Condor* **99**: 595–604.

Barbosa, A.F. & de Almeida, Á.F. (2008). Levantamento quantitativo da avifauna em uma mata de *Araucaria* e *Podocarpus*, no parque estadual de Campos do Jordão, Sp. *Inst. Florestal Sér. Reg. São Paulo* **33**: 13–37. In Portuguese with English summary.

Barbour, T. (1943). *Cuban Ornithology*. Memoirs of the Nuttall Ornithological Club **9**. Nuttall Ornithological Club, Cambridge, Massachusetts. 144 pp., 2 plates.

Barbour, T. & Brooks, W.S. (1923). The Sapo Mountains and the Sambú Valley. A biological reconnaissance in southeastern Panama. *Geograph. Rev.* **8**: 221–222.

Barbraud, C. & Weimerskirch, H. (2001). Emperor Penguins and climate change. *Nature (London)* **411**: 183–186.

Barbraud, C., Marteau, C., Ridoux, V., Delord, K. & Weimerskirch, H. (2008). Demographic response of a population of White-chinned Petrels *Procellaria aequinoctialis* to climate and longline fishery bycatch. *J. Appl. Ecol.* **45(5)**: 1460–1467.

Bardeleben, C. & Gray, M.M. (2005). Isolation of polymorphic tetranucleotide microsatellite markers for the Masked Flowerpiercer *Diglossa cyanea*. *Mol. Ecol. Notes* **5(4)**: 849–850.

Barker, F.K., Vandergon, A.J. & Lanyon, S.M. (2008a). Species status of the Red-shouldered Blackbird (*Agelaius assimilis*): implications for ecological, morphological, and behavioral evolution in *Agelaius*. *Auk* **125(1)**: 87–94.

Barker, F.K., Vandergon, A.J. & Lanyon, S.M. (2008b). Assessment of species limits among yellow-breasted meadowlarks (*Sturnella* spp.) using mitochondrial and sex-linked markers. *Auk* **125(4)**: 869–879.

Barlow, C., Wacher, T. & Disley, T. (1997). *A Field Guide to Birds of The Gambia and Senegal*. Pica Press, Robertsbridge, UK.

Barlow, J., Haugaasen, T. & Peres, C.A. (2002). Effects of ground fires on understorey bird assemblages in Amazonian forests. *Biol. Conserv.* **105(2)**: 157–169.

Barlow, J.C., Dick, J.A., Weyer, D. & Young, W.F. (1972). New records of birds from British Honduras (Belize), including a skua. *Condor* **74**: 486–487.

Barlow, J.C., Mcgillivray, B.C. & Dickinson, T. (1994). Song structure and speciation in meadowlarks. *J. Orn.* **135**: 28.

Barnard, G.C. (1954). Notes on the nesting of the Thick-billed Euphonia in the Panama Canal Zone. *Condor* **56**: 98–101.

Barnard, G.C. (1956). Nesting of the Blue-black Grassquit in Panama. *Condor* **58**: 229–231.

Barnard, W.H., Mettke-Hofmann, C. & Matsuoka, S.M. (2010). Prevalence of hematozoa infections among breeding and wintering Rusty Blackbirds. *Condor* **112(4)**: 849–853.

Barnes, R., Butchart, S.H.M., Davies, C.W.N., Fernandez, M. & Seddon, N. (1997). New distributional information on eight bird species from northern Peru. *Bull. Brit. Orn. Club* **117(1)**: 69–74.

Barnett, A.R., Shapley, P., Benjamin, E.H. & McGarrell, M. (2002). Birds of the Potaro plateau, with eight new species for Guyana. *Cotinga* **18**: 19–36.

Barrantes, G. (1994a). First description of the nest and eggs of the Sooty-faced Finch. *Wilson Bull.* **106(3)**: 574.

Barrantes, G. (1994b). Comparación del peso de diferentes tipos de plumas entre cinco especies de aves del páramo de Chirripó, Costa Rica. *Rev. Biol. Trop. (Univ. Costa Rica)* **41(3B)**: 901–903. In Spanish with English summary.

Barrantes, G. & Hidalgo, E.B. (2004). Range expansion of *Ramphocelus costaricensis* (Aves: Thraupidae) to the northeastern Central Valley, Costa Rica. *Brenesia* **62**: 101.

Barreira, A.S., Lijtmaer, D.A., Lougheed, S.C. & Tubaro, P.L. (2007). Subspecific and temporal variation in the structurally based coloration of the Ultramarine Grosbeak. *Condor* **109(1)**: 187–192.

Barreiro, J. & Pérez del Val, J. (2000). *Icterus xantolaemus* Gil, 1918, a non valid species. *Bull. Brit. Orn. Club* **120(1)**: 62–63.

Barrera Vásquez, A. & Rendón, S. eds. (1948). *El Libro de los Libros de Chilam Balam*. Fondo de Cultura Económica, Mexico City, Mexico. In Spanish.

Barrio, J. (1995). The Rufous-breasted Warbling-finch *Poospiza rubecula* in Bosque Zárate, Peru. *Cotinga* **3**: 56–57.

Barrowclough, G.F. & Escalante-Pliego, P. (1990). Notes on the birds of the Sierra de Untuarán, southern Venezuela. *Bull. Brit. Orn. Club* **110(4)**: 167–169.

Basili, G.D. & Temple, S.A. (1995). A perilous migration. *Nat. Hist. (New York)* **104**: 40–47.

Basili, G.D. & Temple, S.A. (1998). Dickcissels and crop damage in Venezuela: defining the problem with ecological models. *Ecol. Appl.* **9**: 732–739.

Basili, G.D. & Temple, S.A. (1999a). Demographic characteristics of Dickcissels in winter. *Studies Avian Biol.* **19**: 281–288.

Basili, G.D. & Temple, S.A. (1999b). Winter ecology, behavior, and conservation needs of Dickcissels in Venezuela. *Studies Avian Biol.* **19**: 289–299.

Bass, R.A. (1979). Chromosomal polymorphism in Cardinals *Cardinalis cardinalis*. *Can. J. Gen. Cytol.* **21**: 549–553.

Bassett, O. (1980). Abert's Towhee reported. *Nebraska Bird Rev.* **48(4)**: 89.

Bates, J.M. (1997). Distribution and geographic variation in three South American grassquits (Emberizinae, *Tiaris*). *Orn. Monogr.* **48**: 91–110.

Bates, J.M. (2006). The seasonal movements of southern populations of Dull-colored Grassquit (*Tiaris obscura obscura*). *Bull. Brit. Orn. Club* **126**: 50–53.

Bates, R.S.P. & Lowther, E.H.N. (1952). *Breeding Birds of Kashmir*. Oxford University Press, Bombay, India.

Bauer, C., Pacheco, J.F., Venturini, A.C., Paz, P.R., Rehen, M.P. & Carmo, L.P. (1998). O primeiro registro documentado do séc. XX da Saíra-a punhalada, *Nemosia rourei* Cabanis, 1870, uma espécie enigmática do sudeste do Brasil. *Atualidades Orn.* **82**: 6. In Portuguese.

Bauer, C., Pacheco, J.F., Venturini, A.C. & Whitney, B.M. (2000). Rediscovery of the Cherry-throated Tanager *Nemosia rourei* in southern Espírito Santo, Brazil. *Bird Conserv. Int.* **10**: 97–108.

Baumgartner, A.M. (1937). Nesting habits of the Tree Sparrow at Churchill, Manitoba. *Bird-Banding* **8**: 99–108.

Baumgartner, A.M. (1942). Sex ratio in Oklahoma Tree Sparrows. *Bird-Banding* **13**: 181–182.

Baumgartner, A.M. (1968a). Tree Sparrow. Pp. 1137–1165 in: Bent & Austin (1968).

Baumgartner, A.M. (1968b). Harris's Sparrow. Pp. 1249–1273 in: Bent & Austin (1968).

Baumgartner, A.M. (1986). Sex-reversal in banded Cardinal. *North Amer. Bird Bander* **12**: 76.

Baumgartner, F.M. (1988). Winter status of the Rufous-sided Towhee in Oklahoma. *Bull. Okla. Orn. Soc.* **21(4)**: 27–28.

Baumgartner, F.M. (1990). Additional summer records for the Rufous-sided Towhee in Oklahoma. *Bull. Okla. Orn. Soc.* **23(1)**: 6–7.

Baumgartner, F.M. & Baumgartner, A.M. (1992). *Oklahoma Bird Life*. University of Oklahoma Press, Norman, Oklahoma.

Baxter, P. & Shaw, D. (2007). Identification of a female Black-headed Bunting on Fair Isle. *Birding World* **20(7)**: 299–302.

Bayard, T.S. & Elphick, C.S. (2011). Planning for sea-level rise: quantifying patterns of Saltmarsh Sparrow (*Ammodramus caudacutus*) nest flooding under current sea-level conditions. *Auk* **128(2)**: 393–403.

Baynard, O.E. (1932). The first eggs of Scott's Seaside Sparrow. *Auk* **49**: 97–98.

Bazeries, J. (1994). Uma façanha dos criadores. A reprodução, com sucesso, da Saí-de-perna-amarela *Cyanerpes caeruleus*. *Atualidades Orn.* **58**: 3. In Portuguese.

Beadell, J., Greenberg, R., Droege, S. & Royle, J.A. (2003). Distribution, abundance, and habitat affinities of the Coastal Plain Swamp Sparrow. *Wilson Bull.* **115(1)**: 38–44.

Beadle, D. & Rising, J.D. (2002). *Sparrows of the United States and Canada: The Photographic Guide*. Academic Press, San Diego, California.

Beal, F.E.L. (1910). Birds of California in relation to the fruit industry. Part 2. *US Dept. Agricult. Biol. Surv. Bull.* **34**: 1–96.

Beal, F.E.L., McAtee, W.L. & Kalmbach, E.R. (1916). Common birds of southeastern United States in relation to agriculture. *US Dept. Agricult. Farmers' Bull.* **755**: 34–35.

Beale, C. (2000). Notes on the birds of Lebanon, autumn–winter 1999. *Sandgrouse* **22(2)**: 122–124.

Bears, H. (2004). Parasite prevalence in Dark-eyed Juncos, *Junco hyemalis*, breeding at different elevations. *Can. Field-Nat.* **118(2)**: 235–238.

Bears, H., Drever, M.C. & Martin, K. (2008). Comparative morphology of Dark-eyed Juncos *Junco hyemalis* breeding at two elevations: a common aviary experiment. *J. Avian Biol.* **39(2)**: 152–162.

Beason, R.C. (1989). Use of an inclination compass during migratory orientation by the Bobolink (*Dolichonyx oryzivorus*). *Ethology* **81(4)**: 291–299.

Beason, R.C. (1992). You can get there from here: responses to simulated magnetic equator crossing by the Bobolink (*Dolichonyx oryzivorus*). *Ethology* **91**: 75–80.

Beason, R.C. & Trout, L.L. (1984). Cooperative breeding in the Bobolink. *Wilson Bull.* **96**: 709–710.

Beaumont, L.J., Mcallan, I.A.W. & Hughes, L. (2006). A matter of timing: changes in the first date of arrival and last date of departure of Australian migratory birds. *Global Change Biol.* **12**: 1339–1354.

Bechtoldt, C.L. & Stouffer, P.C. (2005). Home-range size, response to fire, and habitat preferences of wintering Henslow's Sparrows. *Wilson Bull.* **117(3)**: 211–225.

Bedard, J. & LaPointe, G. (1984a). Banding returns, arrival times, and site fidelity in the Savannah Sparrow. *Wilson Bull.* **96(2)**: 196–205.

Bedard, J. & LaPointe, G. (1984b). The Savannah Sparrow territorial system: can habitat features be related to breeding success? *Can. J. Zool.* **62(9)**: 1819–1828.

Bedard, J. & LaPointe, G. (1985). Influence of parental age and season on Savannah Sparrow reproductive success. *Condor* **87(1)**: 106–110.

Bedard, J. & Meunier, M. (1983). Parental care in the Savannah Sparrow. *Can. J. Zool.* **61(2)**: 2836–2843.

Beddall, B.G. (1963). Range expansion of the Cardinal and other birds in the northeastern States. *Wilson Bull.* **75**: 140–158.

Beebe, C.W. (1909). An ornithological reconnaissance of northeastern Venezuela. *Zoologica (New York)* **1(3)**: 67–114.

Beebe, C.W. (1916). Notes on the birds of Pará, Brazil. *Zoologica (New York)* **2**: 55–106.
Beebe, C.W. (1917). Part 1. Pp. 23–290 in: Beebe, W., Hartley, G.I. & Howes, P.G. eds. (1917). *Tropical Wild Life in British Guiana. Zoological Contributions from the Tropical Research Station of the New York Zoological Society*. Vol. 1. New York Zoological Society, New York. 504 pp.
Beecher, M.D. & Burt, J.M. (2009). More on the cognitive ecology of song communication and song learning in the Song Sparrow. Pp. 49–70 in: Dukas, R. & Ratcliffe, J.M. eds. (2009). *Cognitive Ecology*. Part 2. The University of Chicago Press, Chicago & London.
Beecher, W.J. (1950). Convergent evolution in the American orioles. *Wilson Bull.* **62**: 51–86.
Beecher, W.J. (1951a). Convergence in the Coerebidae. *Wilson Bull.* **63**: 274–287.
Beecher, W.J. (1951b). Adaptations for food-getting in the American blackbirds. *Auk* **68**: 411–440.
Beecher, W.J. (1953). A phylogeny of the oscines. *Auk* **70**: 270–333.
Beedy, E.C. & Hamilton, W.J. (1999). Tricolored Blackbird (*Agelaius tricolor*). No. **423** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 11. The Birds of North America Inc., Philadelphia, Pennsylvania.
Beehler, B. (1980). A comparison of avian foraging at flowering trees in Panama and New Guinea. *Wilson Bull.* **92**: 513–519.
Begazo, A.J., Valqui, T.H., Sokol, M. & Langlois, E. (2001). Notes on some birds from central and northern Peru. *Cotinga* **15**: 81–87.
Behrstock, R.A., Sexton, C.W., Lasley, G.W., Eubanks, T.L. & Gee, J.P. (1997). First nesting records of Worthen's Sparrow *Spizella wortheni* for Nuevo León, Mexico, with a habitat characterisation of the nest site and notes on ecology, voice, additional recent sightings and leg coloration. *Cotinga* **8**: 27–33.
Belcher, C. & Smooker, G.D. (1937). Birds of the colony of Trinidad and Tobago. *Ibis* **Ser. 14, no. 1**: 225–249; 504–550.
Belcher, J.W. & Thompson, W.L. (1969). Territorial defense and individual song recognition in the Indigo Bunting. *Jack-Pine Warbler* **47**: 76–83.
Belda, E.J., Kvist, L., Monrós, J.S., Ponnikas, S. & Torralvo, C. (2009). Uso de técnicas moleculares y análisis discriminantes para diferenciar mediante biometría dos subespecies de Escribano Palustre *Emberiza schoeniclus*. *Ardeola* **56(1)**: 85–94. In Spanish with English summary.
Beletsky, L.D. (1982a). Vocal behavior of the Northern Oriole. *Wilson Bull.* **94(3)**: 372–381.
Beletsky, L.D. (1982b). Vocalizations of female Northern Orioles. *Condor* **84**: 445–447.
Beletsky, L.D. (1983). Aggressive and pair-bond maintenance songs of female Red-winged Blackbirds (*Agelaius phoeniceus*). *Z. Tierpsychol.* **62**: 47–54.
Beletsky, L.D. (1996). *The Red-winged Blackbird. The Biology of a Strongly Polygynous Songbird*. Academic Press, New York.
Beletsky, L.D. & Orians, G.H. (1987a). Territoriality among male Red-winged Blackbirds. Part 1. Site fidelity and movement patterns. *Behav. Ecol. Sociobiol.* **20**: 21–34.
Beletsky, L.D. & Orians, G.H. (1987b). Territoriality among male Red-winged Blackbirds. Part 2. Removal experiments and site dominance. *Behav. Ecol. Sociobiol.* **20**: 339–349.
Beletsky, L.D. & Orians, G.H. (1989). A male Red-winged Blackbird breeds for 11 years. *Northwestern Naturalist* **70**: 10–12.
Beletsky, L.D. & Orians, G.H. (1996). *Red-winged Blackbirds: Decision-making and Reproductive Success*. Univerity Chicago Press, Chicago, Illinois.
Bell, B.D. (1970). Moult in the Reed Bunting. *Bird Study* **17**: 269–281.
Bell, B.D. & Hornby, R.J. (1969). Polygamy and nest-sharing in the Reed Bunting. *Ibis* **111**: 402–405.
Bell, C.P. (1997). Leap-frog migration in the Fox Sparrow: minimizing the cost of spring migration. *Condor* **99**: 470–477.
Bell, J.L. & Whitmore, R.C. (1997). Eastern Towhee numbers increase following defoliation by gypsy moths. *Auk* **114(4)**: 708–716.
Bell, J.L. & Whitmore, R.C. (2000). Bird nesting ecology in a forest defoliated by gypsy moths. *Wilson Bull.* **112(4)**: 524–531.
Bellemain, E., Bermingham, E. & Ricklefs, R.E. (2008). The dynamic evolutionary history of the Bananaquit (*Coereba flaveola*) in the Caribbean revealed by a multigene analysis. *BioMed Centr. Evol. Biol.* **8(240) DOI**: 10.1186/1471-2148-8-240. URL: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2533019 (download 20 July 2010).
Bello Falavena, M.A. (1988). Alguns dados sobre a reprodução do Garibaldi (*Agelaius r. ruficapillus*) (Icteridae, Aves) em lavouras de arroz no Rio Grande do Sul. *Rev. Bras. Zool.* **4**: 307–317. In Portuguese.
Belousov, E.M. (1999). [About hybridization of *Emberiza melanocephala* and *E. bruniceps* in Low Atrek River]. *Selevinia* **4** (1996/1997): 241. In Russian.
Belton, W. (1974). More new birds for Rio Grande do Sul, Brazil. *Auk* **91(2)**: 429–432.
Belton, W. (1985). Birds of Rio Grande do Sul, Brazil. Part 2. Formicariidae through Corvidae. *Bull. Amer. Mus. Nat. Hist.* **180**: 1–242.
Beltzer, A.H. (1986). *Cacicus solitarius* hospedante de *Molothrus bonariensis bonariensis* (Aves: Icteridae). *Rev. Asoc. Cienc. Nat. Litoral* **17**: 215–216. In Spanish.
Beltzer, A.H. (1988a). Aspects of the food ecology of the Greyish Saltator *Saltator coerulescens coerulescens* and the Golden-billed Saltator *Saltator aurantiirostris aurantiirostris* in the valley of the middle reaches of the Paraná River in Argentina. *Stud. Neotrop. Fauna Environm.* **23(1)**: 9–23.
Beltzer, A.H. (1988b). Biología alimentaria del Tordo Mulato *Molothrus badius badius* (Aves: Icteridae) en el valle aluvial del río Paraná medio, Argentina. *Rev. Asoc. Cienc. Nat. Litoral* **19**: 113–121. In Spanish.
Beltzer, A.H. (1990). Biología alimentaria del Verdón Común *Embernagra platensis platensis* (Aves: Emberizidae) en el valle aluvial del río Paraná medio, Argentina. *Orn. Neotropical* **1(1/2)**: 25–30. In Spanish.
Beltzer, A.H. & Paporello, G. (1983). Alimentación de aves en el valle aluvial del río Paraná. IV. *Agelaius cyanopus cyanopus* Vieillot, 1819 (Passeriformes, Icteridae). *Iheringia (Sér. Zool.)* **62**: 55–60. In Spanish.
Beltzer, A.H., Comini, B., Latino, S. & Quiroga, M. (1999). Alimentary biology of the Golden Billed Saltator *Saltator aurantiirostris* (Aves: Emberizidae) in the Paraná River floodplain (Argentina). *An. Biol.* **22** (*Biol. Anim.* **11**) (1997): 51–60.
Beltzer, A.H., Quiroga, M., Latino, S. & Comini, B. (2004). Feeding ecology of the Grayish Saltator *Saltator coerulescens* (Aves: Emberizidae) in the Paraná River floodplain (Argentina). *Orsis* **19**: 91–99.
Bendell, B.E., Weatherhead, P.J. & Stewart, R.K. (1981). The impact of predation by Red-winged Blackbirds on European corn borer populations. *Can. J. Zool.* **59**: 1535–1538.
Bendire, C. (1895). *Life Histories of North American Birds from the Parrots to the Grackles: with Special Reference to their Breeding Habits and Eggs, &c*. United States National Museum Special Bulletin **3**. United States National Museum, Washington, D.C. viii, 518 pp. 7 plates.
Benedict, L. (2007). Offspring discrimination without recognition: California Towhee responses to chick distress calls. *Condor* **109(1)**: 79–87.
Benedikt, V., Barus, V., Capek, M., Havlicek, M. & Literák, I. (2009). Blood parasites (*Haemoproteus* and microfilariae) in birds from the Caribbean slope of Costa Rica. *Acta Parasitol. Polonica* **54(3)**: 197–204.
Benesh, C.D. (1997). Intraspecific variation in adult male Flame-colored Tanagers. The lesson of Bog Spring. *Birding (USA)* **29(5)**: 417–419.
Bengtsson, K. (2005). Långtflyttande ringar. *Anser* **44(1)**: 33–34. In Swedish.
Benites, P., Eaton, M.D., Lijtmaer, D.A., Lougheed, S.C. & Tubaro, P.L. (2010). Analysis from avian visual perspective reveals plumage colour differences among females of capuchino seedeaters (*Sporophila*). *J. Avian Biol.* **41**: 597–602.
Benites, P., Tubaro, P., Lijtmaer, D.A., Lougheed, S.C. & Eaton, M.D. (2007). Color differences among closely related species of red-breasted meadowlarks (*Sturnella*). *Condor* **109**: 605–616.
Bénito-Espinal, E. & Hautcastel, P. (2003). *Les Oiseaux des Antilles et Leur Nid*. PLB Editions, Guadeloupe, French West Indies. In French.
Bénito-Espinal, E. & Hautcastel, P. (2007). *Oiseaux de la Martinique*. PLB Editions, Guadeloupe, French West Indies. In French.
Bennike, O. & Dyck, J. (1986). A subfossil Lapland Bunting *Calcarius lapponicus* feather from Volvedal, North Greenland. *Ornis Scand.* **17(1)**: 75–77.
Benning, T.L., LaPointe, D., Atkinson, C.T. & Vitousek, P.M. (2002). Interactions of climate change with biological invasions and land use in the Hawaiian Islands: modeling the fate of endemic birds using a geographic information system. *Proc. Natl. Acad. Sci. USA* **99**: 14246–14249.
Benson, C.W. (1941). Further notes on Nyasaland birds. Part 4. *Ibis* **Ser. 14, no. 5**: 1–55.
Benson, C.W. (1982). Migrants in the Afrotropical region south of the Equator. *Ostrich* **53**: 31–49.
Benson, C.W. & Benson, F.M. (1977). *The Birds of Malawi*. Montford Press, Limbe, Malawi.
Bent, A.C. (1958). Life histories of North American blackbirds, orioles, tanagers, and allies. *Bull. US Natl. Mus.* **211**: i–x, 1–549, 1–37 [unabridged and unaltered republication in 1965, Dover Publications, New York].
Bent, A.C. & Austin, O.L. ed. (1968). Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows and allies. Parts 1–3. Order Passeriformes. *U.S. Natl. Mus. Bull.* **237**: 1–1889, pls. 1–78.
Beresovicov, N.N. & Kovshar, A.F. (1992). [Breeding biology of the Red-headed Bunting (*Emberiza bruniceps*) in the farmland of south-eastern Kazakhstan]. *Russ. Orn. Zhurnal* **1(2)**: 221–226. In Russian.
Berg, Å. (2008). Habitat selection and reproductive success of Ortolan Buntings *Emberiza hortulana* on farmland in central Sweden – the importance of habitat heterogeneity. *Ibis* **150(3)**: 565–573.
van den Berg, A.B. & Bosman, C.A.W. (1984). Range extensions and rare records of birds in Ecuador. *Bull. Brit. Orn. Club* **104(4)**: 152–154.
van den Berg, M. & Damhuis, R. (1981). Additional breeding records of the Little Swift (*Apus affinis*) and Cretzschmar's Bunting (*Emberiza caesia*) in Turkey. *Bull. Orn. Soc. Middle East* **6**: 9.
Bergmann, H.H. (1999). Wenig bekannte Vögel kurz vorgestellt: die Weidenammer. *Falke* **46(7)**: 216–219. In German.
Berkeley, L.I., McCarty, J.P. & Wolfenbarger, L.L. (2007). Postfledging survival and movement in Dickcissels (*Spiza americana*): implications for habitat management and conservation. *Auk* **124(2)**: 396–409.
Berla, H.F. (1944). Lista das aves colecionadas em Pedra Branca, Município de Parati, Estado do Rio de Janeiro, com algumas notas sobre sua biologia. *Bol. Mus. Nac. Rio J. Zool.* **18**: 1–24. In Portuguese.
Berlepsch, H. Graf von (1911). Revision der Tanagriden. Pp. 1001–1161 in: Schalow, H. ed. (1911). *Verhandlungen des V. Internationalen Ornithologen-Kongresses in Berlin 1910, 30 Mai bis 4 Juni 1910*. Deutsche Ornithologische Gesellschaft, Berlin. In German.
Berlepsch, H. Graf von & Hartert, E.J.O. (1902). On the birds of the Orinoco region. *Novit. Zool.* **9**: 1–135.
Berlepsch, H. Graf von & Ihering, H. von (1885). Die Vögel der Umgegend von Taquara do Mundo Novo, Prov. Rio Grande do Sul. *Zeitschr. Gesam. Orn.* **2(2)**: 97–184. In German.
Berlioz, M.J. (1939). A new genus and species of tanager from central Brazil. *Bull. Brit. Orn. Club* **59**: 102.
Bernard, A. & Broyer, J. (1995). Bruant proyer *Miliaria calandra*. Pp. 722–723 in: Yeatman-Berthelot, D. ed. (1995). *Nouvel Atlas des Oiseaux Nicheurs de France 1985–1989*. Société Ornithologique de France, Paris. In French.
Bernardi De León, R. (2009). Road development in Podocarpus National Park: an assessment of threats and opportunities. *J. Sustain. Forestry* **28(6)**: 735–754.
Bernardy, P., Dziewiaty, K., Spalik, S. & Südbeck, P. (2008). Was charakterisiert ein „gutes" Ortolan *Emberiza hortulana*-Revier? – Eine Analyse als Grundlage für Schutzbemühungen. *Vogelkdl. Ber. Niedersachsen* **40(1/2)**: 127–138. In German.
Berrett, C.G. (1962). *The Birds of the Mexican State of Tabasco*. PhD thesis, Louisiana State University, Baton Rouge, Louisiana.
Bertagnolio, P. (1968). Breeding of Blue-necked × Golden-masked Tanager. *Avicult. Mag.* **74**: 46–47.
Berthold, P. (1991). Patterns of avian migration in light of current global 'greenhouse' effects: a central European perspective. Pp. 780–786 in: Bell, B.D., Cossee, R.O., Flux, J.E.C., Heather, B.D., Hitchmough, R.A., Robertson, C.J.R. & Williams, M.J. eds. (1991). *Acta XX Congressus Internationalis Ornithologici*. New Zealand Ornithological Congress Trust Board, Wellington, New Zealand.
Berthold, P. (2001). *Bird Migration*. Oxford University Press, Oxford, UK.
Bertonatti, C. & Guerra, A.L. (1997). Hibridación entre Cardenal Amarillo (*Gubernatrix cristata*) y Diuca Común (*Diuca diuca minor*) en estado silvestre, en la Argentina. *Hornero* **14(4)**: 235–242. In Spanish with English summary.
Bertonatti, C., Narosky, T. & Rodríguez Baigurea, V. (1994). Contribución al conocimiento de la avifauna de Martín García. *Nuestras Aves* **12(30)**: 30–31. In Spanish.
Bertoni, A.W. (1898). Catálogo descriptivo de las aves útiles del Paraguay. *Rev. Agron. Cien. Aplic. (Asunción)* **1**: 377–410, 526–539. In Spanish.
Bertoni, A.W. (1901). *Aves Nuevas del Paraguay*. Kraus, Asunción, Paraguay. In Spanish.
Bertoni, A.W. (1904). Contribución para el conocimiento de las aves del Paraguay. *An. Cien. Paraguayos* **3**: 1–10. In Spanish.
Bertoni, A.W. (1918). Apuntes sobre aves del Paraguay. *Hornero* **1**: 188–191. In Spanish.
Bertoni, A.W. (1919). Apuntes sobre aves del Paraguay. *Hornero* **1**: 284–287. In Spanish.
Bertoni, A.W. (1926). Apuntes ornitológicos. *Hornero* **3**: 396–401. In Spanish.
Besser, J.F., Grazio, J.W.D. & Larsen, K.H. (1970). The Dickcissel: a problem in ripening grains in Latin America. Pp. 141–143 in: Rintamaa, D.L. & Jackson, W.B. eds. (1970). *Proceedings of the Fifth Bird Control Seminar, Bowling Green State University, Bowling Green, Ohio*. University of Nebraska, Lincoln, Nebraska.
Best, B.J., Checker, M., Thewlis, R.M., Best, A.L. & Duckworth, J.W. (1996). New bird breeding data from southwestern Equador. *Orn. Neotropical* **7**: 69–73.
Best, B.J., Clarke, C.T., Checker, M., Broom, A.L., Thewlis, R.M., Duckworth, J.W. & McNab, A. (1993). Distributional records, natural history notes and conservation of some poorly known birds from southwestern Ecuador and northwestern Peru. [Part 2]. *Bull. Brit. Orn. Club* **113(4)**: 234–255.
Best, L.B. (1974). An unusual case of nesting persistence in a female Field Sparrow. *Condor* **76(3)**: 349.
Best, L.B. (1977a). Territory quality and mating success in the Field Sparrow (*Spizella pusilla*). *Condor* **79(2)**: 192–204.
Best, L.B. (1977b). Nestling biology of the Field Sparrow. *Auk* **94(2)**: 308–319.
Best, L.B. (1977c). Patterns of feeding Field Sparrow young. *Wilson Bull.* **89(4)**: 625–627.
Best, L.B. (1978). Field Sparrow reproductive success and nesting ecology. *Auk* **95(1)**: 9–22.
Best, L.B. (1979). Effects of fire on a Field Sparrow population. *Amer. Midl. Nat.* **101(2)**: 434–442.
Best, L.B. & Petersen, K.L. (1982). Effects of stage of the breeding cycle on Sage Sparrow detectability. *Auk* **99(4)**: 788–791.
Best, L.B. & Petersen, K.L. (1985). Seasonal changes in detectability of Sage and Brewer's Sparrows. *Condor* **87(4)**: 556–558.
Best, L.B. & Rodenhouse, N.L. (1984). Territory preference of Vesper Sparrows in cropland. *Wilson Bull.* **96(1)**: 72–82.
Betancur, P. (1994). El regreso de *Hypopyrrhus pyrohypogaster*. *Bol. Soc. Antioqueña Orn.* **5(9)**: 15–17. In Spanish.
Bezuijen, M.R. (2006). Incidental wetland bird observations from Attapu and Savannakhet provinces, Lao PDR, March–June 2005. *Forktail* **22**: 49–56.
Bezzel, E. (1993). *Kompendium der Vögel Mitteleuropas*. Aula-Verlag, Wiesbaden, Germany. In German.
Bhardwaj, G.S., Sangha, H.S. & Mistry, D. (2008). Unusual nest of Crested Bunting *Melophus lathami* at Suhagpura, Pratapgarh district, Rajasthan, India. *Indian Birds* **4(5)**: 165–166.
Biaggi, V. (1970). *Las Aves de Puerto Rico*. Editorial Universitaria / University of Puerto Rico, Puerto Rico. In Spanish.

Biancucci, L. & Martin, T.E. (2008). First description of the breeding biology and natural history of the Ochre-breasted Brush Finch (*Atlapetes semirufus*) in Venezuela. *Wilson J. Orn.* **120(4)**: 856–862.
Bibikov, D.I. (1960). [On the ecology of the *Emberiza fucata* Pall.]. *Byull. Mosk. Obsh. Ispyt. Prir. (Otd. Biol.)* **65(1)**: 49–54. In Russian.
Biermann, G.C., McGillivray, W.B. & Nordin, K.E. (1987). The effect of cowbird parasitism on Brewer's Sparrow productivity in Alberta. *J. Field Orn.* **58(3)**: 350–354.
Binford, L.C. (1968). *A Preliminary Survey of the Avifauna of the Mexican State of Oaxaca*. PhD thesis, Louisiana State University, Baton Rouge, Louisiana.
Binford, L.C. (1989). *A Distributional Survey of the Birds of the Mexican State of Oaxaca*. Ornithological Monographs **43**. American Ornithologists' Union, Washington, D.C. vi, 418 pp.
Bird, R.D. & Smith, L.B. (1964). The food habits of the Red-winged Blackbird, *Agelaius phoeniceus*, in Manitoba. *Can. Field-Nat.* **78**: 179–186.
Bjorklund, M. (1991). Evolution, phylogeny, sexual dimorphism and mating system in the grackles (*Quiscalus* spp.: Icterinae). *Evolution* **45**: 608–621.
Blake, C.H. (1969). Notes on the Indigo Bunting. *Bird-Banding* **40**: 133–139.
Blake, C.H. (1971). Primary molt in juvenile Cardinals. *Bird-Banding* **42**: 269–274.
Blake, E.R. (1953). *Birds of Mexico: a Guide for Field Identification*. University of Chicago Press, Chicago.
Blake, E.R. (1956). A collection of Panamanian nests and eggs. *Condor* **58**: 386–387.
Blake, E.R. (1968). Family Icteridae, American orioles and blackbirds. Pp. 138–202 in: Paynter, R.A. ed. (1968). *Check-list of Birds of the World. A Continuation of the Work of James L. Peters*. Vol. 14. Museum of Comparative Zoology, Cambridge, Massachusetts.
Blake, E.R. & Hocking, P. (1974). Two new species of tanager from Peru. *Wilson Bull.* **86**: 321–324.
Blake, J.G. & Loiselle, B.A. (1992). Fruits in the diet of Neotropical migrant birds in Costa Rica. *Biotropica* **24(2a)**: 200–210.
Blake, J.G. & Rougès, M. (1997). Variation in capture rates of understory birds in El Rey National Park, northwestern Argentina. *Orn. Neotropical* **8**: 185–193.
Blake, J.G. & Rougès, M. (2001). Tasas de captura y dietas de aves del sotobosque en el Parque Biológico Sierra de San Javier, Tucumán. *Hornero* **16(1)**: 7–15. In Spanish with English summary.
Blakely, N.R. (1975). Successive polygyny in upland nesting Red-winged Blackbirds. *Condor* **78**: 129–133.
Blanco, D.E. (1995). Parasitismo de cria del Tordo Renegrido *Molothrus bonariensis* sobre *Agelaius ruficapillus*, en el este de la provincia de Buenos Aires. *Hornero* **14**: 44–45. In Spanish.
Blankespoor, G.W., Oolman, J. & Uthe, C. (1982). Eggshell strength and cowbird parasitism of Red-winged Blackbirds. *Auk* **99**: 363–365.
Bledsoe, A.H. (1988). Nuclear DNA evolution and phylogeny of the New World Nine-primaried Oscines. *Auk* **105**: 504–515.
Bledsoe, A.H. & Raikow, R.J. (1990). A quantitative assessment of congruence between molecular and nonmolecular estimates of phylogeny. *J. Mol. Evol.* **30**: 247–259.
Bleiweiss, R. (2004). Ultraviolet plumage reflectance distinguishes sibling bird species. *Proc. Natl. Acad. Sci. USA* **101(47)**: 16561–16564.
Blendinger, P.G. (1999). Facilitation of sap-feeding birds by the White-fronted Woodpecker in the Monte Desert, Argentina. *Condor* **101**: 402–407.
Blendinger, P.G. (2005a). Abundance and diversity of small-bird assemblages in the Monte Desert, Argentina. *J. Arid Environm.* **61**: 567–587.
Blendinger, P.G. (2005b). Foraging behaviour of birds in an arid sand-dune scrubland in Argentina. *Emu* **105**: 67–79.
Blendinger, P.G. & Ojeda, R.A. (2001). Seed supply as a limiting factor for granivorous bird assemblages in the Monte Desert, Argentina. *Austr. Ecol.* **26**: 413–422.
Blomdahl, A. & Hägg, J. (1997). Fältbestämning av honfärgad tallsparv. *Vår Fågelvärld* **56(8)**: 32–33. In Swedish.
Blume, D. (1994). Einemsen oder Lauschen? *Orn. Mitt.* **46(6)**: 153. In German.
Blümel, H. (1982). *Die Rohrammer* Emberiza schoeniclus. Die Neue Brehm-Bücherei **544**. A. Ziemsen, Wittenberg Lutherstadt, Germany. In German.
Boag, P.T. (1983). The heritability of external morphology in Darwin's ground finches (*Geospiza*) on Isla Daphne Major, Galápagos. *Evolution* **37(5)**: 877–894.
Boag, P.T. (1984). Growth and allometry of external morphology in Darwin's finches (*Geospiza*) on Isla Daphne Major, Galápagos. *J. Zool., London* **204(3)**: 413–441.
Boag, P.T. & Grant, P.R. (1978). Heritability of external morphology in Darwin's finches. *Nature (London)* **274(5673)**: 393–794.
Boag, P.T. & Grant, P.R. (1981). Intense natural selection in a population of Darwin's finches (Geospizinae) in the Galápagos. *Science (Washington, D.C.)* **214**: 82–84.
Boag, P.T. & Grant, P.R. (1984). Darwin's finches (*Geospiza*) on Isla Daphne Major, Galápagos: breeding and feeding ecology in a climatically variable environment. *Ecol. Monogr.* **54(4)**: 463–489.
Boal, C.W. & Andersen, D.E. (2005). Microhabitat characteristics of Lapland Longspur, *Calcarius lapponicus*, nests at Cape Churchill, Manitoba. *Can. Field-Nat.* **119(2)**: 208–213.
Boal, C.W., Sibley, F.C., Estabrook, T.S. & Lazell, J. (2006). Insular and migrant species, longevity records, and new species records on Guana Island, British Virgin Islands. *Wilson J. Orn.* **118(2)**: 218–224.
Bock, C.E., Bock, J.H., Jepson, K.L. & Ortega, J.C. (1986). Ecological effects of planting African lovegrasses in Arizona. *Natl. Geogr. Res.* **2**: 456–463.
Bock, H.J. (1995). Nachzucht von Blaubrustpipra und Siebenfarbentangaren. *Gefiederte Welt* **119(10)**: 329–332. In German.
Bock, W.J. (1964). Bill shape as a generic characteristic in the cardinals. *Wilson Bull.* **76**: 50–61.
Bock, W.J. (1985). Is *Diglossa* (?Thraupinae) monophyletic? *Orn. Monogr.* **36**: 319–332.
Bock, W.J. (1994). History and nomenclature of avian family-group names. *Bull. Amer. Mus. Nat. Hist.* **222**: 1–281.
Bodrati, A. (2005). Nuevos aportes a la distribución de algunas especies de aves argentinas. *Nuestras Aves* **50**: 30–33. In Spanish.
Bodrati, A. & Fraga, R.M. (2010). Frequent parasitism of Golden-winged Caciques (*Cacicus chrysopterus*) by Shiny Cowbirds (*Molothrus bonariensis*) in the Chaco region of Argentina and Paraguay. *Rev. Bras. Orn.* **18**: 110–112.
Bodrati, A. & Sierra, E. (2008). Nuevos aportes sobre la colonización austral del Pepitero Verdoso (*Saltator similis*) en las provincias de Buenos Aires y Entre Ríos, Argentina. *Nuestras Aves* **53**: 29–30. In Spanish.
Boesman, P. (1998). Some new information on the distribution of Venezuelan birds. *Cotinga* **9**: 27–39.
Boesman, P. & Curson, J. (1995). Grey-headed Warbler *Basileuterus griseiceps* in danger of extinction? *Cotinga* **3**: 35–39.
Boggs, G.O. (1961). Notas sobre aves de "El Centro" en el valle medio del río Magdalena, Colombia. *Noved. Colombianas* **1**: 401–423. In Spanish.
Bogorodski, Y.V. (1991). [The Yellow-browed Bunting (*Emberiza elegans*) in southern part of the area west to the Baikal Lake]. *Ornitologiya* **25**: 148. In Russian.
Bohórquez, C.I. & Stiles, F.G. (2002). The paradoxical social system of the Dusky Bush-tanager (*Chlorospingus semifuscus*): lekking in a nine-primaried oscine? *J. Field Orn.* **73**: 281–291.
Boie, F. (1826). Generalübersicht der ornithologischen Ordnungen, Familien und Gattungen. *Isis von Oken* **19(10)**: cols. 969–982. In Latin.
Bojfror, D.J. (1959). Songs of the Chipping Sparrow. *Ohio J. Sci.* **59**: 347–356.
Bollinger, E.K. (1985). Factors influencing blackbird damage to field corn. *J. Wildl. Management* **49**: 1109–1115.
Bollinger, E.K. & Caslick, J.W. (1985). Red-winged Blackbird predation on northern corn rootworm beetles in field corn. *J. Appl. Ecol.* **22**: 39–48.
Bollinger, E.K. & Gavin, T.A. (1989). The effects of site quality on breeding-site fidelity in Bobolinks. *Auk* **106**: 584–594.
Bollinger, E.K. & Gavin, T.A. (1991). Patterns of extra-pair fertilizations in Bobolink *Behav. Ecol. Sociobiol.* **29**: 1–7.
Bollinger, E.K. & Gavin, T.A. (2004). Responses of nesting Bobolinks (*Dolichonyx oryzivorus*) to habitat edges. *Auk* **121(3)**: 767–776.
Bollinger, E.K., Bollinger, P.B. & Gavin, T.A. (1990). Effects of hay-cropping on eastern populations of the Bobolink. *Wildl. Soc. Bull.* **18**: 142–150.
Bollinger, E.K., Gavin, T.A., Hibbard, C.J. & Wootton, J.T. (1986). Two male Bobolinks feed young at the same nest. *Wilson Bull.* **98**: 154–156.
Bollinger, E.K., Gavin, T.A. & McIntyre, D.C. (1988). Comparison of transects and circular-plots for estimating Bobolink densities. *J. Wildl. Management* **52**: 777–786.
Bonaccorsi, G. (1999). Présence prolongée de Bruant nain *Emberiza pusilla* en Corse. *Alauda* **67(2)**: 140. In French.
Bonaccorso, E., Navarro-Sigüenza, A.G., Sánchez-González, L.A., Peterson, A.T. & García-Moreno, J. (2008). Genetic differentiation of the *Chlorospingus ophthalmicus* complex in Mexico and Central America. *J. Avian Biol.* **39(3)**: 311–321.
Bond, J. (1928a). The distribution and habits of the birds of the Republic of Haiti. *Proc. Acad. Nat. Sci. Philadelphia* **80**: 483–521.
Bond, J. (1928b). On the birds of Dominica, St. Lucia, St. Vincent, and Barbados, B.W.I. *Proc. Acad. Nat. Sci. Philadelphia* **80**: 523–545.
Bond, J. (1929a). A new tanager from the Massif de la Selle, Haiti. *Proc. Acad. Nat. Sci. Philadelphia* **81**: 473–474.
Bond, J. (1929b). The rediscovery of the St. Lucian Black Finch (*Melanospiza richardsoni*). *Auk* **46**: 523–526.
Bond, J. (1934). A new Lizard Cuckoo from the Dominican Republic with remarks on the Saona Palm Tanager. *Proc. Acad. Nat. Sci. Philadelphia* **85**: 369.
Bond, J. (1939). Some birds from Montserrat, British West Indies. *Auk* **56(2)**: 193–195.
Bond, J. (1943). Nidification of the passerine birds of Hispaniola. *Wilson Bull.* **55**: 115–125.
Bond, J. (1947). A second specimen of *Tangara gouldi* (Sclater). *Auk* **64**: 128.
Bond, J. (1948). Origin of the bird fauna of the West Indies. *Wilson Bull.* **60**: 207–229.
Bond, J. (1951a). Notes on Peruvian Fringillidae. *Proc. Acad. Nat. Sci. Philadelphia* **103**: 65–84.
Bond, J. (1951b). Taxonomic notes on South American birds. *Proc. Acad. Nat. Sci. Philadelphia* **193**: 84.
Bond, J. (1955). Notes on Peruvian Coerebidae and Thraupidae. *Proc. Acad. Nat. Sci. Philadelphia* **107**: 35–55.
Bond, J. (1956). *Check-list of Birds of the West Indies*. The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Bond, J. (1961). *Birds of the West Indies*. Houghton Mifflin, Boston, Massachusetts.
Bond, J. (1971). *Sixteenth Supplement to the Check-list of Birds of the West Indies (1956)*. The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Bond, J. (1982). *Twenty-fourth Supplement to the Check-list of Birds of the West Indies (1956)*. Academy of Natural Sciences, Philadelphia, Pennsylvania.
Bond, J. (1985). *Birds of the West Indies*. 5th edition. Collins, London.
Bond, J. & Dod, A. (1977). A new race of Chat Tanager (*Calyptophilus frugivorus*) from the Dominican Republic. *Notul. Nat. (Philadelphia)* **451**: 1–4.
Bond, J. & Meyer de Schauensee, R. (1939). Descriptions of new birds from Bolivia. Part 1. Oscines. *Notul. Nat. (Philadelphia)* **12**: 1–5.
Bond, J. & Meyer de Schauensee, R. (1942). The birds of Bolivia. Part 1. *Proc. Acad. Nat. Sci. Philadelphia* **94**: 307–391.
Bond, J. & Meyer de Schauensee, R. (1944). The birds of the islands of Old Providence and St. Andrews. *Monogr. Acad. Nat. Sci. Philadelphia* **6**: 10–21.
Bond, J. & Stewart, R.E. (1951). A new Swamp Sparrow from the Maryland Coastal Plain. *Wilson Bull.* **63**: 38–40.
de Bont, M. (2003). Observations of Opal-crowned Tanager *Tangara callophrys* in north-west Brazil. *Cotinga* **20**: 104–106.
Borges, F.J.A. & Marini, M.Â. (2008). Primeira descrição do ninho do Mineirinho (*Charitospiza eucosma*) no cerrado do Brasil Central. *Rev. Bras. Orn.* **16(1)**: 38–39. In Portuguese with English summary.
Borges, S.H. & Cardoso, R.M. (1995). Ninho e ovos de *Caryothraustes canadensis* (Passeriformes: Emberizidae). *Ararajuba* **3**: 76. In Portuguese.
Borges, S.H. & Torres de Macedo, I. (2001). Cecropia fruits and Müllerian bodies in the diet of Chestnut-bellied Seedeater *Sporophila castaneiventris*. *Cotinga* **15**: 17–18.
Borja, R., Núñéz, W., Rodríguez, D. & Bolívar, A. (2001). Reporte del Torito (*Molothrus armenti*) en el Departamento del Atlántico, Caribe colombiano. *Bol. Soc. Antioqueña Orn.* **12**: 84–87. In Spanish.
Bornschein, M.R. & Reinert, B.L. (1996). New records on the Sooty Grassquit (*Tiaris fuliginosa*) (Emberizidae) in Paraguay and southern Brazil. *Ararajuba* **4(2)**: 105–106.
Bornschein, M.R. & Reinert, B.L. (2000). Aves de três remanescentes florestais do norte do estado do Paraná, sul do Brasil, com sugestões para a conservação e manejo. *Rev. Bras. Zool.* **17**: 615–636. In Portuguese.
Bornschein, M.R., Reinert, B.L. & Pichorim, M. (1997). Notas sobre algumas aves novas ou pouco conhecidas no sul do Brasil. *Ararajuba* **5(1)**: 53–59. In Portuguese with English summary.
Bornschein, M.R., Reinert, B.L. & Pichorim, M. (1999a). Sobre *Agelaius cyanopus* no Litoral do Paraná (Icteridae, Aves). I. Registros e subespécie. Page R518 in: Anon. (1999). *Resumos do XX Congresso Brasileiro Zoologia (1994)*. Universidade Federal do Rio de Janeiro, Rio de Janeiro. In Portuguese.
Bornschein, M.R., Reinert, B.L. & Pichorim, M. (1999b). Sobre *Agelaius cyanopus* no Litoral do Paraná (Icteridae, Aves). II. Aspectos reprodutivos. Page R519 in: Anon. (1999). *Resumos do XX Congresso Brasileiro Zoologia (1994)*. Universidade Federal do Rio de Janeiro, Rio de Janeiro. In Portuguese.
Borrero, J.I. (1955). Apuntes sobre aves colombianas. No. 2. *Lozania* **9**: 1–15. In Spanish.
Borror, D.J. (1959). Variation in the songs of the Rufous-sided Towhee. *Wilson Bull.* **71**: 54–72.
Borror, D.J. (1961). Songs of finches (Fringillidae) of eastern North America. *Ohio J. Sci.* **61**: 161–174.
Borror, D.J. (1975). Songs of the Rufous-sided Towhee. *Condor* **77(2)**: 183–195.
Borrow, N. & Demey, R. (2001). *Birds of Western Africa*. Helm Identification Guides. Christopher Helm, London.
Bosche, H.J. (1988). Der Zwergkardinal – seine Pflege und Zucht. *Gefiederte Welt* **112(4)**: 105–106. In German.
Bosche, H.J. (1989). Die gelungene Aufzucht eines Roten Kronfinks *Coryphospingus cucullatus*. *Gefiederte Welt* **113(5)**: 141–142. In German.
Bosque, C., Pacheco, M.A. & Siegel, R.B. (1999). Maintenance energy costs of two partially folivorous tropical passerines. *Auk* **116(1)**: 246–252.
Bosselmann, J. (2005). Vorkommen und Bestandserfassung der Zaunammer *Emberiza cirlus* im Gebiet der Haardt, Rheinland-Pfalz. *Orn. Mitt.* **57(7/8)**: 242–247. In German.
Boswall, J. (1970). The song of the Pine Bunting. *British Birds* **63**: 256–257.
Botero, C.A. (2001). First specimen of the Ecuadorian Cacique from Colombia with notes on its nesting behavior. *Wilson Bull.* **113**: 327–328.
Botero, J.E. & Verhelst, J.C. (2001). Turquoise Dacnis, *Dacnis hartlaubi*, a Colombian endemic in shade coffee plantations. *Cotinga* **15**: 34–36.
Botero, J.E., Lentijo, G.M., López, A.M., Castellanos, O., Aristizábal, C., Franco, N. & Arbeláez, D. (2005). Adiciones a la lista de aves del municipio de Manizales. *Bol. Soc. Antioqueña Orn.* **15**: 69–88. In Spanish.
Both, C. (2010a). Flexibility of timing of avian migration to climate change masked by environmental constraints en route. *Curr. Biol.* **20**: 243–248.
Both, C. (2010b). Food availability, mistiming, and climatic change. Pp. 129–1482 in: Møller, Fiedler & Berthold (2010).

Both, C. & te Marvelde, L. (2007). Climate change and timing of avian breeding and migration throughout Europe. *Climate Res.* **35**: 93–105.
Both, C. & Visser, M.E. (2001). Adjustment to climate change is constrained by arrival date in a long-distance migrant bird. *Nature (London)* **411**: 496–498.
Both, C., Artemyev, A.V., Blaauw, B., and 20 other authors (2004). Large scale geographical variation confirms that climate change causes birds to lay earlier. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **271**: 1657–1662.
Both, C., van Asch, M., Bijlsma, R.G., van den Burg, A.B. & Visser, M.E. (2009). Climate change and unequal phenological changes across four trophic levels: constraints or adaptations? *J. Anim. Ecol.* **78**: 73–83.
Both, C., Bouwhuis, S., Lessells, C. & Visser, M. (2006). Climate change and population declines in a long-distance migratory bird. *Nature (London)* **441**: 81–83.
Both, C., Piersma, T. & Roodbergen, S.P. (2005). Climatic change explains much of the 20th century advance in laying date of Northern Lapwing *Vanellus vanellus* in the Netherlands. *Ardea* **93**: 79–88.
Both, C., Sanz, J.J., Artemyev, A.V., and 15 other authors (2006). Pied Flycatchers *Ficedula hypoleuca* travelling from Africa to breed in Europe: differential effects of winter and migration conditions on breeding date. *Ardea* **94(3)**: 511–525.
Both, C., van Turnhout, C.A.M., Bijlsma, R.G., Siepel, H., van Strien, A.J. & Foppen, R.P.B. (2010). Avian population consequences of climate change are most severe for long-distance migrants in seasonal habitats. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **277**: 1259–1266.
Boulton, R.L. & Lockwood, J.L. (2010). Response of endangered Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*) to nest exclosures. *Florida Field Nat.* **38(1)**: 8–11.
Boulton, R.L., Baiser, B., Davis, M.J., Virzi, T. & Lockwood, J.L. (2011). Variation in laying date and clutch size: the Everglades environment and the endangered Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*). *Auk* **128(2)**: 374–381.
Boulton, R.L., Lockwood, J.L., Davis, M.J., Pedziwilk, A., Boadway, K.A., Boadway, J.J.T., Okines, D. & Pimm, S.L. (2009). Endangered Cape Sable Seaside Sparrow survival. *J. Wildl. Management* **73(4)**: 530–537.
Boulva, J. & Browne, P. (1965). Le Conte's Sparrow breeding in Chicoutimi County, Province of Quebec, Canada. *Auk* **82**: 644–645.
Bourne, W.R.P. & David, A.C.F. (1981). Nineteenth century bird records from Tristan da Cunha. *Bull. Brit. Orn. Club* **101**: 247–256.
Bowdish, B.S. (1903). Birds of Porto Rico. *Auk* **20**: 10–23.
Bowen, P.S.J. (1983). The Larklike Bunting *Emberiza impetuani* in Mwinilunga District. *Bull. Zambian Orn. Soc.* **13–15**: 41–43.
Bowers, R.K. & Dunning, J.B. (1985). Predator avoidance through burrow use by Cassins's and Black-throated Sparrows. *Western Birds* **16(1)**: 51.
Bowman, G. (1996). More hybrid Pine Buntings? *Birding World* **9(4)**: 154.
Bowman, R.I. (1961). Morphological differentiation and adaptation in the Galápagos finches. *Univ. Calif. Publ. Zool.* **58**: i–vii, 1–326.
Bowman, R.I. (1983). The evolution of song in Darwin's finches. Pp. 237–537 in: Bowman, R.I., Berson, M. & Leviton, A.E. eds. (1983). *Patterns of Evolution in Galápagos Organisms*. American Association for the Advancement of Science, Pacific Division, San Francisco, California.
Bowman, R.I. & Billeb, S.L. (1965). Blood-eating in a Galápagos finch. *Living Bird* **4**: 29–44.
Boyd, R.L. (2001). New distributional records of two tanagers in Mexico. *Cotinga* **15**: 58–59.
Boyd, R.L., Nyari, A.S., Benz, B.W. & Chen Guojun (2008). Aves, province of Guizhou, China. *Check List: J. Spec. Lists & Distrib.* **4(1)**: 107–114.
Boyer, H.J. & Bridgeford, P.A. (1988). Birds of the Naukluft Mountains: an annotated checklist. *Madoqua* **15**: 295–314.
Brackbill, H. (1944). Juvenile Cardinal helping at a nest. *Wilson Bull.* **56**: 50.
Brackbill, H. (1952). A joint nesting of Cardinals and Song Sparrows. *Auk* **69**: 302–307.
Brackbill, H. (1954). Cardinal's period of dependency. *Wilson Bull.* **66(2)**: 153.
Brackbill, H. (1967). Cardinal being eaten alive by gray squirrel. *Bird-Banding* **38**: 236.
Bradbury, R.B. & Stoate, C. (2000). The ecology of Yellowhammers *Emberiza citrinella* on lowland farmland. Pp. 165–172 in: Aebischer, N.J., Evans, A.D., Grice, P.V. & Vickery, J.A. eds. (2000). *Ecology and Conservation of Lowland Farmland Birds – Proceedings of the 1999 British Ornithologists' Union Spring Conference*. British Ornithologists' Union, Tring, UK.
Bradbury, R.B., Bailey, C.M., Wright, D. & Evans, A.D. (2008). Wintering Cirl Buntings *Emberiza cirlus* in southwest England select cereal stubbles that follow a low-input herbicide regime. *Bird Study* **55(1)**: 23–31.
Bradbury, R.B., Kyrkos, A., Morris, A.J., Clark, S.C., Perkins, A.J. & Wilson, J.D. (2000). Habitat associations and breeding success of Yellowhammers on lowland farmland. *J. Appl. Ecol.* **37(5)**: 789–805.
Bradley, D. (2005). Audio recordings of *Chlorospingus tacarcuna* from Cerro Chucantí, Panama. Xeno-Canto, XC2980. Unpubl.
Bradley, H.L. (1948). A life history study of the Indigo Bunting. *Jack-Pine Warbler* **26**: 103–113.
Bradley, P. (1995). *Birds of the Cayman Islands*. Revised edition. Caerulea Press, Italy.
Bradley, R.A. (1977). Geographic variation in the song of Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*). *Bull. Florida State Mus. (Biol. Sci.)* **22**: 57–99.
Bradley, R.A. (1994). Cultural change and geographic variation in the songs of the Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*). *Bull. South. Calif. Acad. Sci.* **93(3)**: 91–109.
Bradshaw, C. (1991). Identification of Little and Rustic Buntings. *Birding World* **4(9)**: 309–313.
Bradshaw, C. (1992). Field identification of Black-faced Bunting. *British Birds* **85(12)**: 653–665.
Bradshaw, C. & Gray, M. (1993). Identification of female Pine Buntings. *British Birds* **86(8)**: 378–386.
Bradshaw, F. (1934). The Grasshopper Sparrow, *Ammodramus savannarum* and Lark Bunting, *Calamospiza melanocorys* in Saskatchewan. *Can. Field Nat.* **48**: 137–138.
Brambilla, M., Battaglia, A. & Rubolini, D. (2004). Osservazioni di Zigolo capinero, *Emberiza melanocephala* in canto in provincia di Piacenza. *Riv. Ital. Orn.* **74(2)**: 148–150. In Italian.
Brambilla, M., Guidali, F. & Negri, I. (2008). The importance of an agricultural mosaic for Cirl Buntings *Emberiza cirlus* in Italy. *Ibis* **150(3)**: 628–632.
Brambilla, M., Guidali, F. & Negri, I. (2009). Breeding-season habitat associations of the declining Corn Bunting *Emberiza calandra* – a potential indicator of the overall bunting richness. *Ornis Fenn.* **86(2)**: 41–50.
Brandt, C.S., Hasenack, H., Laps, R.R. & Hartz, S.M. (2009). Composition of mixed-species bird flocks in forest fragments of southern Brazil. *Zoologia (Curitiba, Impresso)* **26(3)**: 488–498.
Braun, M.J. & Emanuel, V. (1982). Records of the Crimson-collared Grosbeak (*Rhodothraupis celaeno*) from Texas. *Auk* **99(4)**: 787.
Braun, M.J., Finch, D.W., Robbins, M.B. & Schmidt, B.K. (2000). *A Field Checklist of the Birds of Guyana*. Publication **41**. Biological Diversity of the Guianas Program, National Museum of Natural History, Smithsonian Institution, Washington, D.C.
Braun, M.J., Robbins, M.B., Milensky, C.M., O'Shea, B.J., Barber, B.R., Hinds, W. & Prince, W.S. (2003). New birds for Guyana from Mts Roraima and Ayanganna. *Bull. Brit. Orn. Club* **123(1)**: 24–31.
Brawn, J.D., Collins, T.M., Medina, M. & Bermingham, E. (1996). Associations between physical isolation and geographical variation within three species of Neotropical birds. *Mol. Ecol.* **5(1)**: 33–46.
Bray, O.E., Kennelly, J.J. & Guarino, J.L. (1975). Fertility of eggs produced on territories of vasectomized Red-winged Blackbirds. *Wilson Bull.* **87(2)**: 187–195.
Bray, O.E., Royall, W.C., Guarino, J.L. & Johnson, R.E. (1979). Activities of radio-equipped Common Grackles during fall migration. *Wilson Bull.* **91**: 78–87.
Brazil, M.A. (1991). *The Birds of Japan*. Christopher Helm, A&C Black & Smithsonian Institution Press, London & Washington, D.C.
Brazil, M.A. (2009). *Field Guide to the Birds of East Asia: Eastern China, Taiwan, Korea, Japan and Eastern Russia*. Christopher Helm, London.
Breaks, M. (2009). Pine Bunting on Fair Isle, October–November 2007. *Scottish Birds* **29(2)**: 180–182.
Brehme, S. & Hamann, J. (1992). Dorfbeobachtungen der Zwergammer (*Emberiza pusilla*) auf der Halbinsel Kola (Russland). *Orn. Mitt.* **44(9)**: 219–221. In German.
Breitwisch, R., Schilling, A.J. & Banks, J.B. (1999). Parental behavior of a bigamous male Northern Cardinal. *Wilson Bull.* **111(2)**: 283–286.
Brennan, L.A. & Kuvlesky, W.P. (2005). North American grassland birds: an unfolding conservation crisis? *J. Wildl. Management* **69(1)**: 1–13.
Brennan, S.P. & Schnell, G.D. (2005). Relationship between bird abundances and landscape characteristics: the influence of scale. *Environm. Monitor. Assessment* **105(1–3)**: 209–228.
Brenowitz, E.A. (1982). Long-range communication of species identity by song in the Red-winged Blackbird. *Behav. Ecol. Sociobiol.* **10**: 29–38.
Bretagnolle, V. & Gillis, H. (2010). Predator-prey interactions and climate change. Pp. 227–249 in: Møller, Fiedler & Berthold (2010).
Brewer, D., Diamond, A., Woodsworth, E.J., Collins, B.T. & Dunn, E.H. (2000). *Canadian Atlas of Bird Banding*. Vol. 1. Doves, cuckoos, and hummingbirds through passerines, 1921–1995. Special Publication. Canadian Wildlife Service, Ottawa, Canada.
Brewster, C.A. (1997). Influx of Larklike Buntings *Emberiza impetuani* into the Bobirwa area of eastern Botswana during 1996. *Babbler (Botswana)* **32**: 24–25.
Brewster, K.W. (1999). The Cirl Bunting in Britain. *British Birds* **92(6)**: 312–313.
Brickell, N. & Arnold, K. (1990). The feeding and breeding of southern African buntings in captivity and in the wild. *Avicult. Mag.* **96**: 184–187.
Brickell, N. & Konigkramer, T. (1997). *African Birds in Field and Aviary – a Guide to a Mixed Collection*. African Bird Book Publishing, Westville, South Africa.
Brickle, N.W. & Peach, W.J. (2004). The breeding ecology of Reed Buntings *Emberiza schoeniclus* in farmland and wetland habitats in lowland England. *Ibis* **146** (Suppl. 2): 69–77.
Bright, J. & Kirby, W. (2008). Signs of hope for Corn Buntings in Europe. *British Birds* **101(11)**: 624–625.
Briskie, J.V. (1992). Copulation patterns and sperm competition in the polygynandrous Smith's Longspur. *Auk* **109(3)**: 563–575.
Briskie, J.V. (1993a). Smith's Longspur (*Calcarius pictus*). No. **34** in: Poole, A., Stettenheim, P. & Gill, F. eds. (1993). *The Birds of North America*. Vol. 1. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Briskie, J.V. (1993b). Anatomical adaptations to sperm competition in Smith's Longspurs and other polygynandrous passerines. *Auk* **110(4)**: 875–888.
Briskie, J.V. (1994). Seasonal patterns of sperm storage in the Yellow-headed Blackbird *Xanthocephalus xanthocephalus*. *Ibis* **136**: 323–330.
Briskie, J.V. (1999). Song variation and the structure of local song dialects in the polygynandrous Smith's Longspur. *Can. J. Zool.* **77(10)**: 1587–1594.
Briskie, J.V. (2009). Smith's Longspur (*Calcarius pictus*). No. **34** in: Poole, A. ed. (2009). The birds of North America online. Cornell Lab of Ornithology, Ithaca. URL: http://bna.birds.cornell.edu/bna/species/034 (download 15 June 2011).
Briskie, J.V. & Sealy, S.G. (1990). Evolution of short incubation periods in the parasitic cowbirds, *Molothrus* spp. *Auk* **107**: 789–794.
Briskie, J.V., Montgomerie, R., Poldmaa, T. & Boag, P.T. (1998). Paternity and paternal care in the polygynandrous Smith's Longspur. *Behav. Ecol. Sociobiol.* **43(3)**: 181–190.
Briskie, J.V., Sealy, S.G. & Hobson, K.A. (1992). Behavioral defenses against avian brood parasitism in sympatric and allopatric host populations. *Evolution* **46**: 334–340.
de Brito, M.T. & Pereira, G.A. (2006). Relação das cinco espécies de aves do Estado de Pernambuco com mais nomes populares. *Atualidades Orn.* **129**: 14–15. In Portuguese.
Broad, R.A. & Oddie, W.E. (1980). Pallas's Reed Bunting: new to Britain and Ireland. *British Birds* **73(9)**: 402–408.
Brodkorb, P. (1937). Additions to the avifauna of Paraguay. *Proc. Biol. Soc. Washington* **50**: 33–34.
Brodkorb, P. (1939). Rediscovery of *Heleodytes chiapensis* and *Tangara cabanisi*. *Auk* **56**: 447–450.
Brodkorb, P. (1940). New birds from southern Mexico. *Auk* **57(4)**: 542–549.
Brodkorb, P. (1957). New passerine birds from the Pleistocene of Reddick, Florida. *J. Paleont. (USA)* **31**: 129–138.
Brodkorb, P. (1978). Catalogue of fossil birds. Part 5. *Bull. Florida State Mus. (Biol. Sci.)* **23(2)**: 139–228.
Brokhovich, S.A. (1990). On the delay of the moult of secondaries in the Ortolan Bunting (*Emberiza hortulana*) during autumn migration. *Ornitologiya* **24**: 168–169.
Brommer, J.E. (2004). The range margins of northern birds shift polewards. *Ann. Zool. Fennici* **41**: 391–397.
Brommer, J.E. (2008). Extent of recent polewards range margin shifts in Finnish birds depends on their body mass and feeding ecology. *Ornis Fenn.* **85**: 109–117.
Brommer, J.E. & Møller, A.P. (2010). Range margins, climate change, and ecology. Pp. 249–274 in: Møller, Fiedler & Berthold (2010).
Brook, B.W., Sodhi, N.S. & Bradshaw, C.J.A. (2008). Synergies among extinction drivers under global change. *Trends Ecol. Evol.* **23**: 453–460.
Brook, E.J. (1916). Breeding of the Yellow-breasted Grosbeak (*Pheucticus chrysogaster*), Nanday Conures, and Guttural Finch. *Avicult. Mag.* **8**: 28–29.
Brookfield, C.M. & Griswald, O. (1957). An exotic new oriole settles in Florida. *Natl. Geogr. Mag.* **109**: 261–264.
Brooks, D.J. (1987). Feeding observations of birds in North Yemen. *Sandgrouse* **9**: 115–120.
Brooks, E.W. (1974). Clay-colored Sparrow nesting in western New York. *Kingbird* **21(2)**: 68–69.
Brooks, E.W. (1985). Fidelity of an American Tree Sparrow to a wintering area. *J. Field Orn.* **56(4)**: 406–407.
Brooks, M. (1934). A melanistic Cardinal at French Creek. *Redstart* **1**: 1–2.
Brooks, M. (1938). Bachman's Sparrow in the north central portion of its range. *Wilson Bull.* **50**: 86–109.
Brooks, T. & Dávalos, L.M. (2001). The birds of Île-à-Vache, Haiti. *Caribb. J. Sci.* **37(1/2)**: 112–115.
Brooks, T.M., Clay, R.P., Lowen, J.C., Butchart, S.H.M., Barnes, R., Esquivel, E.Z., Etcheverry, N.I. & Vincent, J.P. (1996). New information on nine birds from Paraguay. *Orn. Neotropical* **6(2)**: 129–134.
Brosset, A. (1964). Les oiseaux de Pacaritambo (ouest de l'Ecuador). *Oiseau et RFO (Nouv. Sér.)* **34**: 1–24, 112–135. In French.
Brotons, L., Herrando, S. & Pons, P. (2008). Wildfires and the expansion of threatened farmland birds: the Ortolan Bunting *Emberiza hortulana* in Mediterranean landscapes. *J. Appl. Ecol.* **45(4)**: 1059–1066.
Broughton, K.E., Middleton, A.L.A. & Bailey, E.D. (1987). Early vocalizations of the Brown-headed Cowbird and three host species. *Bird Behaviour* **7**: 27–30.
Brower, L.P. & Calvert, W.H. (1985). Foraging dynamics of bird predators on overwintering monarch butterflies in Mexico. *Evolution* **39(4)**: 852–868.
Brown, B.T. (1994). Rates of brood-parasitism by Brown-headed Cowbirds on riparian passerines in Arizona. *J. Field Orn.* **65(2)**: 160–168.
Brown, C.J. & Barnes, P.R. (1984). Birds of the Natal alpine belt. *Lammergeyer* **33**: 1–13.
Brown, G. & Degia, C. (1994). Birds and the dry limestone forests of Jamaica. *Gosse Bird Club Broadsheet* **63**: 3–4.
Brown, H.C. (1920). The Cardinal in north-central Iowa. *Wilson Bull.* **32**: 123–132.
Brown, K.S. & Neto, J.V. (1976). Predation on aposematic Ithomiine butterflies by tanagers (*Pipraeidea melanonota*). *Biotropica* **8**: 136–141.
Browning, N.G. & Robel, R.J. (1981). Metabolizable energy in four seeds fed to Cardinals (*Cardinalis cardinalis*). *Trans. Kansas Acad. Sci.* **84**: 115–118.

Brudenell-Bruce, P.G.C. (1975). *The Birds of the Bahamas*. Taplinger Publishing, New York.
Brugger, K.E. & Dolbeer, R.A. (1990). Geographic origin of Red-winged Blackbirds relative to rice culture in southwestern and south central Louisiana. *J. Field Orn.* **61**: 90–97.
Bruggers, R.L. & Zaccagnini, M.E. (1994). Vertebrate pest problems related to agricultural production and applied research in Argentina. *Vida Silvestre Neotropical* **3**: 71–83.
Brumfield, R.T. & Edwards, S.V. (2007). Evolution into and out of the Andes: a Bayesian analysis of historical diversification in *Thyamnopohilus* antshrikes. *Evolution* **61**: 346–367.
Brumfield, R.T. & Maillard, O. (2007). Birds of the central Rio Paracti valley, a humid montane forest in Departamento Cochabamba, Bolivia. *Orn. Neotropical* **18(3)**: 321–337.
Brunton, D.F. & Pratt, T. (1986). Sightings of a Black-throated Sparrow, *Amphispiza bilineata*, and a Black Vulture, *Coragyps atratus*, in British Columbia. *Can. Field-Nat.* **100(2)**: 256–257.
Brush, A.H. (1967). Pigmentation in the Scarlet Tanager, *Piranga olivacea*. *Condor* **69**: 549–559.
Brush, T. (1998a). Olive Sparrow (*Arremonops rufivirigatus*). No. **325** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 9. The Birds of North America Inc., Philadelphia, Pennsylvania.
Brush, T. (1998b). Rare, local, little-known, and declining North American breeders. A closer look: Altamira Oriole. *Birding (USA)* **30(1)**: 46–53.
Brush, T. (2009). Range expansions and new breeding records of birds in Tamaulipas, Mexico. *Southwest. Nat.* **54(1)**: 91–96.
Bruslund, S. & Kirchhöffel, K. (2010). Azurkopftangaren – kleine Juwelen im Weltvogelpark Walsrode. *Gefiederte Welt* **134(11)**: 8–10. In German.
Bruun, B. (1984). Cinereous Bunting *Emberiza cineracea* in Egypt. *Courser* **1**: 44–46.
Buchi, B. (1984). Zucht des Gelbschnabel-Grünorganisten (*Chlorophonia flavirostris*). *Trochilus* **5(3)**: 83–84. In German.
Buckley, P.A. & Buckley, F.G. (2004). Rapid speciation by a Lesser Antillean endemic, Barbados Bullfinch *Loxigilla barbadensis*. *Bull. Brit. Orn. Club* **124**: 108–123.
Buckley, P.A., Foster, M.S., Morton, E.S., Ridgely, R.S. & Buckley, F.G. eds. (1985). *Neotropical Ornithology*. Ornithological Monographs **36**. American Ornithologists' Union, Washington, D.C.
Buden, D.W. (1980). The Stripe-headed Tanager, *Spindalis zena*, in the southern Bahamas. *Caribb. J. Sci.* **16(1–4)**: 1–4.
Buden, D.W. (1986). A new subspecies of Greater Antillean Bullfinch *Loxigilla violacea* from the Caicos Islands with notes on other populations. *Bull. Brit. Orn. Club* **106(4)**: 156–161.
Buden, D.W. (1987). *The Birds of the Southern Bahamas: an Annotated Check-list*. British Ornithologists' Union Checklist **8**. British Ornithologists' Union, London.
Buden, D.W. & Olson, S.L. (1989). The avifauna of the Cayerias of southern Cuba, with the ornithological results of the Paul Bartsch expedition of 1930. *Smithsonian Contrib. Zool.* **477**: 1–34.
Budki, P., Rani, S. & Kumar, V. (2009). Food deprivation during photosensitive and photorefractory life-history stages affects the reproductive cycle in the migratory Red-headed Bunting (*Emberiza bruniceps*). *J. Exp. Biol.* **212(2)**: 225–230.
Buffel, H. (2007). Der Orangeblaufink – ein schöner, aber empfindlicher Farbfink. *Gefiederte Welt* **131(8)**: 230–232. In German.
Buford, J.E., Friedrich, T.J. & Yasukawa, K. (1998). Response to playback of nestling begging in the Red-winged Blackbird, *Agelaius phoeniceus*. *Anim. Behav.* **56**: 555–561.
Bulgin, N.L., Gibbs, H.L., Vickery, P. & Baker, A.J. (2003). Ancestral polymorphisms in genetic markers obscure detection of evolutionary distinct populations in the endangered Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*). *Mol. Ecol.* **12(4)**: 831–844.
Bull, J. (1988). A first substantiated record of Golden Crowned Sparrow from New York State. *Kingbird* **38(1)**: 8–9.
Bump, S.R. (1986). Yellow-headed Blackbird nest defense: aggressive responses to Marsh Wrens. *Condor* **88**: 328–335.
Bumpus, H.C. (1899). The elimination of the unfit as illustrated by the introduced House Sparrow, *Passer domesticus*. *Biol. Lect. Mar. Biol. Lab. Wood's Hole* **6**: 209–226.
Bunyard, P.F. (1931). Remarks on the eggs of *Plectrophenax nivalis*. *Bull. Brit. Orn. Club* **51**: 112–114.
Burfield, I. & van Bommel, F. eds. (2004). *Birds in Europe: Population Estimates, Trends and Conservations Status*. BirdLife Conservation Series **12**. BirdLife International, Cambridge, UK.
Burhans, D.E. (1997). Habitat and microhabitat features associated with cowbird parasitism in two forest edge cowbird hosts. *Condor* **99**: 866–872.
Burhans, D.E. (2002). *Conservation Assessment – Henslow's Sparrow* Ammodramus henslowii. General Technical Report **226**. North Central Research Station, Forest Service, US Department of Agriculture, St. Paul, Minnesota. i–iv, 1–46 pp.
Burhans, D.E., Strausberger, B.M. & Carey, M.D. (2001). Regional variation in response of Field Sparrows to the threat of Brown-headed Cowbird parasitism. *Auk* **118(3)**: 776–780.
Burhans, D.E., Thompson, F.R. & Faaborg, J. (2000). Costs of parasitism incurred by two songbird species and their quality as cowbird hosts. *Condor* **102**: 364–373.
Burke, T.W. (2001). First record of Cassin's Sparrow (*Aimophila cassinii*) for New York State. *Kingbird* **51(1)**: 450–452.
Burmeister, H. (1856). *Systematische Uebersicht der Thiere Brasiliens, welche während einer Reise durch die Provinzen von Rio de Janeiro und Minas geraës gesammelt oder beobachtet wurden*. Vol. 3. Vögel (Aves), part 2. Georg Reimer, Berlin. In German.
Burnell, K. (1998). Cultural variation in Savannah Sparrow, *Passerculus sandwichensis*, songs: an analysis using the meme concept. *Anim. Behav.* **56(4)**: 995–1003.
Burnell, K. & Rothstein, S.I. (1994). Variation in the structure of female Brown-headed Cowbird vocalizations and its relation to vocal function and development. *Condor* **96**: 703–715.
Burns, K.J. (1997a). *Molecular Phylogenetics of Tanagers and the Evolution of Sexual Dimorphism in Plumage*. PhD thesis, University of California, Berkeley, California.
Burns, K.J. (1997b). Molecular systematics of tanagers (Thraupinae): evolution and biogeography of a diverse radiation of Neotropical birds. *Mol. Phylogen. Evol.* **8**: 334–348.
Burns, K.J. (1998a). Molecular phylogenetics of the genus *Piranga*: implications for biogeography and the evolution of morphology and behavior. *Auk* **115**: 621–634.
Burns, K.J. (1998b). A phylogenetic perspective on the evolution of sexual dichromatism in tanagers (Thraupidae): the role of female versus male plumage. *Evolution* **52**: 1219–1224.
Burns, K.J. & Hackett, S.J. (1993). Nest and nest-site characteristics of a population of Fox Sparrow (*Passerella iliaca*). *Southwest. Nat.* **38**: 277–279.
Burns, K.J. & Naoki, K. (2004). Molecular phylogenetics and biogeography of Neotropical tanagers in the genus *Tangara*. *Mol. Phylogen. Evol.* **32**: 838–854.
Burns, K.J. & Racicot, R.A. (2009). Molecular phylogenetics of a clade of lowland tanagers: implications for avian participation in the great American interchange. *Auk* **126(3)**: 635–648.
Burns, K.J., Barker, F.K., Klicka, J., Lanyon, S.M. & Lovette, I.J. (2010). A multilocus molecular phylogeny of the tanagers (Aves: Thraupidae). MS.
Burns, K.J., Hackett, S.J. & Klein, N.K. (2002). Phylogenetic relationships and morphological diversity in Darwin's finches and their relatives. *Evolution* **56**: 1240–1252.
Burns, K.J., Hackett, S.J. & Klein, N.K. (2003). Phylogenetic relationships of Neotropical honeycreepers and the evolution of feeding morphology. *J. Avian Biol.* **34(4)**: 360–370.
Burns, R.D. (1963). Michigan cooperative Cardinal study nesting data. *Jack-Pine Warbler* **41**: 56–61.
Burrit, E.H. & Hailman, J.P. (1979). Effect of food availability on leaf-scratching by the Rufous-sided Towhee: test of a model. *Wilson Bull.* **91(1)**: 123–126.
Burton, P.J.K. (1975). Passerine bird weights from Panama and Colombia, with some notes on "soft-part" colours. *Bull. Brit. Orn. Club* **95**: 82–86.
Busch, D.S., Wingfield, J.C. & Moore, I.T. (2004). Territorial aggression of a tropical passerine, *Zonotrichia capensis*, in response to a variety of conspecific intruders. *Behaviour* **141(9)**: 1173–1188.
Busche, G. (1989). Niedergang des Bestandes der Grauammer (*Emberiza calandra*) in Schleswig-Holstein. *Vogelwarte* **35**: 11–20. In German.
Busche, G. (2005). Zum Zugvorkommen des Ortolans *Emberiza hortulana* an der Deutschen Bucht (Helgoland und schleswig-holsteinische Küste) 1964–2000. *Vogelwarte* **43(3)**: 179–184. In German with English summary.
Busche, G. & Dierschke, J. (2004). Das Vorkommen der Spornammer *Calcarius lapponicus* an der Westküste Schleswig-Holsteins und auf Helgoland. *Corax* **19(3)**: 303–309. In German with English summary.
Busching, W.D. (2002). Zum Bau des Steuers adulter Graukopfammern *Emberiza fucata*. *Orn. Mitt.* **54(4)**: 140–142. In German.
Buse, A., Dury, S.J., Woodburn, R.J.W., Perrins, C.M. & Good, J.E.G. (1999). Effects of elevated temperature on multi-species interactions: the case of pedunculate oak, winter moth and tits. *Functional Ecol.* **13** (Suppl. 1): 74–82.
Buskirk, W.H. (1976). Social systems in a tropical forest avifauna. *Amer. Naturalist* **110**: 293–310.
Buskirk, W.H., Powell, G.V.N., Wittenberger, J.F., Buskirk, R.E. & Powell, T. (1972). Interspecific bird flocks in tropical highland Panama. *Auk* **89**: 612–624.
Busuttil, S. & Ayé, R. (2009). Ornithological surveys in Bamiyan Province, Islamic Republic of Afghanistan. *Sandgrouse* **31(2)**: 146–159.
Busy, W.H., Patti, S.T. & Rader, M. (1999). Summer record of the Rufous-crowned Sparrow in Kansas. *Kansas Orn. Soc. Bull.* **50(2)**: 27–28.
Butchart, S.H.M. & Stattersfield, A.J. eds. (2004). *Threatened Birds of the World 2004*. CD-ROM. BirdLife International, Cambridge, UK.
Butcher, G.S. (1991). Mate choice in female Northern Orioles with a consideration of the role of the black male coloration in female choice. *Condor* **93**: 82–88.
Butcher, G.S. & Rowher, S. (1988). The evolution of conspicuous and distinctive coloration for communication in birds. *Curr. Orn.* **6**: 51–108.
Butcher, G.S., Niven, D.K., Panjabi, A.O., Pashley, D.N. & Rosenberg, K.V. (2007). The 2007 watchlist for United States birds. *Amer. Birds* **61**: 18–25.
Butler, A.G. (1903). On the development of the adult colouring in the Yellow-billed Cardinal (*Paroaria capitata*) from S. America. *Proc. Zool. Soc. London* **1903**: 350–351.
Butler, L.K., Donahue, M.E. & Rohwer, S. (2002). Molt-migration in Western Tanagers (*Piranga ludoviciana*): age effects, aerodynamics, and conservation implications. *Auk* **119(4)**: 1010–1023.
Butler, M.W., Garvin, J.C., Wheelwright, N.T. & Freeman-Gallant, C.R. (2009). Ambient temperature, but not paternity, is associated with immune response in Savannah Sparrows (*Passerculus sandwichensis*). *Auk* **126(3)**: 536–542.
Butler, R.W. (1981). Nesting of Brewer's Blackbirds on man-made structures and natural sites in British Columbia. *Can. Field-Nat.* **95**: 476–477.
Button, G.M. (1937). The juvenal plumage and post-juvenal molt of the Chipping Sparrow. *Occas. Pap. Mus. Zool. Univ. Mich.* **355**: 1–5.
Buzzetti, D. (2009). Report on Selva Caciques from Acre state, Brazil. Unpubl.
Buzzetti, D. & Carlos, B.A. (2005). A redescoberta do Tiê-bicudo (*Conothraupis mesoleuca*) (Berlioz, 1939). *Atualidades Orn.* **127**: 4–5. In Portuguese.
Buzzetti, D. & Silva, S. (2005). *Nurturing New Life: Nests of Brazilian Birds*. Editora Terceiro Nome, São Paulo, Brazil.
Byers, C., Curson, J. & Olsson, U. (1995). *Sparrows and Buntings. A Guide to the Sparrows and Buntings of North American and the World*. Houghton Mifflin, Boston, Massachusetts.
Byers, C., Olsson, U. & Curson, J. (1995). *Buntings and Sparrows. A Guide to the Buntings and North American Sparrows*. Pica Press, Mountfield, East Sussex, UK.
Cabrera-Garcia, L., Montes, J.A.V. & Weinmann, M.E.E. (2006). Identification of priority habitats for conservation of the Sierra Madre Sparrow *Xenospiza baileyi* in Mexico. *Oryx* **40(2)**: 211–217.
Caccamise, D.F. (1977). Breeding success and nest site characteristics of the Red-winged Blackbird. *Wilson Bull.* **89**: 396–403.
Cáceres, N.C. & Moura, M.O. (2003). Fruit removal of a wild tomato, *Solanum granulosoleprosum* Dunal (Solanaceae), by birds, bats and non-flying mammals in an urban Brazilian environment. *Rev. Bras. Zool.* **20(3)**: 519–522.
Cadena, C.D. & Cuervo, A.M. (2010). Molecules, ecology, morphology, and songs in concert: how many species is *Arremon torquatus* (Aves: Emberizidae)? *Biol. J. Linn. Soc.* **99**: 152–176.
Cadena, C.D., Alvarez, M., Parra, J.L., Jiménez, I., Mejía, C.A., Santamaría, M., Franco, A.M., Botero, C.A., Mejía, G.D., Umaña, A.M., Calixto, A., Aldana, J. & Londoño, G.A. (2000). The birds of CIEM, Tinigua National Park, Colombia: an overview of 13 years of ornithological research. *Cotinga* **13**: 46–54.
Cadena, C.D., Córdoba-Córdoba, S., Londoño, G.A., Calderón-Franco, D., Martin, T.E. & Baptiste, M.P. (2007). Nesting and singing behavior of Common Bush-tanagers (*Chlorospingus ophthalmicus*) in South America. *Orn. Colombiana* **5**: 54–63.
Cadena, C.D., Cuervo, A.M. & Lanyon, S.M. (2004). Phylogenetic relationships of the Red-bellied Grackle (Icteridae: *Hypopyrrhus pyrohypogaster*) inferred from mitochondrial DNA sequence data. *Condor* **106**: 664–670.
Cadena, C.D., Devenish, C. & Silva, N. (2002). First observations on the nesting behavior of the Colombian Mountain-grackle (*Macroagelaius subalaris*), a probable cooperative breeder. *Orn. Neotropical* **13**: 301–305.
Cadena, C.D., Gutiérrez-Pinto, N., Dávila, N. & Chesser, R.T. (2011). No population genetic structure in a widespread aquatic songbird from the Neotropics. *Mol. Phyl. Evol.* **58(3)**: 540–545.
Cadena, C.D., Klicka, J. & Ricklefs, R.E. (2007). Evolutionary differentiation in the Neotropical montane region: molecular phylogenetics and phylogeography of Buarremon Brush-finches (Aves, Emberizidae). *Mol. Phylogen. Evol.* **44(3)**: 993–1016.
Cadman, M.D., Sutherland, D.A., Beck, G.G., Lepage, D. & Couturier, A.R. eds. (2007). *Atlas of the Breeding Birds of Ontario, 2001–2005*. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources & Ontario Nature, Toronto.
Cahill, J.R.A. (2008). An albino Gray-bellied Flowerpiercer (*Diglossa carbonaria*) in the high Andes of Bolivia. *Ecol. Bolivia* **43(1)**: 53–57.
Cahill, J.R.A. & Matthysen, E. (2007). Habitat use by two specialist birds in high-Andean *Polylepis* forests. *Biol. Conserv.* **140**: 62–69.
Cahill, J.R.A., Matthysen, E. & Huanca, N.E. (2008). Nesting biology of the Giant Conebill (*Oreomanes fraseri*) in the high Andes of Bolivia. *Wilson J. Orn.* **120(3)**: 545–549.
Callaghan, E. (1983). Breeding the Black-headed Grosbeak. *Aviculr. Mag.* **89**: 137–145.
Calvert, W.H., Hedrick, L.E. & Brower, L.P. (1979). Mortality of the monarch butterfly (*Danaus plexippus* L.): avian predation at five overwintering sites in Mexico. *Science (Washington, D.C.)* **204(4395)**: 847–851.
Calvo, E., Yesid, A. & Duque Castro, A. (2003). Registro avifaunístico de una zona alta del Chocó (San Antonio de Galápagos – San José del Palmar), con una noticia sobre las poblaciones locales de la especie *Bangsia aureocincta* (Thraupidae). *Bol. Cient. Mus. Hist. Nat. Univ. Caldas* **7**: 29–37. In Spanish.
Camp, R.J., Pratt, T.K., Gorresen, P.M., Jeffrey, J.J. & Woodworth, B.L. (2010). Population trends of forest birds at Hakalau Forest National Wildlife Refuge, Hawai'i. *Condor* **112(2)**: 196–212.
Campagna, L., Lijtmaer, D.A., Kerr, K.C.R., Barreira, A.S., Hebert, P.D.N., Lougheed, S.C. & Tubaro, P.L. (2010). DNA barcodes provide new evidence of a recent radiation in the genus *Sporophila* (Aves: Passeriformes). *Mol. Ecol. Resources* **10(3)**: 459–458.
Campbell, B. & Lack, E. eds. (1985). *A Dictionary of Birds*. T.&A.D. Poyser, Calton, UK.
Campbell, R.W., Dawe, N.K., McTaggart-Cowan, I., Cooper, J.M., Kaiser, G.W., Stewart, A.C. & McNall, C.E. (2001). *The Birds of British Columbia*. Vol. 4. University of British Columbia Press, Vancouver, British Columbia.

Camperi, A.R. (1988). Sobre la supuesta presencia de *Agelaius thilius thilius* en la Argentina. *Hornero* **13**: 86–88. In Spanish.
Camperi, A.R. (1990). Nuevos registros para ictéridos en la Argentina (Aves, Passeriformes). *Neotrópica* **35**: 80. In Spanish.
Camperi, A.R., Cicchino, A.C. & Darrieu, C.A. (1998). *Ecología Alimentaria de* Sturnella superciliaris *(Bonaparte 1850) (Aves, Emberizidae, Icterinae) del Nordeste de la Provincia de Buenos Aires, Argentina*. Informe **53**. Comisión de Investigaciones Científicas, Provincia de Buenos Aires, La Plata, Argentina. In Spanish.
Camperi, A.R., Ferretti, V.A., Cicchino, A.C., Soave, G.E. & Darrieu, C.A. (2004). Diet composition of the White-browed Blackbird (*Sturnella superciliaris*) at Buenos Aires Province, Argentina. *Orn. Neotropical* **15**: 299–306.
Canales-del Castillo, R., González-Rojas, J.I., Ruvalcaba-Ortega, I. & García-Ramírez, Á. (2010). New breeding localities of Worthen's Sparrows in northeastern Mexico. *J Field Orn.* **81(1)**: 5–12.
Canales-del Castillo, R., Klicka, J., Favela, S. & González-Rojas, J.I. (2010). Molecular phylogenetic analysis of an endangered Mexican sparrow: *Spizella wortheni*. *Mol. Phylogen. Evol.* **57**: 1319–1322.
Canales-Delgadillo, J.C., Scott-Morales, L.M., Cotera Correa, M. & Pando Moreno, M. (2008). Observations on flocking behavior of Worthen's Sparrow (*Spizella wortheni*) and occurrence in mixed-species flocks. *Wilson J. Orn.* **120(3)**: 569–574.
Candia-Gallardo, C.E., Silveira, L.F. & Kuniy, A.A. (2010). A new population of the Cone-billed Tanger *Conothraupis mesoleuca*, with information on the biology, behaviour and type locality of the species. *Bird Conserv. Int.* **20**: 149–160.
Canevari, M., Canevari, P., Carrizo, G.R., Harris, G., Rodríguez Mata, J. & Straneck, R.J. (1991). *Nueva Guía de las Aves Argentinas*. Fundación Acindar, Buenos Aires, Argentina. In Spanish.
Cannell, P.F., Cherry, J.D. & Parkes, K.C. (1983). Variation and migration overlap in flight feather molt of the Rose-breasted Grosbeak. *Wilson Bull.* **95**: 621–627.
Cannings, R.A., Cannings, R.J. & Cannings, S.G. (1987). *The Birds of the Okanagan Valley, British Columbia*. Royal British Columbia Museum, Victoria, British Columbia.
Cant, J.G.H. (1979). Dispersal of *Stemmadenia donnell-smithii* by birds and monkeys. *Biotropica* **11(2)**: 122.
Capllonch, P., Lobo, R., Ortiz, D. & Ovejero, R. (2005). La avifauna de la selva de galería en el noreste de Corrientes, Argentina: biodiversidad, patrones de distribución y migración. *Inst. Sup. Correl. Geol. Misc.* **14**: 483–498. In Spanish with English summary.
Capp, M.S. (1992). Tests of the function of the song repertoire in Bobolinks. *Condor* **94**: 468–479.
Capparella, A.P. (1986). First record of Yellow-collared Chlorophonia for Middle America. *Amer. Birds* **40(2)**: 194–195.
Capparella, A.P. (1988). Genetic variation in Neotropical birds: implications for the speciation process. Pp. 1658–1664 in: Ouellet, H. ed. (1988). *Acta XIX Congressus Internationalis Ornithologici*. Vol. 2. University of Ottawa Press, Ottawa, Canada.
Capper, D.R. & Pereira, P. (2007). Orange-throated Tanager the easy way – the Cordillera del Cóndor in south-east Ecuador. *Neotropical Birding* **2**: 44–47.
Capper, D.R., Clay, R.P. & Lowen, J.C. (1998). Recent sightings of threatened birds around Corcovado National Park, Costa Rica. *Cotinga* **10**: 102.
Caraco, T. (1981). Energy budgets, risk and foraging preferences in Dark-eyed Juncos (*Junco hyemalis*). *Behav. Ecol. Sociobiol.* **8(3)**: 213–217.
Caraco, T. (1983). White-crowned Sparrows (*Zonotrichia leucophrys*): foraging preferences in a risky environment. *Behav. Ecol. Sociobiol.* **12(1)**: 63–69.
Caraco, T., Blanckenhorn, W.U., Gregory, G.M., Newman, J.A., Recer, G.M. & Zwicker, S.M. (1990). Risk-sensitivity: ambient temperature affects foraging choice. *Anim. Behav.* **39(2)**: 338–345.
Cardiff, E.A. (1965). A southern extension of the breeding range of the Vesper Sparrow in California. *Condor* **67**: 445.
Cardiff, E.E. & Cardiff, B.E. (1950). Late nesting record for the Abert Towhee. *Condor* **52**: 135.
Cardiff, S.W. & Remsen, J.V. (1981a). A Blue Bunting [*Passerina* (*Cyanocompsa*) *parellina*] record for the United States from Louisiana. *Auk* **98(3)**: 621–622.
Cardiff, S.W. & Remsen, J.V. (1981b). Breeding avifaunas of the New York mountains and Kingston range: islands of conifers in the Mojave desert of California. *Western Birds* **12**: 73–86.
Cardiff, S.W. & Remsen, J.V. (1994). Type specimens of birds in the Museum of Natural Science, Louisiana State University. *Occas. Pap. Mus. Nat. Sci. Lousiana State Univ.* **68**: 1–32.
Cardoso, G.C., Atwell, J.W., Ketterson, E.D. & Price, T.D. (2009). Song types, song performance, and the use of repertoires in Dark-eyed Juncos (*Junco hyemalis*). *Behav. Ecol.* **20(4)**: 901–907.
Carey, M. (1982). An analysis of factors governing pair-bonding period and the onset of laying in Indigo Buntings. *J. Field Orn.* **53**: 240–248.
Carey, M. (1990). Effects of brood size and nestling age on parental care by male Field Sparrows (*Spizella pusilla*). *Auk* **107(3)**: 580–586.
Carey, M. & Nolan, V. (1979). Population dynamics of Indigo Buntings and the evolution of avian polygyny. *Evolution* **33**: 1180–1192.
Carey, M., Burhans, D.E. & Nelson, D.A. (1994). Field Sparrow (*Spizella pusilla*). No. **103** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Carling, M.D. (2008). *Evolutionary History and Hybridization in* Passerina *Buntings*. PhD thesis, Louisiana State University, Baton Rouge, Louisiana.
Carling, M.D. & Brumfield, R.T. (2008a). Haldane's rule in an avian system: using cline theory and divergence population genetics to test for differential introgression of mitochondrial, autosomal, and sex-linked loci across the *Passerina* bunting hybrid zone. *Evolution* **62(10)**: 2600–2615.
Carling, M.D. & Brumfield, R.T. (2008b). Integrating phylogenetic and population genetic analyses of multiple loci to test species divergence hypotheses in *Passerina* buntings. *Genetics* **178(1)**: 363–377.
Carling, M.D. & Brumfield, R.T. (2009). Speciation in *Passerina* buntings: introgression patterns of sex-linked loci identify a candidate gene region for reproductive isolation. *Mol. Ecol.* **18(5)**: 834–847.
Carling, M.D., Lovette, I.J. & Brumfield, R.T. (2010). Historical divergence and gene flow: coalescent analyses of mitochondrial, autosomal and sex-linked loci in *Passerina* buntings. *Evolution* **64(6)**: 1762–1772.
Carling, M.D., Serene, L.G. & Lovette, I.J. (2011). Using historical DNA to characterize hybridization between Baltimore Orioles (*Icterus galbula*) and Bullock's Orioles (*I. bullockii*). *Auk* **128(1)**: 61–68.
Carmichael, D. (1819). Some account of the island of Tristan da Cunha and of its natural productions. *Trans. Linn. Soc. London* **12**: 483–499.
Caro, S.P., Keulen, C. & Poncin, P. (2009). Song repertoires in a Western European population of Yellowhammers *Emberiza citrinella*. *Acta Orn. (Warszawa)* **44(1)**: 9–16.
Caro, S.P., Sewall, K.B., Salvante, K.G. & Sockman, K.W. (2010). Female Lincoln's Sparrows modulate their behavior in response to variation in male song quality. *Behav. Ecol.* **21(3)**: 562–569.
Carrano, E., Ribas, C.F. & Müller, J.A. (2002). Primeiros registros do Bigodinho *Sporophila lineola* para Santa Catarina. *Atualidades Orn.* **108**: 12. In Portuguese.
Carrera, J.D., Fernández, F.J., Kacoliris, F.P., Pagano, L. & Berkunsky, I. (2008). Field notes on the breeding biology and diet of Ferruginous Pygmy-owl (*Glaucidium brasilianum*) in the dry Chaco of Argentina. *Orn. Neotropical* **19**: 315–319.
Carrie, N.R., Wagner, R.O., Moore, K.R., Sparks, J.C., Keith, E.L. & Melder, C.A. (2002). Winter abundance of and habitat use by Henslow's Sparrows in Louisiana. *Wilson Bull.* **114(2)**: 221–226.
Carriker, M.A. (1910). An annotated list of the birds of Costa Rica, including Cocos Island. *Ann. Carnegie Mus.* **6**: 314–915.
Carriker, M.A. (1931). Descriptions of new birds from Peru and Bolivia. *Proc. Acad. Nat. Sci. Philadelphia* **83**: 455–467.
Carriker, M.A. (1933). Descriptions of new birds from Peru, with notes on other little-known species. *Proc. Acad. Nat. Sci. Philadelphia* **85**: 1–38.
Carriker, M.A. (1934). Rediscovery of *Conothraupis speculigera* (Gould). *Auk* **51**: 497–499.
Carriker, M.A. (1941–1954). Collecting journals. National Museum of Natural History, Washington, D.C. Unpubl.
Carriker, M.A. (1959). New records of rare birds from Narino and Cauca and notes on others. *Noved. Colombianas* **1**: 196–199.
Carson, R.J. & Spicer, G.S. (2003). A phylogenetic analysis of the emberizid sparrows based on three mitochondrial genes. *Mol. Phylogen. Evol.* **29**: 43–57.
Carter, M.D. (1986). The parasitic behavior of the Bronzed Cowbird in South Texas. *Condor* **88**: 11–25.
Cartwright, B.W., Short, T.M. & Harris, R.D. (1937). Baird's Sparrow. *Trans. Roy. Can. Inst.* **21**: 153–198.
Carvalho, C.B.V. & Macedo, R.H.F. (2002). Características do display exibido por machos de *Volatinia jacarina* (Aves, Emberizidae) em uma área no Brasil central. *Atualidades Orn.* **110**: 10. In Portuguese.
Carvalho, C.B.V., Macedo, R.H.F. & Graves, J.A. (2006). Breeding strategies of a socially monogamous neotropical passerine: extra-pair fertilizations, behavior, and morphology. *Condor* **108(3)**: 579–590.
Carvalho, C.B.V., Macedo, R.H.F. & Graves, J.A. (2007). Reproduction of Blue-black Grassquits in central Brazil. *Braz. J. Biol.* **67(2)**: 275–281.
de Carvalho, C.T. (1957a). Notas ecológicas sobre *Volatinia jacarina* (Passeres, Fringillidae). *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **2**: 1–10. In Portuguese.
de Carvalho, C.T. (1957b). Notas sobre a biologia do *Ramphocelus carbo*. *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **5**: 1–20. In Portuguese.
de Carvalho, C.T. (1958a). Notas ecológicas sobre *Coereba flaveola* (Passeres, Coerebidae). *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **10**: 1–21. In Portuguese.
de Carvalho, C.T. (1958b). Sobre o ninho e os ovos de *Cyanerpes cyaneus* (Linné). *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **20**: 1–6. In Portuguese.
Carvalho, J.S. (1986). Saira pintor verdadeiro – *Tangara fastuosa*. *SOBoletim* **2(10)**: 15–16. In Portuguese.
Casén, R. & Hildén, O. (1965). Om Gyllensparvens (*Emberiza aureola*) förekomst i Kalajoki ämynning. *Ornis Fenn.* **42**: 33–34. In Finnish.
Cash, K.J. & Johnson, L.S. (1990). Male parental investment and female competence in Yellow-headed Blackbirds. *Auk* **107**: 205–206.
Casper, G. (1980). A Black-throated Sparrow at Milwaukee. Wisconsin's third sighting. *Passenger Pigeon* **42(3)**: 122.
Castelino, M. (1990). Un ave nueva para la República Argentina y segunda mención para otra. *Not. Faun.* **21**: 1–2. In Spanish.
Castelino, M. (1999). Audio recordings of *Diglossa sittoides* from Comarapa, Bolivia. Xeno-Canto, XC57456, XC57458. Unpubl.
Castell, P. (1996). Black-headed Bunting *Emberiza melanocephala* breeding behaviour in Turkey. *Sandgrouse* **18(2)**: 71.
Castell, P. (1997). New information on the breeding biology of Cretzschmar's Bunting *Emberiza caesia*. *Sandgrouse* **19(1)**: 68–69.
Castell, P. (2000). Notes on the breeding biology of several species in north-west Africa. *Bull. Afr. Bird Club* **7(2)**: 104–106.
Castell, P. & Castell, R. (2009). *Breeding Birds of the Western Palearctic. Nests, Eggs, Nestlings, Fledglings and Habitats*. DVD. BirdGuides, London.
Castiglioni, G.D.A. & Gonzaga, L.P. (1999). O uso da técnica de imersão na determinação do estágio de incubação dos ovos de *Ramphocelus bresilius* (Passeriformes: Emberizidae). *Ararajuba* **7(2)**: 141–143. In Portuguese with English summary.
Castiglioni, G.D.A., da Cunha, L.S.T. & Gonzaga, L.P. (1995). *Ramphocelus bresilius* como dispersor das sementes de plantas da restinga de Barra de Maricá, Estado do Rio de Janeiro (Passeriformes: Emberizidae). *Ararajuba* **3**: 94–99. In Portuguese.
del Castillo, H. & Clay, R.P. (2004). *Lista Comentada de las Aves del Paraguay. Annotated Checklist of Birds of Paraguay*. Asociación Guyra Paraguay, Asunción, Paraguay. In Spanish and English.
Catesby, M. (1731). *The Natural History of Carolina, Florida and the Bahama Islands: Containing the Figures of Birds, Beasts, Fishes, Serpents, Insects, and Plants* [...]. Published privately, London.
Cattadori, I.M., Haydon, D.T. & Hudson, P.J. (2005). Parasites and climate synchronize Red Grouse populations. *Nature (London)* **433**: 737–741.
Cavalcanti, R.B. & Alves, M.A.S. (1997). Effects of fire on savanna birds in central Brazil. *Orn. Neotropical* **8**: 85–87.
Cavalcanti, R.B. & Pimentel, T.M. (1988). Shiny Cowbird parasitism in central Brazil. *Condor* **90(1)**: 40–43.
Cave, F.O. & MacDonald, J.D. (1955). *Birds of the Sudan. Their Identification and Distribution*. Oliver and Boyd, Edinburgh & London.
Cazemier, R. (2006). Grijze Gors op Rottumerplaat in Mei 2004. *Dutch Birding* **28(1)**: 11–14. In Dutch.
Chace, J.E. (2005). Host use by sympatric cowbirds in southeastern Arizona. *Wilson Bull.* **117**: 375–381.
Chaine, A.S. & Lyon, B.E. (2008a). Adaptive plasticity in female mate choice dampens sexual selection on male ornaments in the Lark Bunting. *Science (Washington, D.C.)* **319**: 459–462.
Chaine, A.S. & Lyon, B.E. (2008b). Intrasexual selection on multiple plumage ornaments in the Lark Bunting. *Anim. Behav.* **76(3)**: 657–667.
Chalikova, E.S. & Kolbintsev, V.G. (2005). [On the fauna of birds of Karatau and Borolday]. *Selevinia* **11**: 110–116. In Russian.
Chambers, L.E. (2008). Trends in timing of migration of south-western Australian birds and their relationship to climate. *Emu* **108**: 1–14.
Chan, S. (2004). A bird to watch: Yellow-breasted Bunting *Emberiza aureola*. *Birding Asia* **1**: 16–17.
Chan, Y. & Arcese, P. (2003). Morphological and microsatellite differentiation in *Melospiza melodia* (Aves) at a microgeographic scale. *J. Evol. Biol.* **16(5)**: 939–947.
Chandler, C.R. & Mulvihill, R.S. (1990). The relationship between wing shape and differential migration in the Dark-eyed Junco. *Auk* **107**: 490–499.
Chapin, J.P. (1954). The birds of the Belgian Congo. Part 4. *Bull. Amer. Mus. Nat. Hist.* **75B**: i–ix, 1–846.
Chapman, F.M. (1896). Notes on birds observed in Yucatan. *Bull. Amer. Mus. Nat. Hist.* **8**: 271–290.
Chapman, F.M. (1898). Notes on birds observed at Jalapa and Las Vigas, Vera Cruz, Mexico. *Bull. Amer. Mus. Nat. Hist.* **10**: 15–43.
Chapman, F.M. (1911). Description of a new oriole (*Icterus fuertesi*) from Mexico. *Auk* **28**: 1–4.
Chapman, F.M. (1912). Diagnoses of apparently new Colombian birds. *Bull. Amer. Mus. Nat. Hist.* **31**: 139–167.
Chapman, F.M. (1914a). Diagnoses of apparently new Colombian birds. 2. *Bull. Amer. Mus. Nat. Hist.* **33**: 167–192.
Chapman, F.M. (1914b). Diagnoses of apparently new Colombian birds. 3. *Bull. Amer. Mus. Nat. Hist.* **33**: 603–637.
Chapman, F.M. (1915). Diagnoses of apparently new Colombian birds. 4. *Bull. Amer. Mus. Nat. Hist.* **34**: 635–662.
Chapman, F.M. (1917). The distribution of bird-life in Colombia: a contribution to a biological survey of South America. *Bull. Amer. Mus. Nat. Hist.* **36**: 1–729.
Chapman, F.M. (1924). Descriptions of new birds from Colombia, Ecuador, Peru and Bolivia. *Amer. Mus. Novit.* **143**: 1–16.
Chapman, F.M. (1925). Descriptions of new birds from Colombia, Ecuador, Peru, and Argentina. *Amer. Mus. Novit.* **160**: 1–14.
Chapman, F.M. (1926). The distribution of bird-life in Ecuador: a contribution to the study of the origin of Andean bird-life. *Bull. Amer. Mus. Nat. Hist.* **63**: 1–135.
Chapman, F.M. (1927a). Description of new birds from northwestern Peru and western Colombia. *Amer. Mus. Novit.* **250**: 1–7.
Chapman, F.M. (1927b). The variations and distribution of *Saltator aurantiirostris*. *Amer. Mus. Novit.* **261**: 1–19.

Chapman, F.M. (1928). The nesting habits of Wagler's Oropendola (*Zarhynchus wagleri*) on Barro Colorado Island. *Bull. Amer. Mus. Nat. Hist.* **58**: 123–166.
Chapman, F.M. (1929). Descriptions of new birds from Mt. Duida, Venezuela. *Amer. Mus. Novit.* **380**: 1–27.
Chapman, F.M. (1939). The upper zonal birds of Mt. Auyantepui, Venezuela. *Amer. Mus. Novit.* **1051**: 1–15.
Chapman, F.M. (1940). The post-glacial history of *Zonotrichia capensis*. *Bull. Amer. Mus. Nat. Hist.* **77**: 381–438.
Chappuis, C., Heim de Balsac, H. & Vielliard, J. (1973). Distribution, reproduction, manifestations vocales et affinités du Bruant cendré, *Emberiza cineracea*. *Bonn. Zool. Beitr.* **24**: 302–316. In French.
Charlton, T. (1991). The position of Lark Sparrow on the British list. *Birding World* **4(5)**: 156–159.
Charlton, T. (1995). Lark Sparrow in Suffolk: new to the western Palearctic. *British Birds* **88(9)**: 395–400.
Charmantier, A., McCleery, R.H., Cole, L.R., Perrins, C.M., Kruuk, L.E.B. & Sheldon, B.C. (2008). Adaptive phenotypic plasticity in adaptative phenotypic plasticity in response to climate change in a wild bird population. *Science (Washington, D.C.)* **320**: 800–803.
Chase, M.K., Nur, N. & Geupel, G.R. (2005). Effects of weather and population density on reproductive success and population dynamics in a Song Sparrow (*Melospiza melodia*) population: a long-term study. *Auk* **122(2)**: 571–592.
Chatellenaz, M.L. (2008). Diet of the Grayish Saltator (*Saltator coerulescens*) in northeastern Argentina. *Orn. Neotropical* **19(4)**: 617–625.
Chatellenaz, M.L. & Ferraro, L.I. (2000). Materiales vegetales y fúngicos en nidos de aves del noreste argentino y Paraguay. *Facena* **16**: 103–119. In Spanish.
Chattopadhyay, S.K., Maji, T.K., Some, K. & Sarkar, A.K. (1994). Body weight, fat deposition and gonadal conditions in the males of three migratory avian species during wintering months in India. *Proc. Zool. Soc. Calcutta* **47(1)**: 33–39.
Chebez, J.C. & Heinonen Fortabat, S. (1987). Novedades ornitogeográficas argentinas 1. *Not. Faun.* **2**: 1–2. In Spanish.
Chebez, J.C., Casañas, H. & Chichizola, S. (1984). Nueva cita de *Ramphocelus bresilius* (Linne) (Thraupidae) para la Argentina. *Hornero* **12(3)**: 221–222. In Spanish.
Cheke, R.A. & Walsh, J.F. (1996). *The Birds of Togo: an Annotated Check-list*. Check-list **14**. British Ornithologists' Union, Tring, UK.
Cheng Tsohsin [=Zheng Zuoxin] (1987). *A Synopsis of the Avifauna of China*. Science Press & Paul Parey, Beijing, Hamburg & Berlin. In English with Chinese index.
Cheng Tsohsin [=Zheng Zuoxin] **& Stresemann, E.** (1961). Ein übersehener Brutvogel der Palaearktis: '*Emberiza*' *siemsseni* (Martens). *J Orn.* **102**: 152–153. In German.
Chernyshov, V.M. (1991). [First record of the moulting Yellow-breasted Bunting (*Emberiza aureola*) at the south of western Siberia]. *Ornitologiya* **25**: 211. In Russian.
Cherrie, G.K. (1892a). A preliminary list of the birds of San José, Costa Rica. *Auk* **9**: 1–27.
Cherrie, G.K. (1892b). Notes on Costa Rican birds. *Proc. US Natl. Mus.* **14**: 517–537.
Cherrie, G.K. (1896). Contribution to the ornithology of San Domingo. *Field Columbian Mus. (Orn. Ser.)* **10(1)**: 3–26.
Cherrie, G.K. (1916). A contribution to the ornithology of the Orinoco region. *Mus. Brooklyn Inst. Arts Sci. Bull.* **2(6)**: 133a–374.
Chesser, R.T. (1994). Migration in South America: an overview of the austral system. *Bird Conserv. Int.* **4**: 91–107.
Chesser, R.T. & Levey, D.J. (1998). Austral migrants and the evolution of migration in New World birds: diet, habitat, and migration revisited. *Amer. Naturalist* **152**: 311–319.
Chesser, R.T. & Zink, R.M. (1994). Modes of speciation in birds: a test of Lynch's method. *Evolution* **48**: 490–497.
Chesser, R.T., Banks, R.C., Barker, F.K., Cicero, C., Dunn, J.L., Kratter, A.W., Lovette, I.J., Rasmussen, P.C., Remsen, J.V., Rising, J.D., Stotz, D.F. & Winker, K. (2009). Fiftieth supplement to the American Ornithologists' Union Check-list of North American birds. *Auk* **126(3)**: 705–714.
Chesser, R.T., Banks, R.C., Barker, F.K., Cicero, C., Dunn, J.L., Kratter, A.W., Lovette, I.J., Rasmussen, P.C., Remsen, J.V., Rising, J.D., Stotz, D.F. & Winker, K. (2010). Fifty-first supplement to the American Ornithologists' Union Check-List of North American Birds. *Auk* **127(3)**: 726–744.
Cheviron, Z.A. & Brumfield, R.T. (2009). Migration-selection balance and local adaptation of mitochondrial haplotypes in Rufous-collared Sparrows (*Zonotrichia capensis*) along an elevational gradient. *Evolution* **63(6)**: 1593–1605.
Cheviron, Z.A., Whitehead, A. & Brumfield, R.T. (2008). Transcriptomic variation and plasticity in Rufous-collared Sparrows (*Zonotrichia capensis*) along an altitudinal gradient. *Mol. Ecol.* **17(20)**: 4556–4569.
Chew, L. (1981). Geographic and individual variation in the morphology and sequential organization of the song of the Savannah Sparrow (*Passerculus sandwichensis*). *Can. J. Zool.* **59(4)**: 702–713.
Chia Hsiangkang & Li Shichum (1973). [Foods and the economic importance of the Yellow-breasted Bunting (*Emberiza aureola*)]. *Acta Zool. Sinica* **19(2)**: 190–197. In Chinese.
Child, G.I. & Marshall, S.G. (1970). A method of estimating carcass fat and fat-free weights in migrant birds from water content of specimens. *Condor* **72**: 116–119.
Chilton, G. (2003). Cultural evolution and song stereotypy in an isolated population of montane White-crowned Sparrows (*Zonotrichia leucophrys oriantha*). *Bird Behaviour* **15(2)**: 53–63.
Chilton, G. & Lein, M. (1996a). Song repertoires of Puget Sound White-crowned Sparrows *Zonotrichia leucophrys pugetensis*. *J. Avian Biol.* **27(1)**: 31–40.
Chilton, G. & Lein, M. (1996b). Songs and sexual responses of female White-crowned Sparrows (*Zonotrichia leucophrys*) from a mixed-dialect population. *Behaviour* **133(3/4)**: 173–198.
Chilton, G., Baker, M.C., Barrentine, C.D. & Cunningham, M.A. (1995). White-crowned Sparrow (*Zonotrichia leucophrys*). No. **183** in: Poole, A. & Gill, F. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Choepf, S. (1976). Le Japú faiseur des perles. *Bull. Mus. d'Ethnogr. Genève* **19**: 55–82. In French.
Christensen, A.F. (2000). The fifteenth- and twentieth-century colonization of the Basin of Mexico by the Great-tailed Grackle (*Quiscalus mexicanus*). *Global Ecol. Biogeogr.* **9(5)**: 415–420.
Christensen, R. & Kleindorfer, S. (2007). Assortative pairing and divergent evolution in Darwin's Small Tree Finch, *Camarhynchus parvulus*. *J. Orn.* **148(4)**: 463–470.
Christensen, R., Kleindorfer, S. & Robertson, J. (2006). Song is a reliable signal of bill morphology in Darwin's Small Tree Finch *Camarhynchus parvulus*, and vocal performance predicts male pairing success. *J. Avian Biol.* **37(6)**: 617–624.
Christensen, R., Robertson, J. & Kleindorfer, S. (2010). Male response to intruders is related to song characteristics in Darwin's Small Tree Finch (*Camarhynchus parvulus*). *J. Ethol.* **28(2)**: 371–377.
Christian, D.G. (2001). Nests and nesting behavior of some little known Panamanian birds. *Orn. Neotropical* **12**: 327–336.
Christian, K.A. (1980). Cleaning/feeding symbiosis between birds and reptiles of the Galápagos Islands: new observations of inter-island variability. *Auk* **97(4)**: 887–889.
Christiansson, S. & Gerell, R. (1966). White-throated Sparrow, *Zonotrichia albicollis*, new for Sweden. *Vår Fågelvärld* **25**: 1–4.
Christie, M. (2009). Notas sobre conducta y nidificación de *Curaeus curaeus* en Isla Victoria, Parque Nacional Nahuel Huapi, Argentina. Unpubl. In Spanish.
Christie, M., Ramilo, E.J. & Bettinelli, M.D. (2004). *Aves del Noroeste Patagónico: Atlas y Guía*. Sociedad Naturalista Andino Patagónica & Literature of Latin America, Buenos Aires. In Spanish.
Christy, B.H. (1942). The Cardinal: the bird itself. *Cardinal* **5**: 173–186.
Christy, C. (1897). Field-notes on the birds of the island of San Domingo. *Ibis* **Ser. 7, no. 3**: 317–343.
Chubb, C. (1910). On the birds of Paraguay. Part 4. *Ibis* **Ser. 9, no. 4**: 571–647.
Chubb, C. (1921a). *The Birds of British Guiana, Based on the Collection of Frederick Vavasour McConnell*. Vol. 2. Bernard Quaritch, London.
Chubb, C. (1921b). On new forms of South American birds. *Ann. Mag. Nat. Hist.* **9**: 192–194.
Churchwell, R., Geupel, G.R., Hamilton, W. & Schlafmann, D. (2005). Current monitoring and management of Tricolored Blackbirds. *US For. Serv. Gen. Tech. Rep. PSW* **191**: 169–173.
Ciais, P., Reichstein, M., Viovy, N., and 30 other authors (2005). Europe-wide reduction in primary productivity caused by the heat and drought in 2003. *Nature (London)* **437**: 529–533.
Ciarpaglini, P. (1971). Notes on breeding uncommon birds at Cleres in 1970. *Avicult. Mag.* **77**: 49–57.
Cicero, C. (1997). Boggy meadows, livestock grazing, and interspecific interactions: influences on the insular distribution of Montane Lincoln's Sparrows (*Melospiza lincolnii alticola*). *Great Basin Nat.* **57(2)**: 104–115.
Cicero, C. & Benowitz-Fredericks, Z.M. (2000). Song types and variation in insular populations of Lincoln's Sparrow (*Melospiza lincolnii*), and comparisons with other *Melospiza*. *Auk* **117(1)**: 52–64.
Cicero, C. & Johnson, N.K. (2006). Diagnosability of subspecies: lessons from Sage Sparrows (*Amphispiza belli*) for analysis of geographic variation in birds. *Auk* **123(1)**: 266–274.
Cicero, C. & Johnson, N.K. (2007). Narrow contact of desert Sage Sparrows (*Amphispiza belli nevadensis* and *A. b. canescens*) in Owens Valley, eastern California: evidence from mitochondrial DNA, morphology, and GIS-based niche models. *Orn. Monogr.* **63**: 78–95.
Cichocki, W. (1988). The first record of Cretzschmar's Bunting in Poland. *Notatki Ornitologiczne* **28**: 97–98.
Claessens, O. (1992). La situation du Bruant ortolan *Emberiza hortulana* en France et en Europe. *Alauda* **60(2)**: 65–76. In French with English summary.
Clancey, P.A. (1965). Systematic notes on *Emberiza cabanisi* in the South African sub-region. *Ostrich* **36**: 199–200.
Clancey, P.A. (1981). On birds from Gough Island, central south Atlantic. *Durban Mus. Novit.* **12**: 187–200.
Clancey, P.A. (1986). Taxonomic notes on some birds from East Africa. *Scopus* **10**: 33–40.
Clancey, P.A. (1989). Subspeciation in the Lark-like Bunting of the southwestern Afrotropics. *Bull. Brit. Orn. Club* **109**: 130–134.
Clancey, P.A. & Winterbottom, J.M. (1960). Geographical variation in the South African populations of the Golden-breasted Bunting *Emberiza flaviventris* Stephens. *Durban Mus. Novit.* **6**: 1–9.
Claramunt, S., Rocha, G. & Aldabe, J. (2006). The occurrence of *Sporophila hypochroma* and *S. hypoxantha* in Uruguay. *Bull. Brit. Orn. Club* **126(1)**: 45–49.
Clark, A.H. (1905). Birds of the southern Lesser Antilles. *Proc. Boston Soc. Nat. Hist.* **32**: 203–312.
Clark, G.A. (1974). Foot-scute differences among certain North American oscines. *Wilson Bull.* **86**: 104–109.
Clark, G.A. (1986). Systematic interpretations of foot-scute patterns of Neotropical finches. *Wilson Bull.* **98(4)**: 594–597.
Clark, H.L. (1913a). Notes on the Panama Thrush-warbler. *Auk* **30**: 11–15.
Clark, H.L. (1913b). Anatomical notes on some genera of passerine birds. *Auk* **30**: 262–267.
Clark, R.G., Weatherhead, P.J., Greenwood, H. & Titman, R.D. (1986). Numerical responses of Red-winged Blackbird populations to changes in regional land-use patterns. *Can. J. Zool.* **64**: 1944–1950.
Clark, T.O. (1984). Notable records of birds from eastern Sonora, Mexico. *Western Birds* **15(3)**: 134–136.
Clarke, W.E. (1904). *Nesospiza goughensis*, n. sp. and *Nesospiza jessiae*, n. sp. *Bull. Brit. Orn. Club* **15**: 18–19.
Clarke, W.E. (1905). Ornithological results of the Scottish National Antarctic Expedition. 1. On the birds of Gough Island, South Atlantic Ocean. *Ibis* **Ser. 8, no. 5**: 247–268.
Clavero, M., Villero, D. & Brotons, L. (2011). Climate change or land use dynamics: do we know what climate change indicators indicate? *PLoS One* **6(4)**: e18581.
Clement, R.C. (1968). *Zonotrichia leucophrys leucophrys* (Forster), Eastern White-crowned Sparrow. Pp. 1273–1291 in: Bent & Austin (1968).
Clements, J.F. & Shany, N. (2001). *A Field Guide to the Birds of Peru*. Ibis Publishing Company, Temecula, California.
Clotfelter, E.D. (1995). Courtship displaying and intrasexual competition in the Bronzed Cowbird. *Condor* **97**: 816–818.
Clotfelter, E.D. & Brush, T. (1995). Unusual parasitism by the Bronzed Cowbird. *Condor* **97**: 814–815.
Clotfelter, E.D. & Yasukawa, K. (1999a). Impact of brood parasitism by Brown-headed Cowbirds on Red-winged Blackbird reproductive success. *Condor* **101**: 105–114.
Clotfelter, E.D. & Yasukawa, K. (1999b). The effect of aggregated nesting on Red-winged Blackbird nest success and brood parasitism by Brown-headed Cowbirds. *Condor* **101**: 729–736.
Clotfelter, E.D., Schubert, K.A., Nolan, V. & Ketterson, E.D. (2003). Mouth color signals thermal state of nestling Dark-eyed Juncos (*Junco hyemalis*). *Ethology* **109(2)**: 171–182.
Clouet, M., Goar, J.L. & Barrau, C. (1998). Contribution à l'étude ornithologique de l'île de Socotra. *Alauda* **66**: 235–246. In French.
Coconier, E.G., López-Lanús, B., Roesler, I., Moschione, F., Pearman, M., Blendiger, P., Bodrati, A., Monteleone, D., Casañas, H., Pugnali, G. & Alvarez, M.E. (2007). Lista comentada de las aves silvestres de la unidad de gestión Acambuco. Pp. 1–127 in: Coconier, E.G. ed. (2007). *Las Aves Silvestres de Acambuco, Provincia de Salta, Argentina: Relevamientos de un AICA Prioritaria de la Selva Pedemontana*. Temas de Naturaleza y Conservación **6**. Aves Argentinas, Buenos Aires. In Spanish.
Codesido, M. & Fraga, R.M. (2010). Distributions of threatened grassland passerines of Paraguay, Argentina and Uruguay, with new locality records and notes on their natural history and habitat. *Orn. Neotropical* **20**: 585–595.
Coe, S.J. & Rotenberry, J.T. (2003). Water availability affects clutch size in a desert sparrow. *Ecology* **84(12)**: 3240–3249.
Coimbra-Filho, A.F. & Teixeira, D.M. (1983). On a natural hybrid between *Cyanocompsa cyanea* (Linnaeus, 1758) and *Sporophila caerulescens* (Vieillot, 1817), (Fringillidae, Aves). *Rev. Bras. Biol.* **43(3)**: 269–272.
Collar, N.J. & Stuart, S.N. (1985). *Threatened Birds of Africa and Related Islands. The ICBP/IUCN Red Data Book*. Part 1. 3rd edition. International Council for Bird Preservation & International Union for Conservation of Nature and Natural Resources, Cambridge, UK.
Collar, N.J., Andreev, A.V., Chan, S., Crosby, M.J., Subramanya, S. & Tobias, J.A. eds. (2001). *Threatened Birds of Asia: the BirdLife International Red Data Book*. Part B. BirdLife International, Cambridge, UK.
Collar, N.J., Crosby, M.J. & Stattersfield, A.J. (1994). *Birds to Watch 2: the World List of Threatened Birds*. BirdLife Conservation Series **4**. BirdLife International, Cambridge, UK.
Collar, N.J., Gonzaga, L.P., Krabbe, N., Madroño-Nieto, A., Naranjo, L.G., Parker, T.A. & Wege, D.C. (1992). *Threatened Birds of the Americas. The ICBP/IUCN Red Data Book*. Part 2. 3rd edition. International Council for Bird Preservation & International Union for Conservation of Nature and Natural Resources, Cambridge, UK.
Collett, J. (1982). Birds of the Cradock District. *Southern Birds* **9**: 1–65.
Collins, C.T. (1972). Weights of some birds of north-central Venezuela. *Bull. Brit. Orn. Club* **92**: 151–153.
Collins, C.T. (2003). Notable records of Loggerhead Shrike *Lanius ludovicianus* and Yellow-headed Blackbird *Xanthocephalus xanthocephalus* for the Yucatán Peninsula, Mexico. *Cotinga* **20**: 99.
Collins, C.T. (2006). Growth and development of the Violaceous Euphonia and Palm Tanager in Trinidad. *Living World* **2006**: 1–7.
Collins, C.T. & Araya, T.A. (1998). Natal pterylosis of tanagers 2: *Tachyphonus*, *Ramphocelus* and *Tangara*. *Bull. Brit. Orn. Club* **118(3)**: 172–178.

Collins, C.T. & Watson, A. (1983). Field observations of bird predation on Neotropical moths. *Biotropica* **15**: 53–60.
Collins, J.N. & Resh, V.H. (1985). Utilization of natural and man-made habitats by the Salt Marsh Song Sparrow, *Melospiza melodia samuelis* (Baird). *Calif. Fish & Game* **71(1)**: 40–52.
Collins, M.S. (1976). South American cardinal populations on the Big Island. *Elepaio* **37(1)**: 1–2.
Collins, P.W. (1999). Rufous-crowned Sparrow (*Aimophila ruficeps*). No. **472** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 12. The Birds of North America Inc., Philadelphia, Pennsylvania.
Collinson, M. (2006). Splitting headaches? Recent taxonomic changes affecting the British and Western Palearctic lists. *British Birds* **99**: 306–323.
Colston, P.R. (1978). A new bird for Burma – Pallas's Reed Bunting *Emberiza pallasi*. *Bull. Brit. Orn. Club* **98(1)**: 21–22.
Colwell, R.K., Betts, B.J., Bunnell, P., Carpenter, F.L. & Feinsinger, P. (1974). Competition for the nectar of *Centropogon valerii* by the hummingbird *Colibri thalassinus* and the flower-piercer *Diglossa plumbea*, and its evolutionary implications. *Condor* **76**: 447–484.
Colwell, R.R. (1999). Age-specific crown variation in basic-plumaged Golden-crowned Sparrows. *North Amer. Bird Bander* **24(4)**: 138–142.
Colwell, R.R. (2000). Second year Golden-crowned Sparrow with incomplete skull. *North Amer. Bird Bander* **25(4)**: 139–140.
Comins, P.M. (2001). Grasshopper Sparrow. *Connecticut Warbler* **21(3)**: 97–113.
Conklin, K. (1970). Post-Columbian birds from Abaco Island, Bahamas. *Quart. J. Florida Acad. Sci.* **33**: 237–240.
Connell, C.E., Odum, E.P. & Kale, H. (1960). Fat free weights of birds. *Auk* **77**: 1–9.
Conner, R.N., Anderson, M.E. & Dickson, J.F. (1986). Relationships among territory size, habitat, song and nesting success of Northern Cardinals. *Auk* **103**: 23–31.
Conrads, K. (1976). Studien an Fremddialekt-Sängern und Dialekt-Mischsängern des Ortolans (*Emberiza hortulana*). *J. Orn.* **117**: 438–450. In German.
Conrads, K. & Conrads, W. (1971). Regionaldialekt des Ortolans (*Emberiza hortulana*) in Deutschland. *Vogelwarte* **92**: 81–100. In German.
Conrads, K. & Quelle, M. (1986). Occurrence of the Ortolan Bunting *Emberiza hortulana* in NW Germany: observations on a colour-ringed population. *Limosa* **59(2)**: 67–74.
Contreras, A. & Herlyn, H. (2005). The status of Chestnut-collared Longspur in Oregon. *Oregon Birds* **31(3)**: 110–114.
Contreras, J.R. (1979a). Bird weights from northeastern Argentina. *Bull. Brit. Orn. Club* **99**: 221–224.
Contreras, J.R. (1979b). Avifauna puntana. 1. Algunas especies nuevas o poco conocidas para la provincida de San Luis. *Hist. Nat., Corrientes* **1(3)**: 9–12. In Spanish with English summary.
Contreras, J.R. (1980). Avifauna mendocina. II. Revalidación de *Embernagra platensis gossei* Chubb, 1918, y nuevos datos sobre las subespecies de *Embernagra platensis* (Passeriformes: Emberizidae). *Bol. Mus. Cienc. Nat. Antrop. J. C. Moyano* **1**: 23–24. In Spanish.
Contreras, J.R. (1983). Notas sobre el peso de aves argentinas. *Hist. Nat., Corrientes* **3**: 39–40. In Spanish.
Contreras, J.R. & Contreras, A.O. (1993). Acerca de la distribución de *Pipraeidea melanonota melanonota* (Vieillot, 1819) en la República del Paraguay y en el norte argentino (Aves, Emberizidae: Thraupinae). *Not. Faun.* **46**: 1–4. In Spanish.
Contreras, J.R. & Pérez, V.N. & Colman, J.A. (1992). Notas ornitológicas paraguayas. 4. Una especie nueva para el Paraguay y consideraciones sobre otras tres. *Not. Faun.* **32**: 1–3. In Spanish.
Conway, D.K. & Benson, K.L.P. (1990). A range extension for nesting Botteri's Sparrow, *Aimophila botterii*, in southern Texas. *Southwest. Nat.* **35(3)**: 348–349.
Cook, E.R., Bartlein, P.J., Diffenbaugh, N., Seager, R., Shuman, B.N., Webb, R.S., Williams, J.W. & Woodhouse, C. (2010). *Abrupt Climate Change. A Report by the US Climate Change Science Program and the Subcommittee on Global Change Research*. United States Geological Survey, Reston, Virginia.
Cook, L.F. & Toft, C.A. (2005). Dynamics of extinction: population decline in the colonially nesting Tricolored Blackbird *Agelaius tricolor*. *Bird Conserv. Int.* **15**: 73–88.
Cook, R.E. (1977). First Pennsylvania photographic record and other eastern sightings of the Lazuli Bunting. *Auk* **94**: 172.
Cooke, W.W. (1911). The migration of North American sparrows: eighth paper. *Bird Lore* **13**: 15–17.
Coon, D.W., Gotie, R.F. & Arnold, K.A. (1971). Winter nesting attempts by Great-tailed Grackles. *Wilson Bull.* **83**: 440.
Cooper, B.A. & Murphy, E.C. (1985). Savannah Sparrow sings a White-crowned Sparrow song. *Anim. Behav.* **33(1)**: 330–331.
Cooper, S. (1984). Habitat and size of the Le Conte's Sparrow territory. *Loon* **56(3)**: 162–165.
Coopmans, P., Moore, J.V., Krabbe, N., Jahn, O., Berg, K.S., Lysinger, M., Navarrete, L. & Ridgely, R.S. (2004). *The Birds of Southwest Ecuador*. CD 4. J.V. Moore Nature Recordings, San José, California.
Copete, J.L., Mariné, R., Bigas, D. & Martínez-Vilalta, A. (1999). Differences in wing shape between sedentary and migratory Reed Buntings *Emberiza schoeniclus*. *Bird Study* **46(1)**: 100–103.
Coppack, T., Pulido, F. & Berthold, P. (2001). Photoperiodic response to early hatching in a migratory bird species. *Oecologia (Berlin)* **128**: 181–186.
Corado, R. (2008). *Data on Eastern Meadowlark Nests and Eggs from New Mexico (USA) and Chihuahua (Mexico)*. Western Foundation of Vertebrate Zoology, Los Angeles, California.
Corbin, K.W., Sibley, C.G. & Ferguson, A. (1979). Genic changes associated with the establishment of sympatry in orioles of the genus *Icterus*. *Evolution* **33**: 624–633.
Corbitt, C. & Deviche, P. (2005). Age-related difference in size of brain regions for song learning in adult male Dark-eyed Juncos (*Junco hyemalis*). *Brain Behav. Evol.* **65(4)**: 268–277.
Corman, T.E. (2005). Eastern Meadowlark. Pp. 554–555 in: Corman, T.E. & Wise-Gervais, C. eds. (2005). *Arizona Breeding Bird Atlas*. University of New Mexico Press, Albuquerque, New Mexico.
Cornet, R. (1999). Der Graurücken-Kronfink. *Gefiederte Welt* **123(7)**: 252–253. In German.
Cornet, R. (2002). Schwarzwangen-Ammerfink erfolgreich gezüchtet. *Gefiederte Welt* **126(10)**: 346–347. In German.
del Coro Arizmendi, M. (2001). Multiple ecological interactions: nectar robbers and hummingbirds in a highland forest in Mexico. *Can. J. Zool.* **79(6)**: 997–1006.
Corso, A. (1996). The Pine Buntings in Italy. *Birding World* **9(1)**: 14.
Cortes, O. (2009a). Audio recordings of *Tangara cyanicollis* from Río Claro, Doradal, Colombia. Xeno-Canto, XC36850. Unpubl.
Cortes, O. (2009b). Audio recordings of *Dacnis hartlaubi* from Soatá, Boyacá, Colombia. Xeno-Canto, XC28184. Unpubl.
Cortés-Herrera, J.O., Chaves-Portilla, G.A., Hernández-Jaramillo, A., Gamba-Trimiño, C., Alarcón-Bernal, S.M. & Villagran-Chavarro, D.X. (2006). Redescubrimiento de *Macroagelaius subalaris* en el municipio de Soatá, Boyacá, Colombia. *Bol. Soc. Antioqueña Orn.* **16(1)**: 85–92. In Spanish with English summary.
Cortés-Herrera, J.O., Hernández-Jaramillo, A., Chaves-Portilla, G.A., Laverde, O., Gamba-Trimiño, C., Villagrán-Chavarro, D.X. & Alarcón-Bernal, S.M. (2006). Nuevos registros de aves amenazadas en Soatá (Boyacá), Colombia. *Cotinga* **27**: 74–77. In Spanish.
Cortés-Herrera, J.O., Ruiz-Ovalle, J.M. & Hernández-Jaramillo, A. (2011). Nuevos aspectos sobre el comportamiento reproductivo de la Cocha de Soatá (*Macroagelaius subalaris*) en la cordillera oriental de Colombia. MS. In Spanish.
Cortés-Rodríguez, N., Hernández-Baños, B.E., Navarro-Sigüenza, A.G. & Omland, K.E. (2008). Geographic variation and genetic structure in the Streak-backed Oriole: low mitochondrial DNA divergence reveals recent divergence. *Condor* **110**: 729–739.
Cortopassi, A.J. & Mewaldt, L.R. (1965). The circumannual distribution of White-crowned Sparrows. *Bird-Banding* **36**: 141–165.
Cory, C.B. (1886). The birds of the West Indies, including the Bahama Islands, the Greater and Lesser Antilles, excepting the islands of Tobago and Trinidad. *Auk* **3(2)**: 187–245.
Cosens, S.E. & Falls, J.B. (1984). Structure and use of song in the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). *Z. Tierpsychol.* **66**: 227–241.
Costa, L.M., de Freitas, G.H.S., Rodrigues, M. & de Vasconcelos, M.F. (2008). New records of Lesser Grass Finch *Emberizoides ypiranganus* in Minas Gerais, Brazil. *Cotinga* **29**: 182–183.
Costa, R.G.A. & Costa, R.C.V. (2003). Reprodução do Tico-tico-do Campo, *Ammodramus humeralis* associada ao capim-anoni, *Eragrostis* spp. *Atualidades Orn.* **113**: 11. In Portuguese.
de Coster, G., Matthysen, E., Cahill, J.R.A. & Lens, L. (2009). Home range characteristics of the near threatened Giant Conebill *Oreomanes fraseri* in fragmented *Polylepis* forest. *Bird Conserv. Int.* **19(3)**: 215–223.
Courteille, C. & Thévenot, M. (1988). Notes sur la répartition et la reproduction au Maroc du Bruant striolé *Emberiza striolata* Levaillant. *Oiseau et RFO (Nouv. Sér.)* **58**: 320–349. In French.
Couve, E. & Vidal, C. (2003). *Aves de Patagonia, Tierra del Fuego y Peninsula Antártica*. Editorial Fantástico Sur, Punta Arenas, Chile. In Spanish.
Coverdill, A.J., Bentley, G.E. & Ramenofsky, M. (2008). Circadian and masking control of migratory restlessness in Gambel's White-crowned Sparrow (*Zonotrichia leucophrys gambelii*). *J. Biol. Rhythms* **23(1)**: 59–68.
Cox, J. & James, F.C. (1984). Karyotypic uniformity in the Red-winged Blackbird. *Condor* **86(4)**: 416–422.
Cox, J.A. & Jones, S.R. (2004). Use of recorded vocalizations in winter surveys of Bachman's Sparrows. *J. Field Orn.* **75(4)**: 359–363.
Cozzani, N.C., Sánchez, R. & Zalba, S.M. (2004). Nidificación de la Loica Pampeana (*Sturnella defilippii*) en la provincia de Buenos Aires, Argentina. *Hornero* **19**: 47–52. In Spanish.
Cozzani, N.C., Zalba, S.M., Mattos, E. & Sarria, R. (2008). Nidificación del Jilguero Austral (*Sicalis lebruni*) en Sierra de la Ventana, provincia de Buenos Aires, Argentina. *Nuestras Aves* **53**: 3–5. In Spanish.
Cracraft, J. & Barker, F. (2009). Passerine birds (Passeriformes). Pp. 423–431 in: Hedges, S.B. & Kumar, S. eds. (2009). *The Timetree of Life*. Oxford University Press, Oxford & New York.
Cramp, S. & Perrins, C.M. eds. (1994). *Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic*. Vol. 9. Buntings and New World wood warblers. Oxford University Press, Oxford & New York.
Crandall, L.S. (1914). Notes on Costa Rican birds 1. *Zoologica (New York)* **1**: 325–343.
Crandall, L.S. (1940). The giant orioles of the tropics. *Bull. New York Zool. Soc.* **40**: 85–88.
Crase, F.T. & DeHaven, R.W. (1977). Food of nestling Tricolored Blackbirds. *Condor* **79(2)**: 265–269.
Craves, J.A. (1994). Passerines with deformed bills. *North Amer. Bird Bander* **19**: 14–18.
Crawford, R.D. (1977). Breeding biology of year-old and older female Red-winged and Yellow-headed Blackbirds. *Wilson Bull.* **89**: 73–80.
Crebbs, T.C. (1965). Longevity in the Plain-colored Tanager, *Tangara inornata*. *Bird-Banding* **35**: 264.
Cresswell, W. & McCleery, R. (2003). How Great Tits maintain synchronization of their hatch date with food supply in response to long-term variability in temperature. *J. Anim. Ecol.* **72**: 356–366.
Creutz, G. (1988). Ungewöhnliche Truppstärke bei der Schneeammer (*Plectrophenax nivalis* (L.)). *Beitr. Vogelkd.* **34(1)**: 61. In German.
Crick, H.Q.P., Dudley, C., Evans, A.D. & Smith, K.W. (1994). Causes of nest failure among buntings in the UK. *Bird Study* **41(2)**: 88–94.
Crick, H.Q.P., Gibbons, D.W. & Magrath, R.D. (1993). Seasonal changes in clutch size in British birds. *J. Anim. Ecol.* **62(2)**: 263–273.
Cristol, D.A. (1992). Food deprivation influences dominance status in Dark-eyed Juncos, *Junco hyemalis*. *Anim. Behav.* **43(1)**: 117–124.
Cristol, D.A., Nolan, V. & Ketterson, E.D. (1990). Effect of prior residence on dominance status of Dark-eyed Juncos, *Junco hyemalis*. *Anim. Behav.* **40(3)**: 580–586.
Cristol, D.A., Reynolds, E.B., Leclerc, J.E., Donner, A.H., Farabaugh, C.S. & Ziegenfus, C.W.S. (2003). Migratory Dark-eyed Juncos, *Junco hyemalis*, have better spatial memory and denser hippocampal neurons than nonmigratory conspecifics. *Anim. Behav.* **66(2)**: 317–328.
Crossin, R.S. & Petite, L.J. (1962). The nest and eggs of the Rosita Bunting. *J. Arizona Acad. Sci.* **2**: 58.
Crowell, D.K., Carpenter, C.C. & Huffman, D.G. (1982). Nest-sharing by a Lark Sparrow. *Auk* **99(3)**: 591–592.
Crowell, K.L. (1962). Reduced interspecific competition among the birds of Bermuda. *Ecology* **43(1)**: 75–88.
Crowell, K.L. & Rothstein, S.I. (1981). Clutch sizes and breeding strategies among Bermudan and North American passerines. *Ibis* **123**: 42–50.
Cruden, R.W. & Hermann-Parker, S.M. (1977). Defense of feeding sites by orioles and Hepatic Tanagers in Mexico. *Auk* **94**: 594–596.
Cruden, R.W. & Toledo, V.M. (1977). Oriole pollination of *Erythrina breviflora* (Leguminosae): evidence for a polytypic view of ornithophily. *Plant Syst. Evol.* **126**: 393–403.
Cruz, A. (1974). Feeding assemblages of Jamaican birds. *Condor* **76(1)**: 103–107.
Cruz, A. (1978). Adaptive evolution in the Jamaican Blackbird *Nesopsar nigerrimus*. *Ornis Scand.* **9**: 130–137.
Cruz, A. (1981). Bird activity and seed dispersal of a montane forest tree (*Dunalia arborescens*) in Jamaica. *Biotropica* **13** (Suppl. *Reprod. Bot.*): 334–344.
Cruz, A. & Andrews, R.W. (1989). Observations on the breeding biology of passerines in a seasonnally flooded savanna in Venezuela. *Wilson Bull.* **101(1)**: 62–76.
Cruz, A., López-Ortiz, R., Ventosa-Febles, E.A., Wiley, J.W., Nakamura, T.K., Ramos-Alvarez, K.R. & Post, W. (2005). Ecology and management of Shiny Cowbirds (*Molothrus bonariensis*) and endangered Yellow-shouldered Blackbirds (*Agelaius xanthomus*) in Puerto Rico. *Orn. Monogr.* **57(4)**: 38–44.
Cruz, A., Manolis, T.D. & Andrews, R.W. (1990). Reproductive interactions of the Shiny Cowbird *Molothrus bonariensis* and the Yellow-hooded Blackbird *Agelaius icterocephalus* in Trinidad. *Ibis* **132**: 436–444.
Cruz, A., Manolis, T.D. & Andrews, R.W. (1995). History of Shiny Cowbird *Molothrus bonariensis* brood parasitism in Trinidad and Tobago. *Ibis* **137**: 317–321.
Cruz, A., Manolis, T.D. & Wiley, J.W. (1985). The Shiny Cowbird: a brood parasite expanding its range in the Caribbean region. *Orn. Monogr.* **36**: 607–620.
Cruz, A., Wiley, J.W., Nakamura, T.K. & Post, W. (1989). The Shiny Cowbird *Molothrus bonariensis* in the West Indian region: biogeographic and ecological implications. Pp. 519–540 in: Wood, C.A. ed. (1989). *Biogeography of the West Indies*. Sandhill Crane Press, Gainesville, Florida.
Cuadros, T. (1988). Aspectos ecológicos de la comunidad de aves en un bosque nativo en la cordillera Central en Antioquia (Colombia). *Hornero* **13**: 8–20. In Spanish.
Cuao-Carranza, E.A. (2007). El primer registro para Colombia de la Oropéndola de Casco *Clypicterus oseryi* (Icteridae). *Orn. Colombiana* **5**: 78–80. In Spanish with English summary.
Cucco, M. & Ferro, M. (1988). Biometry of the Rock Bunting *Emberiza cia* in north western Italy. *Sitta* **2(3)**: 99–103.
Cuello, J. (1988). Lista de las aves fósiles de la región Neotropical y de las islas Antillanas. *Paula-Coutiana* **2**: 3–79. In Spanish.
Cuello, J. & Gerzenstein, E. (1962). Las aves del Uruguay. *Com. Zool. Mus. Hist. Nat. Montevideo* **93**: 1–191. In Spanish.
Cuervo, A. (2002). *Hypopyrrhus pyrohypogaster*. Pp. 463–469 in: Renjifo *et al.* (2002).

Cueto, V.R., de Casenave, J.L. & Marone, L. (2008). Neotropical austral migrant landbirds: population trends and habitat use in the central Monte Desert, Argentina. *Condor* **110(1)**: 70–79.
Cueto, V.R., Marone, L. & de Casenave, J.L. (2006). Seed preferences in sparrow species of the Monte Desert: implications for seed-granivore interactions. *Auk* **123**: 358–367.
Cully, J.F. & Michaels, H.L. (2000). Henslow's Sparrow habitat associations on Kansas tallgrass prairie. *Wilson Bull.* **112(1)**: 115–123.
Cumming, S.C. & Steyn, P. (1966). Observations on the breeding biology of the Rock Bunting, *Emberiza tahapisi* Smith. *Ostrich* **37**: 170–175.
Cunningham, E.J.A. & Lewis, S. (2006). Parasitism of maternal investment selects for increased clutch size and brood reduction in a host. *Behav. Ecol.* **17(1)**: 126–131.
Curio, E. (1969). Funktionsweise und Stammesgeschichte des Flugfeindeerkennens einiger Darwinfinken (Geospizinae). *Z. Tierpsychol.* **26**: 394–487. In German.
Curio, E. & Kramer, P. (1964). Vom Mangrovefinken (*Cactospiza heliobates* Snodgrass und Heller). *Z. Tierpsychol.* **21(2)**: 223–234. In German with English summary.
Curio, E. & Kramer, P. (1965a). *Geospiza conirostris* auf Abingdon und Wenman entdeckt. *J. Orn.* **106**: 355–357. In German.
Curio, E. & Kramer, P. (1965b). On plumage variation in male Darwin's finches. *Bird-Banding* **36(1)**: 27–44.
Curnutt, J.L., Mayer, A.L., Brooks, T.M., Manne, L., Bass, O.L., Fleming, D.M., Nott, M.P. & Pimm, S.L. (1998). Population dynamics of the endangered Cape Sable Seaside-sparrow. *Anim. Conserv.* **1(1)**: 11–21.
Curry, R.L. & Stoleson, S.H. (1988). New bird records from the Galápagos associated with the El Niño-southern oscillation. *Condor* **90**: 505–507.
Curtis, D. (2008). Dark-eyed Junco in Langham – the first for Norfolk. *Trans. Norfolk Norwich Nat. Soc.* **41(2)**: 168–170.
Cuthbert, R.J. & Hilton, G.M. (2004). Introduced house mice *Mus musculus*: a significant predator of endangered and endemic birds on Gough Island, South Atlantic Ocean? *Biol. Conserv.* **117**: 483–489.
DaCosta, J.M., Spellman, G.M., Escalante, P. & Klicka, J. (2009). A molecular systematic revision of two historically problematic songbird clades: *Aimophila* and *Pipilo*. *J. Avian Biol.* **40**: 206–216.
DaCosta, J.M., Wehtje, W. & Klicka, J. (2008). Historic genetic structuring and paraphyly within the Great-tailed Grackle. *Condor* **110(1)**: 170–177.
Dale, S. (2009). Hortulanen er kritisk truet! *Vår Fuglefauna* **32(3)**: 108–115. In Norwegian.
Dale, S. (2010). Sibling resemblance in natal dispersal distance and direction in the Ortolan Bunting *Emberiza hortulana*. *Ibis* **152(2)**: 292–298.
Dale, S. (2011). Lifetime patterns of pairing success in male Ortolan Buntings *Emberiza hortulana*. *Ibis* **153(3)**: 494–501.
Dale, S. & Christiansen, P. (2010). Individual flexibility in habitat selection in the Ortolan Bunting *Emberiza hortulana*. *J. Avian Biol.* **41(3)**: 266–272.
Dale, S. & Hagen, O. (1997). Population size, distribution and habitat selection of the Ortolan Bunting *Emberiza hortulana* in Norway. *Fauna Norvegica (Ser. C. Cinclus)* **20(2)**: 93–103.
Dale, S. & Hansen, K. (2009). [The Rustic Bunting – a species in decline]. *Vår Fuglefauna* **32(4)**: 158–163. In Norwegian.
Dale, S. & Manceau, N. (2003). Habitat selection of two locally sympatric species of *Emberiza* buntings (*E. citrinella* and *E. hortulana*). *J. Orn.* **144(1)**: 58–68.
Dale, S. & Olsen, B.F.G. (2002). Use of farmland by Ortolan Buntings (*Emberiza hortulana*) nesting on a burned forest area. *J. Orn.* **143(2)**: 133–144.
Dale, S., Lunde, A. & Steifetten, O. (2005). Longer breeding dispersal than natal dispersal in the Ortolan Bunting. *Behav. Ecol.* **16(1)**: 20–24.
Dallimer, M., Cosgrove, R. & French, V. (2005). New records of Wedge-tailed Sabrewing *Campylopterus curvipennis* and Blue-black Grosbeak *Cyanocompsa cyanoides* in Cusuco National Park, Honduras. *Cotinga* **24**: 108–109.
Dalsgaard, B., Hilton, G.M., Gray, G.A.L., Aymer, L., Boatswain, J., Daley, J., Fenton, C., Martin, J., Martin, L., Murrain, P., Arendt, W.J., Gibbons, D.W. & Olesen, J.M. (2007). Impacts of volcanic eruption on the forest bird community of Montserrat, Lesser Antilles. *Ibis* **149**: 298–312.
Dance, K.W. (1986). Winter foods of Northern Cardinal, American Tree Sparrow and Pine Grosbeak in southern Ontario. *Ontario Birds* **4(1)**: 33–35.
Danforth, S.T. (1926). An ecological study of Cartagena Lagoon, Porto Rico, with special reference to the birds. *J. Dept. Agric. Puerto Rico* **10**: 1–136.
Danforth, S.T. (1928). Birds observed in Jamaica during the summer of 1926. *Auk* **45**: 480–491.
Danforth, S.T. (1929). Notes on the birds of Hispaniola. *Auk* **46**: 358–375.
Danforth, S.T. (1935). *The Birds of Saint Lucia*. Monographs of the University of Puerto Rico (Series B) **3**. University of Puerto Rico, Puerto Rico.
D'Angelo Neto, S. (2000). Ocorrência de *Molothrus rufoaxillaris* (Passeriformes: Emberizidae) na região de Francisco Sá, Norte de Minas Gerais. *Melopsittacus* **3**: 134–136. In Portuguese.
D'Angelo Neto, S. & de Vasconcelos, M.F. (2004). Novo registro estende a distribuição conhecida de *Arremon franciscanus* (Passeriformes: Emberizidae) ao sul. *Ararajuba* **11(2)**: 215. In Portuguese with English summary.
D'Angelo Neto, S. & de Vasconcelos, M.F. (2005). Sugestão de mudança no nome popular de *Arremon franciscanus*. *Atualidades Orn.* **127**: 25. In Portuguese.
Danner, R.M., Langridge, S. & Dietsch, T. (2008). The nest and eggs of Prevost's Ground Sparrow (*Melozone biarcuata*), group *biarcuata*. *Orn. Neotropical* **19(2)**: 283–285.
Darley, J.A. (1978). Pairing in captive Brown-headed Cowbirds (*Molothrus ater*). *Can. J. Zool.* **56**: 249–252.
Darley, J.A. (1982). Territoriality and mating behavior of the male Brown-headed Cowbird. *Condor* **84**: 15–21.
Darley, J.A. (1983). Territorial behavior of the female Brown-headed Cowbird (*Molothrus ater*). *Can. J. Zool.* **61**: 65–69.
Darlington, P.J. (1931). Notes on the birds of Río Frío (near Santa Marta), Magdalena, Colombia. *Bull. Mus. Comp. Zool. Harvard* **71**: 349–421.
Darrieu, C.A. (1994). Dos nuevos registros para la avifauna pampeana: *Tersina viridis viridis* (Emberizidae: Thraupinae) y *Columbina talpacoti talpacoti* (Columbidae). *Neotrópica* **40(103/104)**: 56. In Spanish.
Darrieu, C.A. & Camperi, A.R. (1998). Fluctuación anual del peso corporal, tamaño de gónadas y muda de *Pseudoleistes virescens* (Pecho Amarillo Común) (Aves: Emberizidae: Icterinae). *Neotrópica* **44**: 121–122. In Spanish.
Darrieu, C.A., Camperi, A.R. & Cicchino, A.C. (1996). *Ecología Alimentaria de* Pseudoleistes virescens *(Vieillot 1819) (Aves, Icteridae), en Ambientes Ribereños del Nordeste de la Provincia de Buenos Aires, Argentina*. Informe **51**. Comisión de Investigaciones Científicas, Provincia de Buenos Aires, La Plata, Argentina. In Spanish.
Darrieu, C.A., Camperi, A.R., Soave, G.E. & Cicchino, A. (2001). Ecología alimentaria del Varillero Ala Amarilla (*Agelaius thilius*) en ambientes ribereños de la provincia de Buenos Aires. *Orn. Neotropical* **12**: 205–214. In Spanish.
Daskaleva, G. (2007). Zweiter bulgarischer Nachweis des Grauortolans *Emberiza caesia*. *Orn. Mitt.* **59(3)**: 102–103. In German.
Dávalos, L.M. & Porzecanski, A.L. (2009). Accounting for molecular stochasticity in systematic revisions: species limits and phylogeny of *Paroaria*. *Mol. Phylogen. Evol.* **53**: 234–248.
David, N. & Gosselin, M. (2002a). Gender agreement of avian species names. *Bull. Brit. Orn. Club* **122(1)**: 14–49.
David, N. & Gosselin, M. (2002b). The grammatical gender of avian genera. *Bull. Brit. Orn. Club* **122(4)**: 257–282.
David, N., Dickinson, E.C. & Gregory, S.M.S. (2009). Contributions to a list of First Reviser actions: ornithology. *Zootaxa* **2085**: 1–24.
Davidson, A.H. (1994). Common Grackle predation on adult passerines. *Wilson Bull.* **106**: 174–175.
Davidson, M.E. (1938). On some birds rare in, or hitherto un-recorded from, Chiriqui Province, Panama. *Proc. Calif. Acad. Sci.* **23**: 255–261.
Davies, N.B. (2000). *Cuckoos, Cowbirds and other Cheats*. T. & A.D. Poyser, London.
Davis, A. & Arcese, P. (1999). An examination of migration in Song Sparrow using banding recovery data. *North Amer. Bird Bander* **24**: 124–128.
Davis, D.E. (1945a). The occurrence of the incubation-patch in some Brazilian birds. *Wilson Bull.* **57**: 188–190.
Davis, D.E. (1945b). The annual cycle of plants, mosquitoes, birds, and mammals in two Brazilian forests. *Ecol. Monogr.* **15**: 243–295.
Davis, D.E. (1946). A seasonal analysis of mixed flocks of birds in Brazil. *Ecology* **27**: 169–181.
Davis, I.L. (1972). *A Field Guide to the Birds of Mexico and Central America*. University of Texas Press, Austin, Texas.
Davis, J. (1951). Distribution and variation of the brown towhees. *Univ. Calif. Publ. Zool.* **52**: 1–120.
Davis, J. (1953). Birds of the Tzitzio region, Michoacan, Mexico. *Condor* **55**: 90–98.
Davis, J. (1957a). Determination of age in the Spotted Towhee. *Condor* **59**: 195–202.
Davis, J. (1957b). Comparative foraging behavior of the Spotted and Brown Towhees. *Auk* **74**: 129–166.
Davis, J. (1958). Singing behavior and the gonad cycle of the Rufous-sided Towhee. *Condor* **60**: 308–336.
Davis, J. (1960a). Notes on the birds of Colima, Mexico. *Condor* **62**: 215–219.
Davis, J. (1960b). Nesting behavior of the Rufous-sided Towhee in coastal California. *Condor* **62**: 434–456.
Davis, J. (1961). Some seasonal changes in morphology of the Rufous-sided Towhee. *Condor* **63**: 313–321.
Davis, J. (1973). Habitat preferences and competition of wintering Juncos and Golden-crowned Sparrows. *Ecology* **54(1)**: 174–180.
Davis, M. (1953). Longevity of Cuban Red-wing (*Agelaius assimilis*) in captivity. *Auk* **70**: 92.
Davis, S.D., Williams, J.B., Adams, W.J. & Brown, S.L. (1984). The effect of egg temperature on attentiveness in the Belding's Savannah Sparrow. *Auk* **101(3)**: 556–566.
Davis, S.K. (2003). Nesting ecology of mixed-grass prairie songbirds in southern Saskatchewan. *Wilson Bull.* **115(2)**: 119–130.
Davis, S.K. & Sealy, S.G. (1998). Nesting biology of the Baird's Sparrow in southwestern Manitoba. *Wilson Bull.* **110(2)**: 262–270.
Davis, S.K., Klippenstine, D.R. & Brigham, R.M. (2002). Does egg rejection account for the low incidence of cowbird parasitism in Chestnut-collared Longspurs (*Calcarius ornatus*)? *Auk* **119(2)**: 556–560.
Davis, T.H. (1979). Additions to the birds of Suriname. *Cont. Birdl.* **1(6)**: 136–146.
Davis, T.H. (1980). An annotated checklist to the birds of Suriname. Unpubl.
Davis, W.M. (1963). Eastward records of Cassin's Sparrow in Oklahoma. *Southwest. Nat.* **8**: 49–50.
Davis, W.R. & Arnold, K.A. (1972). Food habits of the Great-tailed Grackle in Brazos County, Texas. *Condor* **74**: 439–446.
Davydovich, L.I. & Gorban, I.M. (1990). [The Yellow-browed Bunting (*Emberiza chrysophrys*) – a new species for Ukrain avifauna]. *Ornitologiya* **24**: 147. In Russian.
Dawson, A. (2005). The effect of temperature on photoperiodically regulated gonadal maturation, regression and moult in Starlings: potential consequences of climate change. *Functional Ecol.* **19**: 995–1000.
Dawson, A. (2008). Control of the annual cycle in birds: endocrine constraints and plasticity in response to ecological variability. *Phil. Trans. Roy. Soc. London (Ser. B)* **363**: 1621–1633.
Dawson, R.D., Hillen, K.K. & Whitworth, T.L. (2005). Effects of experimental variation in temperature on larval densities of parasitic *Protocalliphora* (Diptera: Calliphoridae) in nest of Tree Swallows (Passeriformes: Hirundinidae). *Environm. Entomol.* **34**: 563–568.
Dawson, W.R. (1948). Records of fringillids from the Pleistocene of Rancho La Brea. *Condor* **50**: 57–63.
Dawson, W.R. (1950). A comparison of *Pipilo ocai* and the fossil *Pipilo angelensis*. *Condor* **52**: 88.
Dawson, W.R. (1954). Temperature regulation and water requirements of the Brown and Abert Towhees, *Pipilo fuscus* and *Pipilo aberti*. *Univ. Calif. Publ. Zool.* **59**: 81–124.
Dawson, W.R. & Allen, J.M. (1960). Thyroid activity in nestling Vesper Sparrows. *Condor* **62**: 403–405.
Dawson, W.R. & Evans, F.C. (1960). Relation of growth and development to temperature regulation in nestling Vesper Sparrows. *Condor* **62**: 329–340.
Day, D.H. (1987). Birds of the upper Limpopo River Valley. *Southern Birds* **14**: 1–76.
De Las Casas, J.C., Stiles, F.G., Bolívar, I.A. & Murillo, J.I. (2004). Range extension of two species of "red-breasted" meadowlarks (Icteridae: *Sturnella*) in Colombia. *Orn. Colombiana* **2**: 37–40.
De Mársico, M.C. & Reboreda, J.C. (2008). Egg-laying behavior in Screaming Cowbirds: why does a specialist brood parasite waste so many eggs? *Condor* **110**: 143–153.
De Mársico, M.C. & Reboreda, J.C. (2010). Brood parasitism increases mortality of Bay-Winged Cowbird nests. *Condor* **112(2)**: 407–417.
De Mársico, M.C., Mahler, B. & Reboreda, J.C. (2010). Reproductive success and nestling growth of the Baywing parasitized by Screaming and Shiny Cowbirds. *Wilson J. Orn.* **122**: 417–431.
Dean, W.R.J. (1987). Birds associating with fire at Nylsvley Nature Reserve, Transvaal. *Ostrich* **58**: 103–106.
Dean, W.R.J. (1997). The distribution and biology of nomadic birds in the Karoo, South Africa. *J. Biogeogr.* **24**: 769–779.
Dean, W.R.J. (2000). *The Birds of Angola: an Annotated Checklist*. British Ornithologists' Union Checklist **18**. British Ornithologists' Union, Tring, UK.
Dean, W.R.J. & Bond, W.J. (1994). Apparent avian extinctions from islands in a man-made lake, South Africa. *Ostrich* **65**: 7–13.
Dean, W.R.J. & Milton, S.J. (2001). Responses of birds to rainfall and seed abundance in the southern Karoo, South Africa. *J. Arid Environm.* **47**: 101–121.
Dean, W.R.J. & Siegfried, W.R. (1997). The protection of endemic and nomadic avian diversity in the Karoo, South Africa. *South Afr. J. Wildl. Res.* **27**: 11–21.
Dean, W.R.J., Anderson, M.D., Milton, S.J. & Anderson, T.A. (2002). Avian assemblages in native *Acacia* and alien *Prosopis* drainage line woodland in the Kalahari, South Africa. *Arid Environm.* **51**: 1–19.
Deane, R. (1909). Some original manuscripts relating to the history of Townsend's Bunting. *Auk* **26(3)**: 269–272.
Dearborn, D.C. (1996). Video documentation of a Brown-headed Cowbird nestling ejecting an Indigo Bunting nestling from the nest. *Condor* **98(3)**: 645–649.
Dearborn, D.C. (1999). Brown-headed Cowbird nestling vocalizations and risk of predation. *Auk* **116**: 448–457.
Dearborn, D.C. & Lichtenstein, G. (2002). Begging behaviour and host exploitation in parasitic cowbirds. Pp. 361–387 in: Wright, J. & Leonard, M.L. eds. (2002). *The Evolution of Begging: Competition, Cooperation and Communication*. Kluwer Academic Publishers, Dordrecht, Boston & London.
Dearborn, D.C., Anders, A.D., Thompson, F.R. & Faaborg, J. (1998). Effects of cowbird parasitism on parental provisioning and nestling food acquisition and growth. *Condor* **100**: 326–334.
DeBenedictis, P.A. (1966). The bill-brace feeding behavior of the Galápagos finch *Geospiza conirostris*. *Condor* **68(2)**: 206–208.
Debout, G. (2001). Localisation des postes de chant du Bruant jaune (*Emberiza citrinella*) et du Bruant zizi (*E. cirlus*) en sympatrie. *Cormoran* **12(2)**: 113–117. In French.
Dechant, J.A., Sondreal, M.L., Johnson, D.H., Igl, L.D., Goldade, C.M., Zimmerman, A.L. & Eulis, B.R. (2002). *Effects of Management Practices on Grassland Birds: Dickcissel*. Revised edition. Northern Prairie Wildlife Research Center, Jamestown, North Dakota.
Dechelle, M. & Ingels, J. (2007). The Scarlet Tanager *Piranga olivacea*, a new species for French Guiana. *Alauda* **75(3)**: 246–247.

DeGraaf, R.M. (1989). Territory sizes of Song Sparrows, *Melospiza melodia*, in rural and suburban habitats. *Can. Field-Nat.* **103(1)**: 43–47.
DeHaven, R.W., Crase, F.T. & Woronecki, P.P. (1975a). Breeding status of the Tricolored Blackbird, 1969–1972. *Calif. Fish & Game* **61**: 166–180.
DeHaven, R.W., Crase, F.T. & Woronecki, P.P. (1975b). Movements of Tricolored Blackbirds banded in the Central Valley of California 1965–1972. *Bird-Banding* **46**: 220–229.
Del Nevo, A. & Ewins, P.J. (1984). Rustic Bunting (*Emberiza rustica*) – a new species for Nepal. *J. Bombay Nat. Hist. Soc.* **80(2)**: 417–418.
Delacour, J. (1948). Le Tangara de Paradis (*Tangara chilensis*). *Rev. Écol. (Terre Vie)* **95**: 1–8. In French.
Delacour, J. (1972a). Sugar-bird tanager hybrids. *Avicult. Mag.* **78(2)**: 48.
Delacour, J. (1972b). Hybrids sugar-bird × tanager. *Avicult. Mag.* **78(6)**: 187–188.
Delany, M.F. & Cox, J.A. (1986). Florida Grasshopper Sparrow breeding distribution and abundance in 1984. *Florida Field Nat.* **14(4)**: 100–104.
Delany, M.F. & Linda, S.B. (1994). Characteristics of occupied and abandoned Florida Grasshopper Sparrow territories. *Florida Field Nat.* **22(4)**: 106–109.
Delany, M.F. & Linda, S.B. (1998). Characteristics of Florida Grasshopper Sparrow nests. *Wilson Bull.* **110(1)**: 136–139.
Delany, M.F., Giesel, J.T. & Brazeau, D.A. (2000). Genetic variability among populations of the Florida Grasshopper Sparrow. *J. Wildl. Management* **64(3)**: 631–636.
Delany, M.F., Shumar, M.B., McDermott, M.E., Kubilis, P.S., Hatchitt, J.L. & Rivero, R.G. (2007). Florida Grasshopper Sparrow distribution, abundance, and habitat availability. *Southeast. Nat.* **6(1)**: 15–26.
Delany, M.F., Stevenson, H.M. & McCracken, R. (1985). Distribution, abundance and habitat of the Florida Grasshopper Sparrow. *J. Wildl. Management* **49(3)**: 626–631.
Delhey, J.K.V. & Scorolli, A.L. (2002). Abundancia relativa y estatus de residencia del Pepitero Chico (*Saltatricula multicolor*) en el sudoeste de la provincia de Buenos Aires, Argentina. *Hornero* **17(1)**: 41–44. In Spanish with English summary.
Demastes, J.W. & Remsen, J.V. (1994). The genus *Caryothraustes* (Cardinalinae) is not monophyletic. *Wilson Bull.* **106(4)**: 733–738.
Dementiev, G.P., Gladkov, N.A., Sudilovskaya, A.M., Spangenberg, E.P., Boeme, L.B., Volchanetskii, I.B., Voinstvenskii, M.A., Gorchakovskaya, N.N., Korelov, M.N. & Rustamov, A.K. (1954). *Ptitsy sovetskogo soyuza*. [*The Birds of the Soviet Union*]. Vol. 5. Sovetskaya nauka, Moscow. In Russian.
Dementiev, G.P., Gladkov, N.A., Sudilovskaya, A.M., Spangenberg, E.P., Boeme, L.B., Volchanetsky, I.B., Voinstvensky, M.A., Gorchakovskaya, N.N., Korelov, M.N. & Rustamov, A.K. (1970). *Birds of the Soviet Union*. Vol. 5. Israel Program for Scientific Translations, Jerusalem.
Demeritt, W.W. (1936). *Agelaius humeralis* a new bird for North America. *Auk* **53**: 453.
Deng Wenhong & Gao Wei (2005). The effects of forest patch sizes on bird species diversity and individual density. *Shengwu Duoyangxing* **13(3)**: 204–212. In Chinese with English summary.
Deng Wenhong, Zheng Guangmei & Gao Wei (2003). Nesting success of the Meadow Bunting along habitat edges in northeastern China. *J. Field Orn.* **74(1)**: 37–44.
Denisova, M.N. & Gomolitskaya, R.D. (1967). [On daily song activity of the Yellow Bunting]. *Ornitologiya* **8**: 344–345. In Russian.
Dennis, R.H. (1969). Cretzschmar's Bunting on Fair Isle: new to Britain and Ireland. *British Birds* **62**: 144–148.
Denny, M. (2005). White-throated Sparrows (*Zonotrichia albicollis*) consume deadly fare without effect in Umatilla Co., Oregon. *Oregon Birds* **31(3)**: 117.
Derryberry, E.P. (2009). Ecology shapes birdsong evolution: variation in morphology and habitat explains variation in White-crowned Sparrow song. *Amer. Naturalist* **174(1)**: 24–33.
DeSante, D.F. & Ainley, D.G. (1980). *The Avifauna of the South Farallon Islands*. Studies in Avian Biology **4**. Cooper Ornithological Society, Berkeley, California.
Descourtilz, J.T. (1852). *Ornithologie Brésilienne ou Histoire des Oiseaux du Brésil*. T. Reeves, Rio de Janeiro. In French.
Devas, R.P. (1954). *Birds of Grenada. St. Vincent and the Grenadines*. Yuille, Port-of-Spain, Trinidad and Tobago.
Deviche, P., Small, T., Sharp, P. & Tsutsui, K. (2006). Control of luteinizing hormone and testosterone secretion in a flexibly breeding male passerine, the Rufous-winged Sparrow, *Aimophila carpalis*. *Gen. Comp. Endocrinol.* **149(3)**: 226–235.
Devictor, V., Julliard, R., Couvet, D. & Jiguet, F. (2008). Birds are tracking climate warming, but not fast enough. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **275**: 2743–2748.
Dharmakumarsinhji, R.S. (1972). The Crested Bunting, *Melophus lathami* (Gray) in Bhavnagar (Saurashtra), Gujarat. *J. Bombay Nat. Hist. Soc.* **69(3)**: 655–656.
Dhondt, A.A. (1977). Interspecific competition between Great and Blue Tit. *Nature (London)* **268**: 521–523.
Dhondt, A.A. (2011). *Interspecific Competition*. Oxford University Press, Oxford, UK.
Dhondt, A.A. & Dhondt, K.V. (2008). Two bird species new for Hispaniola. *J. Caribb. Orn.* **21(1)**: 46–47.
Dhondt, A.A., Adriaensen, F., Matthysen, E. & Kempenaers, B. (1990). Nonadaptive clutch sizes in tits. *Nature (London)* **348**: 723–725.
D'Horta, F.M., da Silva, J.M.C. & Ribas, C.C. (2008). Species limits and hybridization zones in *Icterus cayanensis-chrysocephalus* group (Aves: Icteridae). *Biol. J. Linn. Soc.* **95**: 583–597.
Di Giacomo, A.G. (1998). Descripción del nido y huevos de *Emberizoides ypiranganus*, y presencia de la especie en Formosa, Argentina. *Hornero* **15(1)**: 51–52. In Spanish with English summary.
Di Giacomo, A.G. (2005). Aves de la Reserva El Bagual. Pp. 201–465 in: Di Giacomo, A.G. & Krapovickas, S. eds. (2005). *Historia Natural y Paisaje de la Reserva El Bagual, Provincia de Formosa, Argentina*. Temas de Naturaleza y Conservación **4**. Aves Argentinas, Buenos Aires. In Spanish.
Di Giacomo, A.G. (2009). Notes on the seasonal distribution of tanagers in Argentina. Unpubl.
Di Giacomo, A.G. & Aguilar, H.A. (1987). Sobre un nuevo hospedante para la Argentina del Renegrido, *Molothrus bonariensis* (Aves: Icteridae). *Not. Faun.* **4**: 1–2. In Spanish with English summary.
Di Giacomo, A.G. & López-Lanús, B. (2000). Nuevos aportes al conocimiento de la nidificación de algunas aves del noroeste argentino. *Hornero* **15**: 131–134. In Spanish.
Di Giacomo, A.G., Di Giacomo, A.S., López, L., Bernabe, M. & Caradonna, A. (1995). Nuevos registros de aves en el noroeste argentino. *Hornero* **14(1/2)**: 67–68. In Spanish.
Di Giacomo, A.G., Di Giacomo, A.S., Mazar Barnett, J., López, L. & Benabe, M. (1997). Nuevas citas de *Catamblyrhynchus diadema* en el noroeste argentino. *Hornero* **14(4)**: 264–266. In Spanish with English summary.
Di Giacomo, A.G., Mahler, B. & Reboreda, J.C. (2010). Screaming Cowbird parasitism of nests of Solitary Caciques and Cattle Tyrants. *Wilson J. Orn.* **122(4)**: 795–799.
Di Giacomo, A.S. & Di Giacomo, A.G. (2006). Observations of Strange-tailed Tyrants (*Alectrurus risora*) and other grassland birds following army ants and armadillos. *J. Field Orn.* **77(3)**: 266–268.
Di Giacomo, A.S., Vickery, P.D., Casañas, H., Spitznagel, O.A., Ostrosky, C., Krapovickas, S. & Bosso, A.J. (2010). Landscape associations of globally threatened grassland birds in the Aguapey River Important Bird Area, Corrientes, Argentina. *Bird Conserv. Int.* **20**: 62–73.
Diamond, A.W. (1973). Habitats and feeding stations of St Lucia forest birds. *Ibis* **115(3)**: 313–329.
Diamond, A.W. & Lovejoy, T.E. eds. (1985). *Conservation of Tropical Forest Birds*. ICBP Technical Publication **4**. International Council for Bird Preservation, Cambridge, UK.
Dias, R.A. & Maurício, G.N. (2002). Natural history notes and conservation of a Saffron-cowled Blackbird *Xanthopsar flavus* population in the southern coastal plain of Río Grande do Sul, Brazil. *Bird Conserv. Int.* **12**: 255–268.
Dias, R.I., Santos, E.S.A. & Macedo, R.H. (2009). Mating system and sexual conflict in the Blue-black Grassquit (*Volatinia jacarina*, Aves: Emberizidae): extra-pair mating behavior sets the scene. *Oecologia Brasiliensis* **13(1)**: 183–191.
Dick, J.A., McGillivray, W.B. & Brooks, D.J. (1984). A list of birds and their weights from Saül, French Guiana. *Wilson Bull.* **96**: 347–514.
Dickerman, R.W. (1960). Red-eyed Cowbird parasitizes Song Sparrow and Mexican Cacique. *Auk* **77**: 472–473.
Dickerman, R.W. (1964). A specimen of Fuertes' Oriole, *Icterus fuertesi*, from Texas. *Auk* **81**: 433.
Dickerman, R.W. (1974). Review of Red-winged Blackbirds of eastern, west-central, and southern Mexico and Central America. *Amer. Mus. Novit.* **2538**: 1–18.
Dickerman, R.W. (1981a). A taxonomic review of the Spotted-breasted Oriole. *Nemouria* **26**: 1–10.
Dickerman, R.W. (1981b). Geographic variation in the Scrub Euphonia. *Occas. Pap. Mus. Zool. Louisiana State Univ.* **59**: 1–6.
Dickerman, R.W. (1986). Notes on the plumages of the Paramo Seedeater (*Catamenia homochroa*). *Auk* **103**: 227–230.
Dickerman, R.W. (1987). Notes on the plumage of *Diglossa duidae* with the description of a new subspecies. *Bull. Brit. Orn. Club* **107**: 42–43.
Dickerman, R.W. (1988). An unnamed subspecies of *Euphonia rufiventris* from Venezuela and northern Brazil. *Bull. Brit. Orn. Club* **108**: 20–22.
Dickerman, R.W. (1989). Notes on *Sturnella magna* in South America with a description of a new subspecies. *Bull. Brit. Orn. Club* **109**: 160–162.
Dickerman, R.W. (2007). Birds of the Southern Pacific lowlands of Guatemala. With a review of *Icterus gularis*. *Spec. Publ. Mus. Southwest. Biol.* **7**: 1–45.
Dickerman, R.W. & Phillips, A.R. (1967). Botteri's Sparrows of the Atlantic coastal lowlands of Mexico. *Condor* **69**: 596–600.
Dickerman, R.W. & Phillips, A.R. (1970). Taxonomy of the Common Meadowlark (*Sturnella magna*) in central and southern Mexico and Caribbean Central America. *Condor* **72**: 305–309.
Dickerman, R.W., Phillips, A.R. & Warner, D.W. (1967). On the Sierra Madre Sparrow, *Xenospiza baileyi*, of Mexico. *Auk* **84**: 49–60.
Dickey, D.R. & van Rossem, A.J. (1938). *The Birds of El Salvador*. Publications / Field Museum of Natural History (Zoological Series) **23**. Field Museum of Natural History, Chicago, Illinois. 609 pp.
Dickinson, E.C. ed. (2003). *The Howard and Moore Complete Checklist of the Birds of the World*. 3rd revised and enlarged edition. Christopher Helm, London.
Dickinson, J.C. (1952). Geographic variation in the Red-eyed Towhee of the eastern United States. *Bull. Mus. Comp. Zool. Harvard* **107(5)**: 271–352.
Dickinson, T.E. & Lein, M.R. (1987). Territory dynamics and patterns of female recruitment in Red-winged Blackbirds. *Can. J. Zool.* **65**: 465–471.
Dickinson, T.E., Falls, J.B. & Kopachena, J. (1987). Effects of female pairing status and timing of breeding on nesting productivity in Western Meadowlarks (*Sturnella neglecta*). *Can. J. Zool.* **65**: 3093–3101.
Dierschke, J. (2001). Herkunft, Zugwege und Populationsgröße in Europa überwinternder Ohrenlerchen (*Eremophila alpestris*), Schneeammern (*Plectrophenax nivalis*) und Berghänflinge (*Carduelis flavirostris*). *Vogelwarte* **41(1)**: 31–43. In German with English summary.
Dierschke, J. (2007). The status of Black-headed and Red-headed Buntings on Helgoland. *British Birds* **100(9)**: 554–557.
Dimiceli, J.K., Stouffer, P.C., Johnson, E.I., Leonardi, C. & Moser, E.B. (2007). Seed preferences of wintering Henslow's Sparrows. *Condor* **109(3)**: 595–604.
Dinelli, L. (1918). Notas biológicas sobre las aves del noroeste de la República Argentina. *Hornero* **1**: 57–68. In Spanish.
Dinelli, L. (1924). Notas biológicas sobre aves del noroeste de la Argentina. *Hornero* **3**: 253–258. In Spanish.
Dinger, R. (2010). Kardinäle – meine Erfahrungen mit Grau-, Rot- und Grünkardinälen. *Gefiederte Welt* **134(7)**: 8–13. In German.
Dinsmore, J.J. & Dinsmore, S.J. (1993). Range expansion of the Great-tailed Grackle in the 1900s. *J. Iowa Acad. Sci.* **100(2)**: 54–59.
Dinzl, L. (1990). Winter "Spotted" Towhee in Hennepin County. *Loon* **62(2)**: 115.
DiQuinzio, D.A., Paton, P.W.C. & Eddleman, W.R. (2001). Site fidelity, philopatry, and survival of promiscuous Saltmarsh Sharp-tailed Sparrows in Rhode Island. *Auk* **118(4)**: 888–899.
DiQuinzio, D.A., Paton, P.W.C. & Eddleman, W.R. (2002). Nesting ecology of Saltmarsh Sharp-tailed Sparrows in a tidally restricted salt marsh. *Wetlands* **22(1)**: 179–185.
Dittus, W.P. & Lemon, R.E. (1969). Effects of song tutoring and acoustic isolation on the song repertoires of Cardinals. *Anim. Behav.* **17**: 523–533.
Dittus, W.P. & Lemon, R.E. (1970). Auditory feedback in the singing of Cardinals. *Ibis* **112**: 544–548.
Dixon, A., Ross, D., O'Malley, S.L.C. & Burke, T. (1994). Paternal investment inversely related to degree of extra-pair paternity in the Reed Bunting. *Nature (London)* **371(6499)**: 698–700.
Dixon, C.L. (1978). Breeding biology of the Savannah Sparrow on Kent Island. *Auk* **95(2)**: 235–246.
Dixon, K.L. (1960). A courtship display of Scott's Oriole. *Auk* **77**: 348.
Dixon, K.L. (1989). Contact zones of avian congeners on the southern Great Plains. *Condor* **91**: 15–22.
Dixon, T.P., Lopez, R.R., Peterson, M.J., McCleery, R.A. & Silvy, N.J. (2008). Field-level spatial factors, associated edges, and Dickcissel nesting ecology on reclaimed lands in Texas. *Landscape Urban Planning* **86(1)**: 60–65.
Dobbs, R.C. & Martin, P.R. (2000). Winter nocturnal roost sites and behavior of some desert passerines in western Texas. *Western Birds* **31(2)**: 120–122.
Dobbs, R.C., Martin, P.R. & Martin, T.E. (1999). Green-tailed Towhee (*Pipilo chlorurus*). No. **368** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.
Dobson, P. (1988). A bird caught in a spider's web. *Laniarius* **33**: 22.
Dod, A.S. (1978). *Aves de la República Dominicana*. Museo Nacional de Historia Natural, Santo Domingo, Dominican Republic. In Spanish.
Dodge, A., Fry, A.J., Blackwell, R.C. & Zink, R.M. (1995). Comparison of phylogenies derived from two molecular data sets in the avian genera *Pipilo* and *Spizella*. *Wilson Bull.* **107**: 641–654.
Doering, A. & Lorentz, P.G. (1939). *La Conquista del Desierto. Diario de los Miembros de la Comisión Científica de la Expedición de 1879*. Comisión Nacional Monumento al Teniente General Don Julio A. Roca, Buenos Aires. In Spanish.
Dolbeer, R.A. (1976). Reproductive rate and temporal spacing of nesting of Red-winged Blackbirds in upland habitat. *Auk* **93**: 343–355.
Dolbeer, R.A. (1978). Movement and migration patterns of Red-winged Blackbirds: a continental overview. *Bird-Banding* **49**: 17–34.
Dolman, P.M. (1995). The intensity of interference varies with resource density: evidence from a field study with Snow Buntings, *Plectrophenax nivalis*. *Oecologia (Berlin)* **102(4)**: 511–514.
Donahue, P. & Wood, T. (1992). Observations at a Paradise Tanager nest. *Wilson Bull.* **104**: 360–361.
Donald, P.F. & Evans, A.D. (1994). Habitat selection by Corn Buntings *Miliaria calandra* in winter. *Bird Study* **41**: 199–210.
Donald, P.F. & Evans, A.D. (1995). Habitat selection and population size of Corn Buntings *Miliaria calandra* breeding in Britain in 1993. *Bird Study* **42**: 190–204.
Donald, P.F. & Forrest, C. (1995). The effects of agricultural change on population size of Corn Buntings *Miliaria calandra* on individual farms. *Bird Study* **42**: 205–215.
Donald, P.F., Wilson, J.D. & Shepherd, M. (1994). The decline of the Corn Bunting. *British Birds* **87**: 106–132.
Donegan, T.M. (2007). A new species of brush finch (Emberizidae: *Atlapetes*) from the northern Central Andes of Colombia. *Bull. Brit. Orn. Club* **127(4)**: 255–268.
Donegan, T.M. & Avendaño, J.E. (2010). A new subspecies of mountain tanager in the *Anisognathus lacrymosus* complex from the Yariguíes Mountains of Colombia. *Bull. Brit. Orn. Club* **130(1)**: 13–32.

Donegan, T.M. & Briceño, E.R. (2005). Birds. Pp. 27–35 in: Donegan, T.M. & Huertas, B. eds. (2005). *Threatened Species of Serrania de los Yariguies: Final Report*. Colombian EBA Project Report Series **5**. Fundación ProAves, Santa Fé de Bogotá, Colombia. 81 pp.

Donegan, T.M. & Dávalos, L.M. (1999). Ornithological observations from Reserva Natural Tambito, Cauca, south-west Colombia. *Cotinga* **12**: 48–55.

Donegan, T.M. & Huertas, B. (2006). A new brush-finch in the *Atlapetes latinuchus* complex from the Yariguíes Mountains and adjacent Eastern Andes of Colombia. *Bull. Brit. Orn. Club* **126(2)**: 94–116.

Donegan, T.M., Avendaño, J.E., Briceño, E.R. & Huertas, B. (2007). Range extensions, taxonomic and ecological notes from Serrania de los Yariguíes, Colombia's new National Park. *Bull. Brit. Orn. Club* **127(3)**: 172–213.

Donegan, T.M., Avendaño, J.E., Huertas, B. & Flórez, P. (2009). Avifauna de San Pedro de los Milagros, Antioquia: una comparación entre colecciones antiguas y evaluaciones rápidas. *Bol. Cient. Mus. Hist. Nat. Univ. Caldas* **13(1)**: 63–72. In Spanish with English summary.

Donnelly, P.J. (1993). Yellow-browed Bunting in Orkney. *British Birds* **86(9)**: 411–414.

Donnelly, P.J. (2008). The Cretzschmar's Bunting on Orkney. *Birding World* **21(9)**: 384–386.

Dontschev, S. (1973). Zur Avifauna Bulgariens. *Bonn. Zool. Beitr.* **24(3)**: 323–324. In German.

Dooling, R.J., Peters, S.S. & Searcy, M.H. (1979). Auditory sensitivity and vocalizations of the Field Sparrow (*Spizella pusilla*). *Bull. Psychonomic Soc.* **14(2)**: 106–108.

Dorn, J. (1980a). Zucht des Haubenfinken (*Coryphospingus cucullatus*). *Gefiederte Welt* **104(1)**: 14–15. In German.

Dorn, J. (1980b). Die Zucht des Streifenpfäffchens (*Sporophila a. americana*). *Gefiederte Welt* **104(10)**: 185–187. In German.

Dorn, R.D. & Dorn, J.L. (1995). Cassin's Sparrow nesting in Wyoming. *Western Birds* **26(2)**: 104–106.

Dornak, L.L. (2010). Breeding patterns of Henslow's Sparrow and sympatric grassland sparrow species. *Wilson J. Orn.* **122(4)**: 635–645.

Dornas, T. (2008). Descrição de ninho e ovos do Cardeal-de-Goiás *Paroaria baeri* e relato de Nido parasitismo na região do Cantão, vale do rio Araguaia, Tocantins, Brasil. *Cotinga* **30**: 68–69. In Portuguese.

Dornas, T., Pinheiro, R.T., Pacheco, J.F. & Olmos, F. (2007). Ocorrência de *Sturnella militaris* (Linnaeus, 1758), polícia-inglesa-do-norte no Tocantins e sudoeste do Maranhão. *Rev. Bras. Orn.* **15(3)**: 448–450. In Portuguese with English summary.

Dornberger, W. (1981). Gesang und vergleichende Messungen an Zippammern (*Emberiza cia* L.). *Ber. Naturforsch. Ges. Bamberg* **56**: 200–211. In German.

Dorsey, G.A. (1976). Bachman's Sparrow: songs and behaviour. *Oriole* **41(4)**: 52–56.

Dorst, J. (1957a). Étude d'une collection d'oiseaux rapportée du bassin du Haut Marañón, Pérou septentrional. *Bull. Mus. Natl. Hist. Nat. Paris* **29**: 377–384. In French.

Dorst, J. (1957b). Contribution à l'étude écologique des oiseaux du Haut Marañón. *Oiseau et RFO (Nouv. Sér.)* **27**: 235–269. In French.

Dorzhiev, T.Z. ed. (2003). *Sovremennye problemy ornitologii Sibiri i Tsentral'noy Azii: materiali II mezhdunarodnoi ornitologicheskoi conferentsii. V 2-h chastyakh*. [*The Modern Problems of Ornithology in Siberia and Central Asia – Proceedings of 2nd International Ornithological Conference. In Two Parts*]. Part 1. Publishing House of Buryat State University, Ulan-Ude, Russia. In Russian.

Dorzhiev, T.Z. & Jumov, B.O. (1991a). *Ecology of Buntings: the Study of the Genus* Emberiza *in Zabaikalje*. Buryatia Scientific Press, Ulan-Ude, Russia.

Dorzhiev, T.Z. & Jumov, B.O. (1991b). [To ecology of the Mongolian Rock Bunting (*Emberiza godlewskii*) at the area east to the Baikal Lake]. *Ornitologiya* **25**: 191–192. In Russian.

Doucet, S.M. (2002). Structural plumage coloration, male body size, and condition in the Blue-black Grassquit. *Condor* **104(1)**: 30–38.

Douglas, D.J.T., Benton, T.G. & Vickery, J.A. (2010). Contrasting patch selection of breeding Yellowhammers *Emberiza citrinella* in set-aside and cereal crops. *Bird Study* **57(1)**: 69–74.

Douglas, L. & Levy, C. (1996). Yellow-shouldered Grassquit *Loxipasser anoxanthus*. *Gosse Bird Club Broadsheet* **67**: 11.

Dove, C.J., Schmidt, B., Gebhard, C. & LeBoeuf, E. (2001). Late record of Le Conte's Sparrow in Florida. *Florida Field Nat.* **29(3)**: 95.

Dow, D.D. (1969). Home range and habitat of the Cardinal in peripheral and central populations. *Can. J. Zool.* **47**: 103–114.

Dow, D.D. (1970). Distribution and dispersal of the Cardinal, *Richmondena cardinalis*, in relation to vegetational cover and river systems. *Amer. Midl. Nat.* **84**: 198–207.

Dow, D.D. & Scott, D.M. (1971). Dispersal and range expansion by the Cardinal: an analysis of banding records. *Can. J. Zool.* **49**: 185–198.

Downer, A. (1972). Longevity records of Indigo Buntings wintering in Jamaica. *Bird-Banding* **43**: 287.

Downer, A. & Sutton, R. (1990). *Birds of Jamaica: a Photographic Field Guide*. Cambridge University Press, Cambridge, UK.

Downhower, J.F. (1976). Darwin's finches and the evolution of sexual dimorphism in body size. *Nature (London)* **5578**: 558–563.

Downhower, J.F. (1978). Observations on the nesting of the Small Ground Finch *Geospiza fuliginosa* and the Large Cactus Ground Finch *G. conirostris* on Española, Galápagos. *Ibis* **120(3)**: 340–346.

Doyle, T.J. (1997). The Timberline Sparrow, *Spizella (breweri) taverneri*, in Alaska, with notes on breeding habitat and vocalizations. *Western Birds* **28(1)**: 1–12.

Drozdov, N.N. (1972). [*Geospiza conirostris* – its original method of finding food]. *Priroda* **1972(2)**: 121. In Russian.

Drury, W.H. (1962). Breeding activities, especially nest-building, of the Yellowtail (*Ostinops decumanus*) in Trinidad, West Indies. *Zoologica (New York)* **47**: 39–58.

Du Bois, H.M. (1959). Black-throated Sparrows in northwestern Oregon. *Condor* **61**: 435.

Du Hengqin (1994). [Observation on the breeding habits of Meadow Bunting]. *Chinese J. Zool.* **29(6)**: 28–29. In Chinese.

Dubke, L.H. (1994). Black-headed Grosbeak in Hamilton County. *Migrant* **63(3)**: 68.

DuBois, A.D. (1923). Two nest studies of McCown's Longspur. *Bird Lore* **25**: 95–105.

DuBois, A.D. (1935). Nests of Horned Larks and longspurs. *Condor* **37**: 56–72.

DuBois, A.D. (1937). Notes on coloration and habits of the Chestnut-collared Longspur. *Condor* **39**: 104–107.

DuBois, A.L., Nowicki, S. & Searcy, W.A. (2009). Swamp Sparrows modulate vocal performance in an aggressive context. *Biol. Letters (London)* **5(2)**: 163–165.

Dubois, P.J. (2008). *Nouvel Inventaire des Oiseaux de France*. Delachaux et Niestlé, Paris.

Dubs, B. (1992). *Birds of Southwestern Brazil - Catalogue and Guide to the Birds of the Pantanal of Mato Grosso and its Border Areas*. Betrona-Verlag, Küsnacht, Switzerland.

Duca, C. & Marini, M.A. (2004). Aspectos da nidificação de *Cacicus haemorrhous* (Passeriformes, Icterini) no sudeste do Brasil. *Ararajuba* **12**: 25–32. In Portuguese with English summary.

Duca, C. & Marini, M.A. (2005). Temporal variation in the reproductive success of *Cacicus haemorrhous* (Linnaeus) (Aves, Icterinae) in an Atlantic Forest reserve in Southeast Brazil. *Rev. Bras. Zool.* **22(2)**: 484–489.

Duca, C. & Marini, M.A. (2008). Breeding success of *Cacicus haemorrhous* (Linnaeus) (Aves: Icteridae) in different environments in an Atlantic forest reserve in southeast Brazil. *Rev. Bras. Zool.* **25**: 165–171.

Duckworth, J.W., Tizard, R.J., Timmins, R.J., Thewlis, R.M., Robichaud, W.G. & Evans, T.D. (1998). Bird records from Laos, October 1994–August 1995. *Forktail* **13**: 33–68.

Dudaniec, R.Y., Kleindorfer, S. & Fessl, B. (2006). Effects of the introduced ectoparasite *Philornis downsi* on haemoglobin level and nestling survival in Darwin's Small Ground Finch (*Geospiza fuliginosa*). *Austr. Ecol.* **31(1)**: 88–94.

Dufty, A.M. (1982). Movements and activities of radio-tracked Brown-headed Cowbirds. *Auk* **99**: 316–327.

Dufty, A.M. (1983). Variation in the egg markings of the Brown-headed Cowbird. *Condor* **85**: 109–111.

Dufty, A.M. (1994). Rejection of foreign eggs by Yellow-headed Blackbirds *Condor* **96**: 799–801.

Dufty, A.M. & Hanson, A. (1999). Vocal and behavioral responses of Brown-headed Cowbirds to flight whistles from different dialects. *Condor* **101**: 484–492.

Dufty, A.M. & McChrystal, R. (1992). Vocalizations and copulatory attempts in free-living Brown-headed Cowbirds. *J. Field Orn.* **63**: 16–25.

Dufty, A.M., Goldsmith, A.R. & Wingfield, J.C. (1987). Prolactin secretion in a brood parasite, the Brown-headed Cowbird, *Molothrus ater*. *J. Zool.* **212**: 669–675.

Dugand, A. (1947). Aves del Departmento del Atlántico, Colombia. *Caldasia* **4**: 499–648. In Spanish.

Dugand, A. & Eisenmann, E. (1983). Rediscovery of, and new data on, *Molothrus armenti* Cabanis. *Auk* **100**: 991–992.

Dunham, D.W. (1965). Agonistic behavior in captive Rose-breasted Grosbeaks (*Pheucticus ludovicianus*). *Behaviour* **27**: 160–173.

Dunham, D.W. (1966a). Maintenance activities of the Rose-breasted Grosbeak. *Wilson Bull.* **78(1)**: 68–78.

Dunham, D.W. (1966b). Reaction to Predators in the Rose-breasted Grosbeak. *Wilson Bull.* **78(3)**: 279–282.

Dunham, D.W. (1966c). Territorial and sexual behavior in the Rose-breasted Grosbeak, *Pheucticus ludovicianus*. *Z. Tierpsychol.* **23**: 438–451.

Dunham, D.W. (1971). Interspecific cacique colonies in Surinam. *Auk* **88**: 178.

Dunham, M.L. (1990). Nest-site selection by Boat-tailed Grackles. *Wilson Bull.* **102**: 702–706.

Dunn, E.H. & Dunn, R.B. (1999). Notes on behavior of Smith's Longspurs wintering in Oklahoma. *Bull. Okla. Orn. Soc.* **32(3)**: 13–20.

Dunn, J.C. & Wright, C. (2009). Ageing and sexing the Yellowhammer *Emberiza citrinella caliginosa* during the non-breeding season. *Ringing & Migration* **24(4)**: 240–252.

Dunn, P.O. & Winkler, D.W. (1999). Climate change has affected the breeding date of Tree Swallows throughout North America. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **266**: 2487–2490.

Dunn, P.O. & Winkler, D.W. (2010). Effects of climate change on timing of breeding and reproductive success in birds. Pp. 113–128 in: Møller, Fiedler & Berthold (2010).

Dunn, P.O. & Winkler, D.W., Whittingham, L.A., Hannon, S.J. & Robertson, R.J. (2011). A test of the mismatch hypothesis: how is timing of reproduction related to food abundance in an aerial insectivore? *Ecology* **92(2)**: 450–461.

Dunning, J.B. (1984). *Body Weights of 686 Species of North American Birds*. Monograph **1**. Western Bird Banding Association, Santa Clara County, California.

Dunning, J.B. (1993a). Bachman's Sparrow (*Aimophila aestivalis*). No. **38** in: Poole, A., Stettenheim, P. & Gill, F. eds. (1993). *The Birds of North America*. Vol. 1. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Dunning, J.B. ed. (1993b). *CRC Handbook of Avian Body Masses*. CRC Press, Boca Raton, Florida.

Dunning, J.B. (2001). Bananaquit. Pp. 510–511 in: Elphick, C., Dunning, J.B. & Sibley, D.A. eds. (2001). *The Sibley Guide to Bird Life and Behavior*. Alfred A. Knopf, New York.

Dunning, J.B. ed. (2008). *CRC Handbook of Avian Body Masses*. 2nd edition. CRC Press, Boca Raton, London & New York.

Dunning, J.B. & Watts, B.D. (1990). Regional differences in habitat occupancy by Bachman's Sparrow. *Auk* **107(3)**: 463–472.

Dunning, J.B. & Watts, B.D. (1991). Habitat occupancy by Bachman's Sparrow in the Francis Marion National Forest before and after Hurricane Hugo. *Auk* **108(3)**: 723–725.

Dunning, J.B., Bowers, R.K., Suter, S.J. & Bock, C.E. (1999). Cassin's Sparrow (*Aimophila cassinii*). No. **471** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 12. The Birds of North America Inc., Philadelphia, Pennsylvania.

Dunning, J.B., Braile, T.M. & Knudson, D.M. (1999). First state record of Black-headed Grosbeak. *Indiana Audubon Quarterly* **77(3)**: 146–149.

Dunning, J.S. (1982). *South American Land Birds. A Photographic Aid to Identification*. Harrowood Books, Newtown Square, Pennsylvania.

Dupuy, D. & Dupuy, J.L. (2000). Premier cas de nidification du Bruant mélanocéphale *Emberiza melanocephala* en France (Alpes-Maritimes). *Ornithos* **7(4)**: 174–179. In French with English summary.

Dupuy, D., Dupuy, J.L., Chapalain, A., Chapalain, C. & Chapalain, F. (2002). Nouvelle nidification du Bruant mélanocéphale *Emberiza melanocephala* en France en 2001. *Ornithos* **9(2)**: 85. In French with English summary.

Duré Ruiz, N.M., Mermoz, M.E. & Fernández, G.J. (2008). Effect of cowbird parasitism on brood reduction in the Brown-and-yellow Marshbird. *Condor* **110(3)**: 507–513.

Dvorak, M., Vargas, H., Fessl, B. & Tebbich, S. (2004). On the verge of extinction: a survey of the Mangrove Finch *Cactospiza heliobates* and its habitat on the Galápagos Islands. *Oryx* **38(2)**: 171–179.

Dwight, J. & Griscom, L. (1921). A revision of *Atlapetes gutturalis* with descriptions of three new races. *Amer. Mus. Novit.* **16**: 1–4.

Dyer, M.I. (1975). The effects of Red-winged Blackbirds on biomass production of corn grains (*Zea mays* L.). *J. Appl. Ecol.* **12**: 719–726.

Dymond, N. (1999). Two records of Black-headed Bunting *Emberiza melanocephala* in Sabah – the first definite occurrences in Malaysia and Borneo. *Forktail* **15**: 102–103.

Dzierzanowski, T. (2004). Trznadel *Emberiza citrinella* i Potrzeszcz *Emberiza calandra* w krajobrazie rolniczym pod Lubochnia. *Kulon* **9(2)**: 163–173. In Polish with English summary.

Earsom, S.D. (2004). Predation of fledgling Warbling Silverbill, *Lonchura malabarica* (Aves: Estrildidae) by Troupial, *Icterus icterus* (Aves: Icteridae) in southwestern Puerto Rico. *Caribb. J. Sci.* **40(3)**: 413–415.

Eason, P.K. (1992). Optimization of territory shape in heterogeneous habitats: a field study of the Red-capped Cardinal (*Paroaria gularis*). *J. Anim. Ecol.* **61(2)**: 411–424.

Eason, P.K. & Stamps, A. (1993). An early warning system for detecting intruders in a territorial animal. *Anim. Behav.* **46(6)**: 1105–1109.

Eason, P.K. & Stamps, A. (2001). The effect of visibility on space use by territorial Red-capped Cardinals. *Behaviour* **138(1)**: 19–30.

Easterla, D.A. (1962). Foods of Le Conte's Sparrow. *Auk* **79**: 272–273.

Eaton, M.D. (2006). A phylogenetic perspective on the evolution of chromatic ultraviolet plumage coloration in grackles and allies (Icteridae). *Auk* **123**: 211–234.

Eaton, S.W. (2001). Pneumatization of the skull in the Parulidae. *Wilson Bull.* **113(3)**: 273–278.

Eaton, S.W. & Edwards, E.P. (1948). Notes on birds of the Gomez Farias region of Tamaulipas. *Wilson Bull.* **60**: 109–114.

Eber, G. & Szijj, J. (1960). *Emberiza hortula* L. In: Stresemann & Portenko (1960).

Echeverry-Galvis, M.Á. & Córdoba-Córdoba, S. (2006). Descripción del huevo del Saltátor Collarejo (*Saltator cinctus*) y comentarios preliminares sobre huevos del género *Saltator*. *Bol. Soc. Antioqueña Orn.* **16(1)**: 76–84. In Spanish.

Echeverry-Galvis, M.Á. & Córdoba-Córdoba, S. (2007). New distributional and other bird records from Tatamá Massif, West Andes, Colombia. *Bull. Brit. Orn. Club* **127(3)**: 213–224.

Echeverry-Galvis, M.Á. & Morales-Rozo, A. (2007). Lista anotada de algunas especies de la vereda "Cerca de Piedra". *Bol. Soc. Antioqueña Orn.* **17**: 87–93. In Spanish.

Echeverry-Galvis, M.Á., Córdoba-Córdoba, S., Peraza, C.A., Baptiste, M.P. & Ahumada, O.A. (2005). Body weights of 98 species of Andean cloud-forest birds. *Bull. Brit. Orn. Club* **126(4)**: 291–298.

Eckerle, K.P. & Breitwisch, R. (1997). Reproductive success of the Northern Cardinal, a large host of Brown-headed Cowbirds. *Condor* **99**: 169–178.

Eckert, C.G. & Weatherhead, P.J. (1987). Male characteristics, parental quality and the study of mate choice in the Red-winged Blackbird (*Agelaius phoeniceus*). *Behav. Ecol. Sociobiol.* **20**: 35–42.

Eckhardt, F. (1994). Black-headed Grosbeak in Lac Qui Parle County. *Loon* **66(3)**: 155.

Eda, S. (1995). [New records of birds of Kurashiki City, Okayama Prefecture, southwest Honshu, Japan]. Part 1. *Bull. Kurashiki Mus. Nat. Hist.* **10**: 55. In Japanese.

Eda, S. (1996). [New records of birds of Kurashiki City, Okayama Prefecture, southwest Honshu, Japan]. Part 2. *Bull. Kurashiki Mus. Nat. Hist.* **11**: 63. In Japanese.
Eddleman, W.R. (2002). Hepatic Tanager (*Piranga flava*). No. **655** in: Poole, A.F. & Gill, F.B. eds. (2002). *The Birds of North America*. Vol. 17. The Birds of North America Inc., Philadelphia, Pennsylvania.
Edinger, B.B. (1988). Extra-pair courtship and copulation attempts in Northern Orioles. *Condor* **90(3)**: 546–554.
Edmonds, S.T., Evers, D.C., Cristol, D.A., Mettke-Hofmann, C., Powell, L.L., McGann, A.J., Armiger, J.W., Lane, O.P., Tessler, D.F., Newell, P., Heyden, K. & O'Driscoll, N.J. (2010). Geographic and seasonal variation in mercury exposure of the declining Rusty Blackbird. *Condor* **112(4)**: 789–799.
Edwards, E.P. (1967). Nests of the Common Bush-tanager and the Scaled Antpitta. *Condor* **69**: 605.
Edwards, E.P. (1972). *A Field Guide to the Birds of Mexico*. Published privately, Sweet Briar, Virginia.
Edwards, E.P. & Tashian, R.E. (1959). Avifauna of the Catemaco basin of southern Veracruz, Mexico. *Condor* **61**: 325–337.
Eguiarte, L.E. & del Rio, C.M. (1985). Feeding habits of the Citreoline Trogon in a tropical deciduous forest during the dry season. *Auk* **102**: 872–874.
Eguiarte, L.E., del Rio, C.M. & Arita, H. (1987). El néctar y el polen como recursos: el papel ecológico de los visitantes a las flores de *Pseudobombax ellipticum* (H.B.K.) Dugand. *Biotropica* **19(1)**: 74–82. In Spanish with English summary.
Ehrengruber, M.U., Pasinelli, G. & Egli, T. (2006). Gesangsvariabilität der Rohrammer *Emberiza schoeniclus* in der Schweiz. *Orn. Beob.* **103(2)**: 87–96. In German with English summary.
Ehrenroth, B. & Jansson, B. (1966). Gluttsnäppa (*Tringa nebularia*) och videsparv (*Emberiza rustica*) funna häckande i norra Värmland. *Vår Fågelvärld* **25**: 97–105. In Swedish.
Ehrich, D. (1997). Zur Brutbiologie von Spornammer *Calcarius lapponicus*, Ohrenlerche *Eremophila alpestris* und Schneeammer *Plectrophenax nivalis* in der arktischen Tundra West-Taimyrs (Sibirien). *Orn. Beob.* **94(3)**: 209–224. In German with English summary.
Eibl-Eibesfeldt, I. (1961). Über den Werkzeuggebrauch des Spechtfinken *Camarhynchus pallidus*. *Z. Tierpsychol.* **18**: 343–346. In German.
Eibl-Eibesfeldt, I. (1964). Woodpecker Finch of the Galápagos – The bird that uses a tool for food-gathering. *Anim. Kingdom* **67**: 11–13.
Eibl-Eibesfeldt, I. & Sielmann, H. (1962). Beobachtungen am Spechtfinken *Cactospiza pallida* (Sclater & Salvin). *J. Orn.* **103**: 92–101. In German.
Eisenmann, E. (1952). Annotated list of birds of Barro Colorado Island, Panama Canal Zone. *Smithsonian Misc. Coll.* **117**: 1–62.
Eisenmann, E. (1955). *The Species of Middle American Birds: a List of All Species Recorded from Mexico to Panama, with Suggested English Names, Outlines of Range and a Distributional Bibliography*. Transactions of the Linnaean Society of New York **7**. The Linnaean Society of New York, New York. vi, 128 pp.
Eisenmann, E. (1957). Notes on birds of the province of Bocas del Toro, Panama. *Condor* **59**: 247–262.
Eisenmann, E. (1961). Favorite foods of Neotropical birds: flying termites and *Cecropia* catkins. *Auk* **78**: 636–638.
Eisenmann, E. (1962). On the systematic position of *Rhodinocichla rosea*. *Auk* **79**: 640–648.
Eisenmann, E. (1969). Wing formula as a means of distinguishing Summer Tanager, *Piranga ruba*, from Hepatic Tanager, *P. flava*. *Bird-Banding* **40**: 144–145.
Eisenmann, E. & Short, L.L. (1982). Systematics of the avian genus *Emberizoides* (Emberizidae). *Amer. Mus. Novit.* **2740**: 1–21.
Eisentraut, A. (1935). Biologische Studien im bolivianischen Chaco. Part 6. Beitrag zur Biologie der Vogelfauna. *Mitt. Zool. Mus. Berlin* **20**: 367–443. In German.
Eisermann, K. & Brooks, D.M. (2006). Unusual and noteworthy nesting records for Guatemala. *Cotinga* **26**: 48–51.
Eisermann, K., Arbeiter, S., López, G., Avendaño, C. & de León Lux, J. (2011). Distribution, habitat use, and implications for the conservation of the globally threatened Azure-rumped Tanager *Tangara cabanisi* in Guatemala. *Bird Conserv. Int.* **DOI**: 10.1017/S0959270910000638.
Eisermann, K., Arbeiter, S., López, G., Avendaño, C., de León Lux, J., Burge, A., de León Lux, A. & Buchán, E. (2011). Nesting ecology of the endangered Azure-rumped Tanager (*Tangara cabanisi*) in Guatemala. *Orn. Neotropical* **22**: 39–57.
Eisermann, K., López, G., Berry, J., de León Lux, J. & Burge, A. (2011). Vocalisations and juvenile plumage of Azure-rumped Tanager *Tangara cabanisi*. *Cotinga* **33** (online): 46–49.
Eitniear, J.C. (1997). White-collared Seedeater (*Sporophila torqueola*). No. **278** in: Poole, A. & Gill, F. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Eitniear, J.C. (2004). Diet of the White-collared Seedeater *Sporophila torqueola* (Passeriformes: Emberizidae) in Texas. *Texas J. Sci.* **56(1)**: 77–81.
Eitniear, J.C. (2006a). Courtship display of the Black-and-white Seedeater *Sporophila luctuosa*. *Cotinga* **25**: 87–88.
Eitniear, J.C. (2006b). The diet of the Crimson-collared Grosbeak in Texas. *Bull. Texas Orn. Soc.* **39(1)**: 24–25.
Eitniear, J.C. & Tapia, A.A. (2000). Notes on the diet of the Crimson-collared Grosbeak (*Rhodothraupis celaeno*) in northeastern Mexico. *Orn. Neotropical* **11**: 363–364.
Ekman, R. (1983). Stenskvätta, *Oenanthe oenanthe*, delar boplats med snösparv, *Plectrophenax nivalis*? *Vår Fågelvärld* **42(5)**: 348. In Swedish with English summary.
Elderd, B.D. & Nott, M.P. (2008). Hydrology, habitat change and population demography: an individual-based model for the endangered Cape Sable Seaside Sparrow *Ammodramus maritimus mirabilis*. *J. Appl. Ecol.* **45(1)**: 258–268.
Elekonich, M.M. (2000). Female Song Sparrow, *Melospiza melodia*, response to simulated conspecific and heterospecific intrusion across three seasons. *Anim. Behav.* **59(3)**: 551–557.
Elgood, J.H. (1959). Bird migration at Ibadan, Nigeria. *Ostrich (Suppl.)* **3**: 306–316.
Elgood, J.H., Fry, C.H. & Dowsett, R.J. (1973). African migrants in Nigeria. *Ibis* **115**: 375–411.
Elgood, J.H., Heigham, J.B., Moore, A.M., Nason, A.M., Sharland, R.E. & Skinner, N.J. (1994). *The Birds of Nigeria: an Annotated Check-list*. 2nd edition. British Ornithologists' Union Checklist **4**. British Ornithologists' Union, Tring, UK.
Elkins, N. (1985). Possible passage route of Fair Isle Yellow-browed Bunting. *British Birds* **78(1)**: 51–52.
Ellery, T. (2011). Notes on the nesting of *Psarocolius cassini*. Unpubl.
Elliott, C.C.H. (1969). Gough Island. *Bokmakierie* **21**: 17–19.
Elliott, H.F.I. (1957). A contribution to the ornithology of the Tristan da Cunha group. *Ibis* **99**: 545–586.
Elliott, P.F. (1977). Adaptive significance of cowbird egg distribution. *Auk* **94**: 590–593.
Elliott, P.F. (1978). Cowbird parasitism in the tallgrass prairie of northeastern Kansas. *Auk* **95**: 161–167.
Elliott, P.F. (1980). Evolution of promiscuity in the Brown-headed Cowbird. *Condor* **82**: 138–141.
Ellis, C.J. (1976). Syringeal histology. 5. Thraupidae: Yellow Rumped Tanager *Ramphocelus icteronotus*, and Scarlet Tanager, *Piranga olivacea*. *Iowa State J. Res.* **50(4)**: 357–362.
Ellison, K. (1999). Importance of predation and brood parasitism on nest success in four sparrow species in southern Californian coastal sage scrub. *Studies Avian Biol.* **18**: 191–199.
Ellison, K. & Brush, T. (2004). Hooded Oriole nest failure associated with a novel nest site. *Western Birds* **35(2)**: 71–76.
Ellison, K., Sealy, S.G. & Gibbs, H.L. (2006). Genetic elucidation of host use by individual sympatric Bronzed Cowbirds (*Molothrus aeneus*) and Brown-headed Cowbirds (*M. ater*). *Can. J. Zool.* **84(9)**: 1269–1280.
Ellison, K., Sealy, S.G. & McGaha, H.R. (2007). Color variation among nestling Brown-headed Cowbirds (*Molothrus ater*) does not reflect differential success with hosts in Texas. *Auk* **124(2)**: 526–536.
van Els, P., Walker, C.M. & O'Connell, T.J. (2009). Capture of Gray-headed Junco (*Junco hyemalis caniceps*) in Payne County, Oklahoma. *Bull. Okla. Orn. Soc.* **42(3)**: 9–12.
Emlen, J.T. (1941). An experimental analysis of the breeding cycle of the Tricolored Red-wing. *Condor* **43**: 209–219.
Emlen, J.T. (1972). Size and structure of a wintering avian community in southern Texas. *Ecology* **53**: 317–329.
Emlen, J.T. (1985). Morphological correlates of synchronized nesting in a Tricolored Blackbird colony. *Auk* **102**: 882–884.
Emlen, S.T. (1967a). Migratory orientation in the Indigo Bunting, *Passerina cyanea*. Part 1: evidence for use of celestial cues. *Auk* **84**: 309–342.
Emlen, S.T. (1967b). Migratory orientation in the Indigo Bunting, *Passerina cyanea*. Part 2: mechanism of celestial orientation. *Auk* **84(4)**: 463–489.
Emlen, S.T. (1967c). Orientation of Zugunruhe in the Rose-breasted Grosbeak, *Pheucticus ludovicianus*. *Condor* **69**: 203–205.
Emlen, S.T. (1969). Bird Migration: influence of physiological state upon celestial orientation. *Science (Washington, D.C.)* **165**: 716–718.
Emlen, S.T. (1970). Celestial rotation: its importance in the development of migratory orientation. *Science (Washington, D.C.)* **170**: 1198–1201.
Emlen, S.T. (1971a). Geographic variation in Indigo Bunting song (*Passerina cyanea*). *Anim. Behav.* **19**: 407–408.
Emlen, S.T. (1971b). The role of song in individual recognition in the Indigo Bunting. *Z. Tierpsychol.* **28**: 241–246.
Emlen, S.T. (1972). An experimental analysis of the parameters of bird song eliciting species recognition. *Behaviour* **41**: 130–171.
Emlen, S.T., Rising, J.D. & Thompson, W.L. (1975). A behavioral and morphological study of sympatry in the Indigo and Lazuli Buntings of the Great Plains. *Wilson Bull.* **87**: 145–179.
Emlen, S.T., Wiltschko, W., Demong, N.J., Wiltschko, R. & Bergman, S. (1976). Magnetic direction finding: evidence for its use in migratory Indigo Buntings. *Science (Washington, D.C.)* **193**: 505–508.
Engblom, G. & Durand, A. (2010). Report on Unicolored Blackbirds in Peru. Unpubl.
English, T.M.S. (1916). Notes on some of the birds of Gran Cayman, West Indies. *Ibis* **Ser. 10, no. 4**: 17–35.
Enstrom, D.A. (1992a). Breeding season communication hypotheses for delayed plumage maturation in passerines: tests in the Orchard Oriole, *Icterus spurius*. *Anim. Behav.* **43**: 463–472.
Enstrom, D.A. (1992b). Delayed plumage maturation in the Orchard Oriole (*Icterus spurius*): tests of winter adaptation hypotheses. *Behav. Ecol. Sociobiol.* **30(1)**: 35–42.
Enstrom, D.A. (1993). Female choice for age-specific plumage in the Orchard Oriole: implications for delayed plumage. *Anim. Behav.* **45**: 435–442.
Erickson, H.T. & Mumford, R.E. (1976). Notes on birds of Viçosa, Brazil Region. Agricultural Experimental Station Bulletin **131**. Purdue University, West Lafayette, Indiana.
Erickson, M.M. (1968). *Passerina amoena* (Say), Lazuli Bunting. Pp. 111–132 in: Bent & Austin (1968).
Ericson, P.G.P. & Amarilla, L.A. (1997). First observations and new distributional data for birds in Paraguay. *Bull. Brit. Orn. Club* **117**: 60–67.
Erskine, A.J. (1971). Some new perspectives on the breeding ecology of Common Grackles. *Wilson Bull.* **83**: 352–370.
Espmark, Y. (1995). Individual and local variations in the song of the Snow Bunting (*Plectrophenax nivalis*) on Spitsbergen. *Bioacoustics* **6(2)**: 117–133.
Espmark, Y. (1999). Song of the Snow Bunting (*Plectrophenax nivalis*) in areas with and without sympatric passerines. *Can. J. Zool.* **77(9)**: 1385–1392.
Esquivel, A., Velázquez, M.C., Bodrati, A., Fraga, R.M., del Castillo, H., Klavins, J., Clay, R.P., Madroño, A. & Peris, S.J. (2007). Status of the avifauna of San Rafael National Park, one of the last large fragments of Atlantic forest in Paraguay. *Bird Conserv. Int.* **17**: 301–317.
Estades, C.F. (1996). Natural history and conservation status of the Tamarugo Conebill in northern Chile. *Wilson Bull.* **108(2)**: 268–279.
Estades, C.F. (1997). Bird-habitat relationships in a vegetational gradient in the Andes of central Chile. *Condor* **99**: 719–727.
Estades, C.F. & López-Calleja, M.V. (1995). First nesting record of the Tamarugo Conebill (*Conirostrum tamarugense*). *Auk* **112(3)**: 797–800.
Estela, F.A., Briceno, E.R., Restrepo, J.H. & Rodríguez, D. (2000). Ampliación del rango altitudinal de la tangara *Nemosia pileata*. *Bol. Soc. Antioqueña Orn.* **11(20–21)**: 85–88. In Spanish.
Estep, L.K., Mays, H., Keyser, A.J., Ballentine, B. & Hill, G.E. (2005). Effects of breeding density and plumage coloration on mate guarding and cuckoldry in Blue Grosbeaks (*Passerina caerulea*). *Can. J. Zool.* **83(9)**: 1143–1148.
Estrada, B.Q. & Rondan, J.F. (2009). Aves de bosques de *Polylepis* spp. en la cuenca del Vilcanota. URL: http://es.oocities.com/bberioska/AVESENVILCANOTA.pdf (download 24 June 2011). In Spanish.
Estrada, J., Pedrocchi, V., Brotons, L. & Herrando, S. eds. (2004). *Atles dels Ocells Nidificants de Catalunya 1999–2002*. Lynx Edicions, Bellaterra, Barcelona. In Catalan.
Étchécopar, R.D. (1961). *Emberiza melanocephala* et *E. brunniceps* sont-ils conspécifiques? *Oiseau et RFO (Nouv. Ser.)* **31**: 158. In French.
Étchécopar, R.D. & Hüe, F. (1967). *The Birds of North Africa, from the Canary Islands to the Red Sea*. Oliver and Boyd, Edinburgh.
Euler, C. (1867). Beiträge zur Naturgeschichte der Vögel Brasiliens. *J. Orn.* **15**: 177–198. In German.
Euler, C. (1900). Descrição de ninhos e ovos das aves do Brasil. *Rev. Mus. Paulista* **4**: 9–148. In Portuguese.
Evans, A.D. & Smith, K.W. (1994). Habitat selection of Cirl Buntings *Emberiza cirlus* wintering in Britain. *Bird Study* **41(2)**: 81–87.
Evans, A.D., Smith, K.W., Buckingham, D.L. & Evans, J. (1997). Seasonal variation in breeding performance and nestling diet of Cirl Buntings *Emberiza cirlus* in England. *Bird Study* **44(1)**: 66–79.
Evans, E.W. (1978). Nesting responses of Field Sparrows (*Spizella pusilla*) to plant succession on a Michigan old field. *Condor* **80(1)**: 34–40.
Evans, J., Boudreau, K. & Hyman, J. (2010). Behavioural syndromes in urban and rural populations of Song Sparrows. *Ethology* **116(7)**: 588–595.
Evans, P.G.H. (1990). *Birds of the Eastern Caribbean*. Macmillan, London.
Everett, W.T., Gustafson, J.R., Koehler, C.E. & Larson, J. (1994). San Clemente Sage Sparrow. Pp. 220–221 in: Thelander, C.G. & Crabtree, M. eds. (1994). *Life on the Edge: a Guide to California's Endangered Natural Resources: Wildlife*. BioSystems Books, Santa Cruz, California.
Ewert, D.N. (1975). Notes on nests of four avian species from the coastal Cordillera of Venezuela. *Wilson Bull.* **87(1)**: 105–106.
Ewert, D.N. (1979). Development of song of a Rufous-sided Towhee raised in acoustic isolation. *Condor* **81(3)**: 313–316.
Ewert, D.N. (1980). Recognition of conspecific song by the Rufous-sided Towhee. *Anim. Behav.* **28(2)**: 379–386.
Ewert, D.N. & Kroodsma, D.E. (1994). Song sharing and repertoires among migratory and resident Rufous-sided Towhees. *Condor* **96(1)**: 190–196.
Ezaki, Y., Bamba, T. & Hotta, M. (2007). Breeding ecology of forest dwelling Grey Buntings *Emberiza variabilis*: territorial fidelity and intense home range overlap. *J. Yamashina Inst. Orn.* **38(2)**: 67–79.
Faaborg, J. (1982). Avian population fluctuations during drought conditions in Puerto Rico. *Wilson Bull.* **94**: 20–30.
Facchinetti, C., Di Giacomo, A.G. & Reboreda, J.C. (2008). Parental care in Tawny-bellied (*Sporophila hypoxantha*) and Rusty-collared (*S. collaris*) Seedeaters. *Wilson J. Orn.* **120(4)**: 879–883.
Fairbank, R. (1994). Black-headed Bunting identification. *Birding World* **7(8)**: 319.
Fairfield, G.M. (1968). Chestnut-collared Longspur. Pp. 1635–1652 in: Bent & Austin (1968).
Fajardo, N., Strong, A.M., Perlut, N.G. & Buckley, N.J. (2009). Natal and breeding dispersal of Bobolinks (*Dolichonyx oryzivorus*) and Savannah Sparrows (*Passerculus sandwichensis*) in an agricultural landscape. *Auk* **126(2)**: 310–318.

Falconer, C.M., Mallory, M.L. & Nol, E. (2008). Breeding biology and provisioning of nestling Snow Buntings in the Canadian High Arctic. *Polar Biol.* **31(4)**: 483–489.
Falls, J.B. (1988). Does song deter territorial intrusion in White-throated Sparrows (*Zonotrichia albicollis*)? *Can. J. Zool.* **66(1)**: 206–211.
Falls, J.B. & d'Agincourt, L.G. (1981). A comparison of neighbor-stranger discrimination in Eastern and Western Meadowlarks. *Can. J. Zool.* **59**: 2380–2385.
Falls, J.B. & Kopachena, J.G. (1995). White-throated Sparrow (*Zonotrichia albicollis*). No. **128** in: Poole, A. & Gill, F. eds. (1995). *The Birds of North America*. Vol. 4. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Falls, J.B. & Krebs, J.R. (1975). Sequence of songs in repertoires of Western Meadowlarks (*Sturnella neglecta*). *Can. J. Zool.* **53**: 1165–1178.
Falls, J.B., Horn, A.G. & Dickinson, T.E. (1988). How Western Meadowlarks classify their songs: evidence from song matching. *Anim. Behav.* **36**: 579–585.
Fandiño-Mariño, H. & Vielliard, J.M.E. (2004). Complex communication signals: the case of the Blue-black Grassquit *Volatinia jacarina* (Aves, Emberizidae) song. Part I – A structural analysis. *An. Acad. Bras. Ciênc.* **76(2)**: 325–334.
Farner, D.S., Donham, R.S., Moore, M.C. & Lewis, R.A. (1980). The temporal relationship between the cycle of testicular development and molt in the White-crowned Sparrow, *Zonotrichia leucophrys gambelii*. *Auk* **97(1)**: 63–75.
Farthing, J. (2001). A new locality for Gold-ringed Tanager *Bangsia aureocincta*. *Cotinga* **16**: 66–67.
Faustino, T.C. & Machado, C.G. (2006). Frugivoria por aves em uma área de campo rupestre na Chapada Diamantina, BA. *Rev. Bras. Orn.* **14(2)**: 137–143. In Portuguese.
Fautin, R.W. (1941). Incubation studies of the Yellow-headed Blackbird. *Wilson Bull.* **53**: 107–122.
Fedak, J. (1999). Documentation of Clay-colored Sparrow breeding at Piney Tract, Clarion County, Pennsylvania. *Pennsylvania Birds* **13(2)**: 63.
Federschmidt, A. (1988). Zur Verbreitung und Habitatwahl der Zaunammer (*Emberiza cirlus*) in Südbaden. *Ökol. Vögel* **10(2)**: 151–164. In German.
Feduccia, A. (1976). New bird records for El Salvador. *Wilson Bull.* **88(1)**: 150–151.
Feekes, F. (1977). Colony-specific song in *Cacicus cela*: the pass-word hypothesis. *Ardea* **65**: 197–202.
Feekes, F. (1981). Biology and colonial organization of two sympatric caciques *Cacicus c. cela* and *Cacicus h. haemorrhous* in Surinam. *Ardea* **69**: 83–107.
Feekes, F. (1982). Song mimesis within colonies of *Cacicus c. cela*. A colonial password? *Z. Tierpsychol.* **58**: 119–152.
Fernandes, A.M. (2007). Southern range extension for the Red-and-black Grosbeak (*Periporphyrus erythromelas*), Amazonian, Brazil. *Rev. Bras. Orn.* **15(3)**: 468–469.
Fernández, G.J. & Mermoz, M.E. (2000). Effect of predation and cowbird parasitism on the nesting success of two sympatric Neotropical marshbirds. *Wilson Bull.* **112(3)**: 354–364.
Fernández, G.J., Mermoz, M.E., Llambías, P.E. & Pujol, E.M. (2007). Life history traits and breeding successs of the Scarlet-headed Blackbird (*Amblyrhamphus holosericeus*) in the Argentinian pampas. *Orn. Neotropical* **18**: 407–420.
Fernández, H.G. (1991). Nuevas aves para la provincia de Buenos Aires. *Nuestras Aves* **24**: 26. In Spanish.
Fernández-Juricic, E., Vaca, R. & Schroeder, N. (2004). Spatial and temporal responses of forest birds to human approaches in a protected area and implications for two management strategies. *Biol. Conserv.* **117**: 407–416.
Ferreira, C.M. & Glock, L. (2004). Diagnóstico preliminar sobre a avifauna traficada no Rio Grande Do Sul, Brasil. *Biociências* **12(1)**: 21–30. In Portuguese.
Fessl, B., Dvorak, M., Vargas, F.H. & Young, H.G. (2011). Recent conservation efforts and identification of the critically endangered Mangrove Finch *Camarhynchus heliobates* in Galápagos. *Cotinga* **33** (online): 27–33.
Fessl, B., Loaiza, A.D., Tebbich, S. & Young, H.G. (2011). Feeding and nesting requirements of the critically endangered Mangrove Finch *Camarhynchus heliobates*. *J. Orn.* **152(2)**: 453–460.
ffrench, R.P. (1965). The nesting behaviour of the Yellow-bellied Seedeater. *Caribb. J. Sci.* **5**: 149–156.
ffrench, R.P. (1967). The Dickcissel on its wintering range in Trinidad. *Living Bird* **6**: 123–140.
ffrench, R.P. (1973). *A Guide to the Birds of Trinidad and Tobago*. Livingston, Wynnewood, Pennsylvania.
ffrench, R.P. (1984). Further notes on the avifauna of Trinidad & Tobago. *Living World* **1983/1984**: 32–34.
ffrench, R.P. (1991). *A Guide to the Birds of Trinidad and Tobago*. 2nd edition. Livingstone, Comstock & Christopher Helm, Wynnewood, Ithaca & London.
Fiala, K.L. (1981). Sex ratio constancy in the Red-winged Blackbird. *Evolution* **35**: 898–910.
Ficken, R.W. (1963). Courtship and agonistic behavior of the Common Grackle, *Quiscalus quiscula*. *Auk* **80**: 52–72.
Fiedler, W., Bairlein, F. & Köppen, U. (2004). Using large scale data from ringed birds for the investigation of effects of climate change on migrating birds: pitfalls and prospects. Pp. 49–68 in: Møller *et al.* (2004).
Field, G.W. (1894). Birds of Port Henderson, Jamaica, West Indies. *Auk* **11**: 117–127.
Fierro-Calderón, K., Estela, F.A. & Chacón-Ulloa, P. (2006). Observaciones sobre las dietas de algunas aves de la cordillera Oriental de Colombia a partir del análisis de contenidos estomacales. *Orn. Colombiana* **4**: 6–15. In Spanish with English summary.
de Figueirido, A. & Fernando, L. (2003). Anting in Sayaca Tanager, *Thraupis sayaca*. *Bol. Centr. Estud. Orn.* **15**: 60.
Filliater, T.S. & Breitwisch, R. (1997). Nestling provisioning by the extremely dichromatic Northern Cardinal. *Wilson Bull.* **109**: 145–153.
Filliater, T.S., Breitwisch, R. & Nealen, P.M. (1994). Predation on Northern Cardinal nests: Does choice of nest site matter? *Condor* **96(3)**: 761–768.
Finch, D.M. (1981). Nest predation of Abert's Towhees by coachwhips and roadrunners. *Condor* **83(4)**: 389.
Finch, D.M. (1983a). Seasonal variation in nest placement of Abert's Towhees. *Condor* **85(1)**: 111–113.
Finch, D.M. (1983b). Brood parasitism of the Abert's Towhee: timing, frequency, and effects. *Condor* **85(3)**: 355–359.
Finch, D.M. (1984). Parental expenditure of time and energy in the Abert's Towhee (*Pipilo aberti*). *Auk* **101(3)**: 473–485.
Finch, D.M. (1985a). Some factors affecting productivity in Abert's Towhee. *Wilson Bull.* **96(4)**: 701–705.
Finch, D.M. (1985b). Aspects of nestling growth in Abert's Towhee. *Wilson Bull.* **96(4)**: 705–708.
Finch, D.M. (1985c). Multivariate analysis of early and late nest sites of Abert's Towhees. *Southwest. Nat.* **30(3)**: 427–432.
Finck, E.J. (1984). Male Dickcissel behavior in primary and secondary habitats. *Wilson Bull.* **96**: 672–680.
Fink, L.S. & Brower, L.P. (1981). Birds can overcome the cardenolide defence of monarch butterflies in Mexico. *Nature (London)* **291**: 67–70.
Fiorini, V.D. & Reboreda, J.C. (2006). Cues used by Shiny Cowbirds (*Molothrus bonariensis*) to locate and parasitise Chalk-browed Mockingbird (*Mimus saturninus*) nests. *Behav. Ecol. Sociobiol.* **60(3)**: 379–385.
Fiorini, V.D., Astie, A.A., Tuero, D.T. & Reboreda, J.C. (2005). Éxito reproductivo del Tordo Renegrido (*Molothrus bonariensis*) en hospedadores de distinto tamaño corporal. *Hornero* **20(2)**: 173–182. In Spanish with English summary.
Fischer, D.H. (1978). Dew-bathing by Long-billed Thrashers (*Toxostoma longirostre*), and an Olive Sparrow (*Arremonops rufivirgatus*). *Bull. Texas Orn. Soc.* **11(2)**: 49–50.
Fischer, K.N., Prather, J.W. & Cruz, A. (2002). Nest site characteristics and reproductive success of the Western Tanager (*Piranga ludoviciana*) on the Colorado Front Range. *West. North Amer. Nat.* **62(4)**: 479–483.
Fischer, W. (1994). Vom Handel bis zur Haltung des Gelbkopf-Kernknackers *Pheucticus chrysopeplus*. Parts 1–2. *Gefiederte Welt* **118(5)**: 157–160; **118(6)**: 192–193. In German.
Fisk, E.J. (1974). Wintering populations of Painted Buntings in southern Florida. *Bird-Banding* **45**: 353–359.
Fisk, E.J. (1979). Fall and winter birds near Homestead, Florida. *Bird-Banding* **50**: 224–243, 297–303.
Fitch, H.S. & Fitch, V.R. (1955). Observations on the Summer Tanager in northeastern Kansas. *Wilson Bull.* **67**: 45–54.
Fitzpatrick, J.W. (1980). A new race of *Atlapetes leucopterus*, with comments on widespread albinism in *A. l. dresseri* (Taczanowski). *Auk* **97(4)**: 883–887.
Fjeldså, J. (1993). *Phrygilus coracinus* Sclater, 1891, is a valid taxon. *Bull. Brit. Orn. Club* **113(2)**: 121–126.
Fjeldså, J. (2002). Key areas for conserving the avifauna of *Polylepis* forests. *Ecotropica* **8**: 125–131.
Fjeldså, J. & Kessler, M. (1996). *Conserving the Biological Diversity of* Polylepis *Woodlands of the Highlands of Peru and Bolivia – a Contibution to Sustainable Natural Resource Management*. Nordeco, Copenhagen, Denmark.
Fjeldså, J. & Krabbe, N. (1990). *Birds of the High Andes. A Manual to the Birds of the Temperate Zone of the Andes and Patagonia, South America*. Zoological Museum, University of Copenhagen & Apollo Books, Copenhagen & Svendborg.
Fjeldså, J. & Rahbek, C. (2006). Diversification of tanagers, a species rich bird group, from lowlands to montane regions of South America. *Integrative & Comp. Biol.* **46(1)**: 72–81.
Fleischer, R.C. (1985). A new technique to identify and assess the dispersion of eggs of individual brood parasites. *Behav. Ecol. Sociobiol.* **17**: 91–99.
Fleischer, R.C. & Rothstein, S.I. (1988). Known secondary contact and rapid gene flow among subspecies and dialects in the Brown-headed Cowbird. *Evolution* **42**: 1146–1158.
Fleischer, R.C. & Smith, N.G. (1992). Giant Cowbird eggs in nests of two icterid hosts: use of morphology and electrophoretic variants to identify individuals and species. *Condor* **94**: 572–578.
Fleischer, R.C., Smyth, A.P. & Rothstein, S.I. (1987). Temporal and age-related variation in the laying rate of the Brown-headed Cowbird in the eastern Sierra Nevada, California. *Can. J. Zool.* **65**: 2724–2730.
Fleming, J.H. (1914). An abnormal Rose-breasted Grosbeak. *Auk* **31**: 102.
Fletcher, N.H., Riede, T. & Suthers, R.A. (2006). Model for vocalization by a bird with distensible vocal cavity and open beak. *J. Acoust. Soc. Amer.* **119**: 1005–1011.
Fletcher, R.J. & Koford, R.R. (2003). Spatial responses of Bobolinks (*Dolichonyx oryzivorus*) near different types of edges in northern Iowa. *Auk* **120(3)**: 799–810.
Fletcher, R.J., Koford, R.R. & Seaman, D.A. (2006). Critical demographic parameters for declining songbirds breeding in restored grasslands. *J. Wildl. Management* **70(1)**: 145–157.
Flint, V.E. (1979). [The Grey-hooded Bunting (*Emberiza fucata*) in the south western Zabaikalye]. *Ornitologiya* **14**: 200. In Russian.
Flint, V.E., Boehme, R.L., Kostin, Y.V. & Kuznetsov, A.A. (1984). *A Field Guide to the Birds of the USSR. Including Eastern Europe and Central Asia*. Princeton University Press, Princeton, New Jersey.
Flood, N.J. (1984). Adaptive significance of delayed plumage maturation in male Northern Orioles. *Evolution* **38**: 267–279.
Flood, N.J. (1985). Incidences of polygyny and extrapair copulation in the Northern Oriole. *Auk* **102(2)**: 410–413.
Flood, N.J. (1989). Coloration in New World orioles. 1. Tests of predation-related hypotheses. *Behav. Ecol. Sociobiol.* **25(1)**: 49–56.
Flood, N.J. (1990). Aspects of the breeding biology of Audubon's Oriole. *J. Field Orn.* **61**: 290–302.
Flood, N.J. (2002). Scott's Oriole (*Icterus parisorum*). No. **608** in: Poole, A.F. & Gill, F.B. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.
Flood, N.J., Rising, J.D. & Brush, T. (2002). Audubon's Oriole (*Icterus graduacauda*). No. **691** in: Poole, A.F. & Gill, F.B. eds. (2002). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.
Flórez, P., Krabbe, N., Castaño, J., Suárez, G. & Arango, J.D. (2004). *Evaluación Avifauna del Páramo de Frontino, Antioquia, Agosto 2004*. Colombian EBA Project Report Series **6**. Fundación ProAves, Bogotá, D.C., Colombia. In Spanish.
Fonderflick, J. & Thévenot, M. (2002). Effectifs et variation de densité du Bruant ortolan *Emberiza hortulana* sur le Causse Méjean (Lozère, France). *Alauda* **70(3)**: 399–412. In French with English summary.
Fonderflick, J., Thévenot, M. & Guillaume, C.P. (2005). Habitat of the Ortolan Bunting *Emberiza hortulana* on a Causse in southern France. *Vie & Milieu* **55(2)**: 109–120.
Fonseca, V.S.S., Petry, M.V. & Fonseca, F.L.S. (2004). A new breeding colony of the Saffron-cowled Blackbird (*Xanthopsar flavus*) in Rio Grande do Sul, Brazil. *Orn. Neotropical* **15**: 133–137.
Fontana, C.S., Repenning, M., Rovedder, C. & Franz, I. (2010). Breeding biology of migratory seedeaters from grasslands of southern Brazil: Plumbeous Seedeater (*Sporophila* cf. *plumbea*), Tawny-bellied Seedeater (*S. hypoxantha*) and Black-bellied Seedeater (*S. melanogaster*). Page 96 in: Miyaki, C.Y., Höfling, E. & Donatelli, R.J. eds. (2010). *Abstracts of the 25th International Ornithological Congress 22–28 August 2010*. Elizabeth Höfling, Campos do Jardão, Brazil. 994 pp.
Foote, J.R. & Barber, C.A. (2007). High level of song sharing in an eastern population of Song Sparrow (*Melospiza melodia*). *Auk* **124(1)**: 53–62.
Forbes, K.A. (2010). Bermuda's fauna: animals, birds, fish, insects, marine life, reefs, endemic and naturalized. URL: http://www.bermuda-online.org/fauna.htm (download 14 August 2010).
Forbes, W.A. (1881). Eleven weeks in northeastern Brazil. *Ibis* **Ser. 4, no. 5**: 312–362.
Forcada, J., Trathan, P.N., Reid, K., Murphy, E.J. & Croxall, J.P. (2006). Contrasting population changes in sympatric penguin species in association with climate warming. *Global Change Biol.* **12**: 411–423.
Ford, H.A., Parkin, D.T. & Ewing, A.W. (1973). Divergence and evolution in Darwin's finches. *Biol. J. Linn. Soc.* **5(3)**: 289–295.
Forsman, J.T. & Mönkkönen, M. (2003). The role of climate in limiting European resident bird populations. *J. Biogeogr.* **30**: 55–70.
Forsythe, B. (1995). Sage Sparrow in Nova Scotia – first Canadian record. *Birders J.* **4**: 45–47.
Forsythe, D. (1974). *Song Characteristics of Sympatric and Allopatric Indigo Bunting and Painted Bunting Populations in the Southeastern United States*. PhD thesis, Clemson University, Clemson, South Carolina [Abstract: *Diss. Abstr. Int. B Sci. Eng.* **35(8)**: 4282].
Foster, J.T. (2009). The history and impact of introduced birds. Pp. 312–330 in: Pratt, T.K., Atkinson, C.T., Banko, P.C., Jacobi, J.D. &. Woodworth, B.L. eds. (2009). *Conservation Biology of Hawaiian Forest Birds: Implications for Island Avifauna*. Yale University Press, New Haven & London.
Foster, M.S. & Johnson, N.K. (1974). Notes on birds of Costa Rica. *Wilson Bull.* **86(1)**: 58–63.
Foster, M.S., Lopez, N.E. & Escobar, M.E. (1989). Observations of a nest of Red-crowned Ant-tanagers in Paraguay. *J. Field Orn.* **60(4)**: 459–468.
Fox, A.D., Francis, I.S., Madsen, J. & Stroud, J.M. (1987). The breeding biology of the Lapland Bunting *Calcarius lapponicus* in west Greenland during two contrasting years. *Ibis* **129(4)**: 541–552.
Fox, A.D., Francis, I.S., McCarthy, J.P. & McKay, C.R. (1992). Body mass dynamics of the Lapland Bunting *Calcarius lapponicus* in west Greenland. *Dansk Orn. Foren. Tidsskr.* **86(1/2)**: 155–162.
Fox, G.A. (1961). A contribution to the life history of the Clay-colored Sparrow. *Auk* **78**: 220–224.
Fraga, R.M. (1972). Cooperative breeding and a case of successive polyandry in the Bay-winged Cowbird. *Auk* **89**: 447–449.
Fraga, R.M. (1978). The Rufous-collared Sparrow as a host of the Shiny Cowbird. *Wilson Bull.* **90**: 271–284.
Fraga, R.M. (1979). Differences between nestlings and fledglings of Screaming and Bay-winged Cowbirds. *Wilson Bull.* **91**: 151–154.
Fraga, R.M. (1982). *Host-brood Parasite Interactions between Chalk-browed Mockingbirds and Shiny Cowbirds*. MSc thesis, University of California, Santa Barbara, California.
Fraga, R.M. (1983a). Parasitismo de cría del Renegrido *Molothrus bonariensis* sobre el Chingolo *Zonotrichia capensis*: nuevas observaciones y conclusiones. *Hornero* **12(2)** (Suppl.): 245–255. In Spanish.

Fraga, R.M. (1983b). The eggs of the parasitic Screaming Cowbird (*Molothrus rufoaxillaris*) and its host, the Baywinged Cowbird (*Molothrus badius*): is there evidence for mimicry? *J. Orn.* **124**: 187–193.
Fraga, R.M. (1984). Bay-winged Cowbirds (*Molothrus badius*) remove ectoparasites from their brood parasites, the Screaming Cowbirds (*Molothrus rufoaxillaris*). *Biotropica* **16**: 223–226.
Fraga, R.M. (1985). Host-parasite interactions between Chalk-browed Mockingbirds and Shiny Cowbirds. *Orn. Monogr.* **36**: 829–844.
Fraga, R.M. (1986). *The Bay-winged Cowbird (*Molothrus badius*) and its Brood Parasites: Interactions, Coevolution, and Comparative Efficiency*. PhD thesis, University of California, Santa Barbara, California.
Fraga, R.M. (1987a). Vocal mimicry in the Epaulet Oriole. *Condor* **89**: 133–137.
Fraga, R.M. (1987b). Field notes on vocalizations, behavior and nesting of Chestnut-headed (*Psarocolius wagleri*) and Montezuma (*P. montezumae*) Oropendolas from Panama and Costa Rica. Unpubl.
Fraga, R.M. (1988). Nest sites and breeding success of Baywinged Cowbirds (*Molothrus badius*). *J. Orn.* **129**: 175–183.
Fraga, R.M. (1989). Colony sizes and nest trees of Montezuma Oropendolas in Costa Rica. *J. Field Orn.* **60**: 289–295.
Fraga, R.M. (1991). The social system of a communal breeder, the Bay-winged Cowbird *Molothrus badius*. *Ethology* **89**: 195–210.
Fraga, R.M. (1992). Biparental care in Bay-winged Cowbirds *Molothrus badius*. *Ardea* **80**: 389–393.
Fraga, R.M. (1996). Further evidence of parasitism of Chopi Blackbird (*Gnorimopsar chopi*) by the specialized Screaming Cowbird (*Molothrus rufoaxillaris*). *Condor* **98**: 866–867.
Fraga, R.M. (1998). Interactions of the parasitic Screaming and Shiny Cowbirds (*Molothrus rufoaxillaris* and *M. bonariensis*) with a shared host, the Bay-winged Cowbird (*M. badius*). Pp. 173–193 in: Rothstein, S.I. & Robinson, S.K. eds. (1998). *Parasitic Birds and their Hosts*. Oxford University Presss, Oxford, UK.
Fraga, R.M. (2001). The avifauna of Estancia San Juan Poriahú, Esteros del Iberá. *Cotinga* **16**: 81–86.
Fraga, R.M. (2002). Notes on new or rarely reported Shiny Cowbird hosts from Argentina. *J. Field Orn.* **73**: 213–219.
Fraga, R.M. (2004). Notes on behavior and vocalizations of Bolivian icterids: *Psarocolius atrovirens*, *Agelaioides badius*, and *Oreopsar bolivianus*. Unpubl.
Fraga, R.M. (2005a). A new generic name for the Solitary Cacique. *Bull. Brit. Orn. Club* **125**: 286–287.
Fraga, R.M. (2005b). Ecology, behavior and social organization of Saffon-cowled Blackbirds (*Xanthopsar flavus*). *Orn. Neotropical* **16**: 15–29.
Fraga, R.M. (2006). Notes on behavior and vocalizations of Brazilian icterids: *Agelaioides fringillarius*, *Cacicus cela*, *Icterus jamacaii* and *Molothrus rufoaxillaris*. Unpubl.
Fraga, R.M. (2007). Notes on behavior and vocalizations of *Chrysomus ruficapillus*, *Agelasticus cyanopus*, *Amblyrhamphus holosericeus*, *Molothrus oryzivorus*, *Sturnella loyca*, *S. defilippi*, *Icterus croconotus*, *Psarocolius decumanus* and *Cacicus haemorrhous* in Argentina and Paraguay. Unpubl.
Fraga, R.M. (2008a). Invalid specimen records of Saffron-cowled Blackbird *Xanthopsar flavus* from Argentina and Paraguay. *Bull. Brit. Orn. Club* **128**: 36–37.
Fraga, R.M. (2008b). Phylogeny and behavioral evolution in the Icteridae. *Orn. Neotropical* **19** (Suppl.): 61–71.
Fraga, R.M. (2008c). Notes on the nesting of Chopi Blackbirds (*Gnorimopsar chopi*) in Argentina and Paraguay, with data on cooperative breeding and brood parasitism by Screaming Cowbirds (*Molothrus rufoaxillaris*). *Orn. Neotropical* **19**: 299–303.
Fraga, R.M. (2009). Notes on behavior and vocalizations of Venezuelan icterids: *Quiscalus lugubris*, *Macroagelaius imthurni*, *Gymnomystax mexicanus*, *Lampropsar tanagrinus*, *Psarocolius angustifrons oleagineus*, *Psarocolius viridis*. Unpubl.
Fraga, R.M. (2011). Brood parasitism of Giant Cowbirds (*Molothrus oryzivorus*) on Red-rumped Caciques (*Cacicus haemorrhous*) in the Atlantic Forest of northeastern Argentina. *Wilson J. Orn.* **123(2)**: 277–282.
Fraga, R.M. & Clark, R. (1999). Birds of the Upper Bermejo (Argentina and Bolivia). *Cotinga* **12**: 77–78.
Fraga, R.M. & Di Giacomo, A. (2004). Cooperative breeding of the Yellow-rumped Marshbird (Icteridae) in Argentina and Paraguay. *Condor* **106**: 671–673.
Fraga, R.M. & Kreft, S. (2007). Natural history and breeding behavior of the Olive (*Psarocolius yuracares*) and Yellow-billed (*P. angustifrons alfredi*) Oropendolas in the Chapare province, Bolivia. *Orn. Neotropical* **18**: 251–261.
Fraga, R.M., Codesido, M.L., Povedano, H., Jurado, A. & Zárate, R. (2003). First documented record of Brown-and-yellow Marshbirds (*Pseudoleistes virescens*) for Paraguay, with comments on its sympatry with the Yellow-rumped Marshbird (*P. guirahuro*) in Argentina and Paraguay. *Orn. Neotropical* **15**: 139–141.
Fraga, R.M., Pugnali, G. & Casañas, H. (1998). Natural history and conservation status of the endangered Saffron-cowled Blackbird *Xanthopsar flavus* in Argentina. *Bird Conserv. Int.* **8**: 255–267.
Francis, C.M. & Cooke, F. (1990). Differential timing of spring migration in Rose-breasted Grosbeaks. *J. Field Orn.* **61**: 404–412.
Francis, I.S., Fox, A.D., McCarthy, J.P. & McKay, C.R. (1991). Measurements and moult of the Lapland Bunting *Calcarius lapponicus* in West Greenland. *Ringing & Migration* **12**: 28–37.
Francisco, M.R. (2006). Breeding biology of the Double-collared Seedeater (*Sporophila caerulescens*). *Wilson J. Orn.* **118**: 85–90.
Francisco, M.R. (2009). First description of nests and eggs of the White-bellied Seedeater (*Sporophila leucoptera*). *Wilson J. Orn.* **121(3)**: 628–630.
Franz, I. & Fontana, C.S. (2010). First data on the breeding biology of the Tawny-bellied Seedeater (*Sporophila hypoxantha*) in south Brazilian high altitude grasslands. Page 756 in: Miyaki, C.Y., Höfling, E. & Donatelli, R.J. eds. (2010). *Abstracts of the 25th International Ornithological Congress 22–28 August 2010*. Elizabeth Höfling, Campos do Jardão, Brazil. 994 pp.
Fraser, M.W. & Briggs, D.J. (1992). New information on the *Nesospiza* buntings at Inaccessible Island, Tristan da Cunha, and notes on their conservation. *Bull. Brit. Orn. Club* **112**: 191–205.
Fraser, M.W. & Crowe, T.M. (1990). Effects of alien woody plant invasion on the birds of Mountain Fynbos in the Cape of Good Hope. *South Afr. J. Zool.* **25**: 97–108.
Fraticelli, F. (1997). Avvistamento di Zigolo golarossa *Emberiza leucocephalos* nel Lazio. *Alula* **44(1/2)**: 99. In Italian with English title.
Frauendorf, E. (2003). Dialekte der Goldammer, *Emberiza citrinella*, auf der Insel Fehmarn und im Dialektgrenzgebiet Schleswig-Holsteins. *Corax* **19(2)**: 139–152. In German.
Frederiksen, M., Daunt, F., Harris, M.P. & Wanless, S. (2008). The demographic impact of extreme events: stochastic weather drives survival and population dynamics in a long-lived seabird. *J. Anim. Ecol.* **77**: 1020–1029.
Fredrickson, R.W. (1951). Scott's Sparrow, *Aimophila ruficeps scottii*, a new bird for Kansas. *Auk* **68**: 522.
Freeberg, T.M. (1998). The cultural transmission of courtship patterns in Cowbirds *Molothrus ater*. *Anim. Behav.* **56**: 1063–1073.
Freeland, J.R. & Boag, P.T. (1999). The mitochondrial and nuclear genetic homogeneity of the phenotypically diverse Darwin's ground finches. *Evolution* **53(5)**: 1553–1563.
Freeman, B.G. & Arango, J.A. (2010). The nest of the Gold-ringed Tanager (*Bangsia aureocincta*), a Colombian endemic. *Orn. Colombiana* **9**: 71–75.
Freeman, B.G. & Greeney, H.F. (2009). Parental care of the Black-capped Tanager (*Tangara heinei*) in northeastern Ecuador. *Bol. Soc. Antioqueña Orn.* **19(1/2)**: 32–37.
Freeman, S. & Zink, R.M. (1995). A phylogenetic study of the blackbirds based on variation in mitochondrial DNA restriction sites. *Syst. Biol.* **44**: 409–420.
Freeman-Gallant, C.R. (1996). Microgeographic patterns of genetic and morphological variation in Savannah Sparrows (*Passerculus sandwichensis*). *Evolution* **50(4)**: 1631–1637.
Freeman-Gallant, C.R. (1997). Extra-pair paternity in monogamous and polygynous Savannah Sparrows, *Passerculus sandwichensis*. *Anim. Behav.* **53(2)**: 397–404.
Freeman-Gallant, C.R., O'Connor, K.D. & Breuer, M.E. (2001). Sexual selection and the geography of *Plasmodium* infection in Savannah Sparrows (*Passerculus sandwichensis*). *Oecologia (Berlin)* **127(4)**: 517–521.
Freeman-Gallant, C.R., Wheelwright, N.T., Meiklejohn, K.E. & Sollecito, S.V. (2006). Genetic similarity, extrapair paternity, and offspring quality in Savannah Sparrows (*Passerculus sandwichensis*). *Behav. Ecol.* **17(6)**: 952–958.
Freeman-Gallant, C.R., Wheelwright, N.T., Meiklejohn, K.E., States, S.L. & Sollecito, S.V. (2005). Little effect of extrapair paternity on the opportunity for sexual selection in Savannah Sparrows (*Passerculus sandwichensis*). *Evolution* **59(2)**: 422–430.
Freile, J.F. (2004). Range extensions and other noteworthy and new bird records from mainland Ecuador. *Bull. Brit. Orn. Club* **124**: 188–202.
de Freitas, G.H.S. & Rodrigues, M. (2008). Canário-rabudo *Embernagra longicauda*: uma ave típica das montanhas do leste do Brasil. *Atualidades Orn.* **141**: 20–21. In Portuguese.
de Freitas, G.H.S., Chaves, A.V. & dos Santos, F.R. (2009). Nova área de ocorrência da espécie ameaçada *Coryphaspiza melanotis* (Aves: Emberizidae) em Minas Gerais. *MG Biota* **2(1)**: 32–45. In Portuguese with English summary.
de Freitas, G.H.S., de Vasconcelos, M.F. & Rodrigues, M. (2009). Aspectos reprodutivos e comentários adicionais sobre o jovem do Rabo-mole-da-serra (*Embernagra longicauda*) na Serra do Cipó, Minas Gerais. *Atualidades Orn.* **147**: 8–9. In Portuguese.
French, P. (2001). The Black-faced Bunting on Fair Isle. *Birding World* **14(10)**: 437–438.
Fretwell, S.D. (1968). Habitat distribution and survival in the Field Sparrow (*Spizella pusilla*). *Bird-Banding* **39**: 293–306.
Fretwell, S.D. (1977). Is the Dickcissel a threatened species? *Amer. Birds* **31(5)**: 923–932.
Fretwell, S.D. (1979). Dickcissel extinction predicted before the year 2000. *Bird Watch (Kansas)* **7(1)**: 1–3.
Fretwell, S.D. (1986). Distribution and abundance of the Dickcissel. *Curr. Orn.* **4**: 211–242.
Fretwell, S.D. & Shane, T.G. (1975). Ecotypic variation in feeding habits of Dickcissels on their wintering grounds. *EBBA News* **38**: 125–128.
Friedmann, H. (1927). Notes on some Argentine birds. *Bull. Mus. Comp. Zool. Harvard* **68**: 139–236.
Friedmann, H. (1929). *The Cowbirds: a Study in the Biology of Social Parasitism*. Charles C. Thomas Publisher, Springfield, Illinois.
Friedmann, H. (1933). Notes on Arment's Cowbird. *Ibis* **Ser. 13, no. 3**: 492–494.
Friedmann, H. (1938). Additional hosts of the parasitic cowbirds. *Auk* **55**: 41–50.
Friedmann, H. (1957). The rediscovery of *Tangavius armenti* (Cabanis). *Auk* **74**: 492–493.
Friedmann, H. (1963). Host relations of the parasitic cowbirds. *Bull. US Natl. Mus.* **233**: i–ix, 1–276.
Friedmann, H. (1965). The history of our knowledge of avian brood parasitism. *Centaurus* **10**: 282–304.
Friedmann, H. (1971). Further information on the host relations of the parasitic cowbirds. *Auk* **88**: 239–255.
Friedmann, H. & Kiff, L.F. (1985). The parasitic cowbirds and their hosts. *Proc. West. Found. Vert. Zool.* **2**: 225–304.
Friedmann, H. & Northern, J.R. (1975). Results of the Taylor South West African Expedition 1972: ornithology. *Nat. Hist. Mus. Los Angeles County (Contrib. Sci.)* **266**: 1–39.
Friedmann, H. & Smith, F.D. (1950). A contribution to the ornithology of northeastern Venezuela. *Proc. US Natl. Mus.* **100**: 411–538.
Friedmann, H. & Smith, F.D. (1955). A further contribution to the ornithology of northeastern Venezuela. *Proc. US Natl. Mus.* **104**: 463–524.
Friedmann, H., Griscom, L. & Moore, R.T. (1957). *Distributional Checklist of the Birds of Mexico, Part II*. Pacific Coast Avifauna **33**. Cooper Ornithological Society, Berkeley, California.
Friedmann, H., Kiff, L.F. & Rothstein, S.I. (1977). A further contribution to knowledge of the host relations of the parasitic cowbirds. *Smithsonian Contrib. Zool.* **235**: 1–75.
Friesen, L.E., Cadman, M.D. & MacKay, R.J. (1999). Nesting success of Neotropical migrant songbirds in a highly fragmented landscape. *Conserv. Biol.* **13(2)**: 338–346.
Friesen, L.E., Wyatt, V.E. & Cadman, M.D. (1999). Nest reuse by Wood Thrush and Rose-breasted Grosbeak. *Wilson Bull.* **111(1)**: 133–134.
Frisch, S. & Frisch, J.D. (1964). *Aves Brasileiras*. Irmãos Vitale, São Paulo. In Portuguese.
Fry, C.H. (1970). Ecological distribution of birds in northeastern Mato Grosso State, Brazil. *An. Acad. Bras. Ciênc.* **42**: 275–318.
Fry, C.H. (1971). Migration, moult and weights of birds in northern Guinea savanna in Nigeria and Ghana. *Ostrich (Suppl.)* **8**: 239–263.
Fry, C.H. & Eriksen, J. (1984). Feeding technique of House Bunting. *British Birds* **87**: 187–188.
Fry, C.H. & Keith, S. eds. (2004). *The Birds of Africa*. Vol. 7. Sparrows to buntings. Christopher Helm, London.
Fu Tongsheng, Song Yujun & Gao Wei (1998). *Fauna Sinica. Aves*. Vol. 14. Passeriformes, Ploceidae–Fringillidae. Science Press, Beijing. In Chinese.
Fuchs, F.J. & Macke, T. (2002). Verbreitung der Zippammer (*Emberiza cia*) im Ahrtal. Ergebnisse der Revierkartierungen 1997 und 1999. *Fauna & Flora Rheinl.-Pfalz Beih.* **27**: 263–266. In German.
Fugle, G.N., Rothstein, S.I., Osenberg, C.W. & McGinley, M.A. (1984). Signals of status in wintering White-crowned Sparrows, *Zonotrichia leucophrys gambelii*. *Anim. Behav.* **32(1)**: 86–93.
Fujii, T., Sasaki, H., Sasaki, A., Kudo, K. & Yotsuya, K. (2010). First record of Savannah Sparrow *Passerculus sandwichensis* in Iwate Prefecture, Japan. *Jap. J. Orn.* **59(1)**: 69–72. In Japanese.
Fujimaki, Y. (1980). Birds of Tokachi district, Hokkaido. 1. Birds of Shintoku-yama and its surrounding area. *J. Yamashina Inst. Orn.* **12(1)**: 40–52. In Japanese with English summary.
Fujimaki, Y. (1984). Birds of Tokachi district, Hokkaido. 4. Birds of agricultural land. *J. Yamashina Inst. Orn.* **16(2/3)**: 159–167. In Japanese with English summary.
Fujimaki, Y. (1989). Birds of Tokachi district, Hokkaido. 5. Birds along the lower reaches of the Tokachi River. *J. Yamashina Inst. Orn.* **21(1)**: 76–83. In Japanese with English summary.
Fujimaki, Y. (1994). Birds of Tokachi district, Hokkaido. 6. Birds along the middle reaches of the Tokachi River. *J. Yamashina Inst. Orn.* **26(1)**: 68–76. In Japanese with English summary.
Fujimaki, Y. (2010). [Avifauna of Okushiri Island in breeding season]. *Rishiri Studies* **29**: 1–6. In Japanese.
Fujimaki, Y. & Hikawa, M. (1978). The first breeding record of the Grey Bunting (*Emberiza variabilis*) in Hokkaido. *J. Yamashina Inst. Orn.* **10(1/2)**: 172–177.
Fujimaki, Y., Matsuo, T. & Nechaev, V.A. (1996). Birds of central and southern Sakhalin. *Res. Bull. Obihiro Univ. Nat. Sci.* **19(4)**: 231–242. In Japanese with English summary.
Fuller, L. (2010). Painted Buntings on the rebound? Citizen science helping solve mystery. *Cape Fear's Going Green* **3(2)**: 6–7.
Fuller, R.J., Gregory, R.D., Gibbons, D.W., Marchant, J.H., Wilson, J.D., Braillie, S.R. & Carter, N. (1995). Population declines and range contractions among lowland farmland birds in Britain. *Conserv. Biol.* **9(6)**: 1425–1441.
Furrer, R.K. (1975). Breeding success and nest site stereotypy in a population of Brewer's Blackbirds. *Oecologia (Berlin)* **20(4)**: 339–350.
Gabelli, F.M., Fernández, G.J., Ferretti, V., Posse, G., Coconier, E., Gavieiro, H.J., Llambías, P.E., Peláez, P.I., Vallés, M.L. & Tubaro, P.L. (2004). Range contraction of the Pampas Meadowlark *Sturnella defilippii* in the southern pampas grasslands of Argentina. *Oryx* **38(2)**: 164–170.
Gabrey, S.W. & Afton, A.D. (2000). Effects of winter marsh burning on abundance and nesting activity of Louisiana Seaside Sparrows in the Gulf Coast Chenier Plain. *Wilson Bull.* **112(3)**: 365–372.
Gabrielson, I.N. (1915). Field observations on the Rose-breasted Grosbeak. *Wilson Bull.* **27(3)**: 357–368.
Gabrielson, I.N. & Lincoln, F.C. (1959). *The Birds of Alaska*. Stackpole & Wildlife Manage Institute, Harrisburg & Washington, D.C.
Gagliardi, R. (2007a). Audio recordings of *Schistoclamys ruficapillus* from Taquaril Petrópolis, Rio de Janeiro, Brazil. Xeno-Canto, XC13210. Unpubl.

Gagliardi, R. (2007b). Audio recordings of *T. desmaresti* from Itatiaia National Park, Rio de Janeiro, Brazil. Xeno-Canto, XC11687. Unpubl.
Galligan, E.W., De Vault, T.L. & Lima, S.L. (2006). Nesting success of grassland and savanna birds on reclaimed surface coalmines in the Mid-western United States. *Wilson J. Orn.* **118(4)**: 537–546.
Gálvez Aguilera, X.G., Pimentel, O.P. & Berovides Álvarez, V. (1999). Dinámica poblacional del Negrito (*Melopyrrha nigra*) (Aves, Passeriformes) en el área protegida Mil Cumbres, Pinar del Río, Cuba. *Orn. Neotropical* **10(1)**: 101–104. In Spanish.
Gambarotta, J.C. (1985). Presencia de *Mimus triurus* (Mimidae) y *Tangara preciosa* (Thraupidae) en el ambiente urbano y nuevo registro de *Sporophila collaris* (Emberizidae) para Uruguay (Passeriformes). *Actas Jorn. Zool. Uruguay* **1985**: 79–80. In Spanish.
Gamova, T.V. (2002a). Breeding biology of the Tristram's Bunting *Emberiza tristrami* in southern Primorye (Russian Far East). *Avian Ecol. Behav.* **9**: 23–38.
Gamova, T.V. (2002b). [Breeding biology of the Meadow Bunting in the south of Primorye region]. *Berkut* **11(2)**: 188–200. In Russian.
Gamova, T.V. (2003a). [Song activity and repertoire in the Japanese Reed Bunting *Emberiza yessoensis*]. Pp. 156–158 in: Dorzhiev (2003).
Gamova, T.V. (2003b). [Structural and functional aspects of home ranges of the Japanese Reed Bunting *Emberiza yessoensis* in southern Prymorye (Russian Far East)]. Pp. 159–160 in: Dorzhiev (2003).
Ganier, A.F. (1941). Through the seasons with the Cardinal. *Migrant* **12**: 1–4.
Gantlett, S. (2000). The Meadow Bunting in Norfolk. *Birding World* **13(2)**: 86–87.
Gao Wei (1983). A comparative study on the population of two birds on the peat grassland at Shangpai Shan. *Zool. Res.* **4(2)**: 157–166. In Chinese with English summary.
Gao Wei, Wang Haitao, Sun Danting (2003). The habitat and nest-site selection of Jankowski's Bunting. *Acta Ecol. Sinica* **23(4)**: 665–672.
Garamszegi, L.Z. (2011). Climate change increases the risk of malaria in birds. *Global Change Biol.* **17**: 1751–1759.
García Montaña, F. (1998). *Las Aves de Cuba. Subespecies Endémicas*. Editorial Gente Nueva, La Habana, Cuba. In Spanish.
García Romero, M.E. & Fernández García, I. (1998). Hábitos alimentarios del Sabanero (*Sturnella magna*) en un agroecosistema cubano. *Pitirre* **11(2)**: 42–45. In Spanish with English summary.
García-Moreno, J. & Fjeldså, J. (1999). Re-evaluation of species limits in the genus *Atlapetes* based on mtDNA sequence data. *Ibis* **141(2)**: 199–207.
García-Moreno, J. & Fjeldså, J. (2003). Phylogenetic relationships among *Hemispingus* tanagers. *Orn. Neotropical* **14**: 363–370.
García-Moreno, J., Navarro-Sigüenza, A.G., Peterson, A.T. & Sánchez-González, L.A. (2004). Genetic variation coincides with geographic structure in the Common Bush-tanager (*Chlorospingus ophthalmicus*) complex from Mexico. *Mol. Phylogen. Evol.* **33(1)**: 186–196.
García-Moreno, J., Ohlson, J. & Fjeldså, J. (2001). MtDNA sequences support monophyly of *Hemispingus* tanagers. *Mol. Phylogen. Evol.* **21(3)**: 424–435.
Gardali, T. & Nur, N. (2006). Site-specific survival of Black-headed Grosbeaks and Spotted Towhees at four sites within the Sacramento Valley, California. *Wilson J. Orn.* **118(2)**: 178–186.
Gardali, T., King, A.M. & Geupel, G.R. (1998). Cowbird parasitism and nest success of the Lazuli Bunting in the Sacramento Valley. *Western Birds* **29(3)**: 174–179.
Garner, M. (2002). Identification of eastern Reed Buntings with reference to an apparent Siberian Reed Bunting in Northern Ireland. *Birding World* **15(2)**: 74–86.
Garrett, K.L. (1994). The Large-billed Sparrow *Passerculus (sandwichensis) rostratus*. *West. Tanager* **60(6)**: 4.
Garrett, K.L. & Dunn, J.L. (1981). *Birds of Southern California: Status and Distribution*. Los Angeles Audubon Society, Los Angeles, California.
Garrett, K.L., Dunn, J.L. & Righter, R. (2000). Call notes and winter distribution in the Fox Sparrow complex. *Birding (USA)* **32**: 412–417.
Garrido, O.H. (1970). Variación del género *Agelaius* (Aves: Icteridae) en Cuba. *Poeyana (Ser. A)* **68**: 1–18. In Spanish.
Garrido, O.H. (1973). Anfibios, reptiles y aves de Cayo Real (Cayos de San Felipe), Cuba. *Poeyana* **119**: 1–50. In Spanish.
Garrido, O.H. (2001). Was Red-legged Honeycreeper *Cyanerpes cyaneus carneipes* in Cuba introduced from Mexico? *Cotinga* **15**: 58.
Garrido, O.H. & Kirkconnell, A. (1996). Taxonomic status of the Cuban form of the Red-winged Blackbird. *Wilson Bull.* **108**: 372–374.
Garrido, O.H. & Kirkconnell, A. (2000). *Field Guide to the Birds of Cuba*. Comstock & Christopher Helm, Ithaca & London.
Garrido, O.H. & Kirkconnell, A. (2008). The first record of Black-headed Grosbeak *Pheucticus melanocephalus* in the West Indies. *Cotinga* **30**: 72.
Garrido, O.H. & Montaña, F.G. (1975). *Catálogo de las Aves de Cuba*. Academia de Ciencias de Cuba, Havanna. In Spanish.
Garrido, O.H. & Wiley, J.W. (2003). The taxonomic status of the Puerto Rican Bullfinch (*Loxigilla portoricensis*) (Emberizidae) in Puerto Rico and St. Kitts. *Orn. Neotropical* **14(1)**: 91–98.
Garrido, O.H., Parkes, K.C., Reynard, G.B., Kirkconnell, A. & Sutton, R. (1997). Taxonomy of the Stripe-headed Tanager, genus *Spindalis* (Aves: Thraupidae) of the West Indies. *Wilson Bull.* **109(4)**: 561–594.
Garrido, O.H., Wiley, J.W. & Kirkconnell, A. (2005). The genus *Icterus* in the West Indies. *Orn. Neotropical* **16**: 449–470.
Garrigues, R. & Dean, R. (2007). *The Birds of Costa Rica. A Field Guide*. Cornell University Press, Ithaca, New York.
Gartshore, M.E. (1975). Some aspects of the breeding biology of the Cinnamon-breasted Rock Bunting *Emberiza tahapisi*. *Nigerian Orn. Soc. Bull.* **11**: 27–33.
Garza de Leon, A., Moran Rosales, I., Cancino de La Fuente, F., Tinajero Hernandez, R. & Lopez de Aquino, S. (2007). Breeding parameters and new nesting area for Worthen's Sparrow (*Spizella wortheni*) in Coahuila, Mexico. *Orn. Neotropical* **18(2)**: 243–249.
Gates, J.E. & Gates, D.M. (1975). Apparent brooding behaviour of a male Rufous-sided Towhee. *Bird-Banding* **46(3)**: 253.
Gavin, T.A. (1984). Broodedness in Bobolinks. *Auk* **101**: 179–181.
Gavin, T.A. & Bollinger, E.K. (1985). Multiple paternity in a territorial passerine: the Bobolink. *Auk* **102**: 550–555.
Gavrilov, E.I. & Gavrilov, A.E. (2005). *The Birds of Kazakhstan*. Abridged edition. Tethys Ornithological Research **2**. Tethys, Almaty, Kazakhstan.
Gelis, R.A., Greeney, H.F. & Dingle, C. (2006). Cooperative breeding and first nest description for Golden Tanager *Tangara arthus*. *Cotinga* **26**: 79–81.
George, W.G. (1964). Rarely seen songbirds of Peru's high Andes. *Nat. Hist. (New York)* **78**: 26–29.
Gerasimov, N.N. (1997). [First record of *Zonotrichia atricapilla* in Kamchatka]. *Russ. Orn. Zhurnal Ekspress Vypusk* **24**: 13. In Russian.
Gerhart, N.G. (2004). Rediscovery of the Selva Cacique (*Cacicus koepckae*) in southeastern Peru, with notes on habitat, voice and nest. *Wilson Bull.* **116**: 74–82.
Géroudet, P. (1967). Progression de *Passer hispaniolensis* et d'*Emberiza melanocephala* en Roumanie. *Alauda* **35**: 234. In French.
Gibbons, D.W., Smith, K.W., Atkinson, P., Pain, D., Arendt, A.A., Gray, G., Hartley, J., Owen, A. & Clubbe, C. (1998). After the volcano: a future for the Montserrat Oriole? *RSPB Conserv. Rev.* **12**: 97–101.
Gibbs, H.L. (1988). Heritability and selection on clutch size in Darwin's Medium Ground Finches (*Geospiza fortis*). *Evolution* **42(4)**: 750–762.
Gibbs, H.L. (1990). Cultural evolution of male song types in Darwin's Medium Ground Finches, *Geospiza fortis*. *Anim. Behav.* **39(2)**: 253–263.
Gibbs, H.L. & Grant, P.R. (1987a). Oscillating selection on Darwin's finches. *Nature (London)* **327**: 511–513.
Gibbs, H.L. & Grant, P.R. (1987b). Adult survivorship in Darwin's ground finch (*Geospiza*) populations in a variable environment. *J. Anim. Ecol.* **56(3)**: 797–813.
Gibbs, H.L. & Grant, P.R. (1989). Inbreeding in Darwin's Medium Ground Finches (*Geospiza fortis*). *Evolution* **43(6)**: 1273–1284.
Gibbs, H.L., Grant, P.R. & Weiland, J. (1984). Breeding of Darwin's finches at an unusually early age in an El Niño year. *Auk* **101(4)**: 872–874.
Gibbs, H.L., Miller, P., Alderson, G. & Sealy, S.G. (1997). Genetic analysis of Brown-headed Cowbirds, *Molothrus ater*, raised by different hosts: evidence from mtDNA & microsatellite DNA markers. *Mol. Ecol.* **6**: 189–193.
Gibbs, H.L., Weatherhead, P.J., Boag, P.T., White, B.N., Tabak, L.M. & Haywick, D.J. (1990). Realized reproductive success of polygynous Red-winged Blackbirds revealed by DNA markers. *Science (Washington, D.C.)* **250**: 1394–1397.
Gibson, D.D. & Hall, G.E. (1978). *Emberiza variabilis* and *Ficedula parva* new to North America and the Aleutian Islands, Alaska. *Auk* **95(2)**: 428–429.
Gibson, E. (1918). Further ornithological notes from the neighborhood of Cape San Antonio, Province of Buenos Aires. I. Passeres. *Ibis* **Ser. 10, no. 6**: 363–415.
Gibson, L. (1979). Breeding and hand-rearing the Red-legged Honeycreeper. *Avicult. Mag.* **86(1)**: 6–15.
Gibson, L. (1987). Breeding the Silver-beaked or Maroon Tanager *Ramphocelus carbo*. *Avicult. Mag.* **93(3)**: 152–155.
Giebing, M. (2000). Über die Zippammer. *Gefiederte Welt* **124(7)**: 225–227. In German.
Gienapp, P., Leimu, R. & Merilä, J. (2007). Responses to climate change in avian migration time: microevolution versus phenotypic plasticity. *Climate Res.* **35**: 25–35.
Gienapp, P., Teplitsky, C., Alho, J.S., Mills, J.A. & Merilä, J. (2008). Climate change and evolution: disentangling environmental and genetic responses. *Mol. Ecol.* **17**: 167–178.
Gierow, P. & Gierow, M. (1991). Breeding biology of the Lapland Bunting *Calcarius lapponicus* in Lapland, Sweden. *Ornis Svecica* **1(2)**: 103–111.
Gifford, C.E. & Odum, E.P. (1965). Bioenergetics of lipid deposition in the Bobolink, a transequatorial migrant. *Condor* **67**: 383–403.
Gifford, E.W. & Block, G.H. (1930). *Californian Indian Nights*. A. Clarke Co., Glendale, California.
Gilg, O., Sittler, B. & Hanski, I. (2009). Climate change and cyclic predator-prey population dynamics in the high Arctic. *Global Change Biol.* **15**: 2634–2652.
Gill, F.B., Wright, M.T., Conyne, S.B. & Kirk, R. (2009). On hyphens and phylogeny. *Wilson J. Orn.* **121(3)**: 652–655.
Gill, M.J. & Krannitz, P.G. (1997). A case of helping behavior at a Brewer's Sparrow, *Spizella breweri*, nest. *Can. Field-Nat.* **111(4)**: 650–652.
Gill, S.A., Grieef, P.M., Staib, L.M. & Sealy, S.G. (1997). Does nest defence deter or facilitate cowbird parasitism? A test of the nesting-cue hypothesis. *Ethology* **103**: 56–71.
Gillespie, T.W. (2000). Rarity and conservation of forest birds in the tropical dry forest region of Central America. *Biol. Conserv.* **96(2)**: 161–168.
Gilliard, E.T. (1941). The birds of Mt. Auyan-tepui, Venezuela. *Bull. Amer. Mus. Nat. Hist.* **77**: 439–508.
Gilliard, E.T. (1946). Two new gray seed-eaters from South America. *Auk* **63**: 570–574.
Gilliard, E.T. (1958). *Living Birds of the World*. Hamish Hamilton, London.
Gilliard, E.T. (1959). Notes on some birds of northern Venezuela. *Amer. Mus. Novit.* **1927**: 1–33.
Gilligan, J., Schmidt, O., Irons, D. & Smith, R. (1985). First record of LeConte's Sparrow in Oregon. *Western Birds* **15(4)**: 185–186.
Gilligan, J., Smith, M., Rogers, D. & Contreras, A. (1994). *Birds of Oregon: Status and Distribution*. Cinclus Publications, McMinnville, Oregon.
Ginés, H., Aveledo, R., Yepez, G., Linares, G. & Poján, J. (1951). Avifauna. *Mem. Soc. Cienc. Nat. La Salle* **11**: 237–323.
Giocomo, J.J., Moss, E.D., Buehler, D.A. & Minser, W.G. (2008). Nesting biology of grassland birds at Fort Campbell, Kentucky and Tennessee. *Wilson J. Orn.* **120(1)**: 111–119.
Gjerdrum, C., Elphick, C.S. & Rubega, M.A. (2005). Nest site selection and nesting success in saltmarsh breeding sparrows: the importance of nest habitat, timing, and study site differences. *Condor* **107(4)**: 849–862.
Gjerdrum, C., Elphick, C.S. & Rubega, M.A. (2008). How well can we model numbers and productivity of Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*) using habitat features? *Auk* **125(3)**: 608–617.
Gladwin, T.W. (1985). Skylarks and Yellowhammers roosting under snow. *British Birds* **78(2)**: 109–110.
Glaubrecht, M. (2003). Die Dialekte der Goldammer (*Emberiza citrinella*). Oder was uns Vogelgesänge erzählen. *Corax* **19(2)**: 117–120. In German with English summary.
Gliemann, L. (1973). *Die Grauammer*. Die Neue Brehm-Bücherei **443**. A. Ziemsen, Wittenberg Lutherstadt, Germany. In German.
Glustchenko, F.P. (1986). [On structure and spatial variation of song in the Red-headed Bunting (*Emberiza bruniceps*)]. *Ornitologiya* **21**: 158–159. In Russian.
Glutz von Blotzheim, U.N. & Bauer, K.M. eds. (1997). *Handbuch der Vögel Mitteleuropas*. Vol. 14(3). Passeriformes (5. Teil) Passeridae. Aula-Verlag, Wiesbaden, Germany. In German.
Gochfeld, M. (1975). *Comparative Ecology and Behavior of Red-breasted Meadowlarks (Aves, Icteridae) and their Interactions in Sympatry*. PhD thesis, City University of New York, New York.
Gochfeld, M. (1978). Social facilitation of singing: group size and flight song rates in the Pampas Meadowlark *Sturnella defilippii*. *Ibis* **120**: 338–339.
Gochfeld, M. (1979a). Interspecific territoriality in red-breasted meadowlarks and a method for estimating the mutuality of their participation. *Behav. Ecol. Sociobiol.* **5**: 159–170.
Gochfeld, M. (1979b). Brood parasite and host coevolution: interactions between Shiny Cowbirds and two species of meadowlarks. *Amer. Naturalist* **113(6)**: 855–870.
Gochfeld, M. & Tudor, G. (1978). Ant-following birds in South American subtropical forests. *Wilson Bull.* **90**: 139–141.
Gochfeld, M., Gochfeld, R., Kleinbaum, M. & Tudor, G. (1974). Sight record of a Blue Grosbeak (*Guiraca caerulea*) in Colombia. *Amer. Birds* **28**: 958.
Godfrey, W.E. (1949). Distribution of the races of the Swamp Sparrow. *Auk* **66**: 35–38.
Godfrey, W.E. (1986). *The Birds of Canada*. Revised edition. National Museum of Natural Sciences, National Museums of Canada, Ottawa.
Godínez, E. & Blanco, P. (1993). Nido de *Dives atroviolacea* (Icteridae) en condiciones antropizadas. *Orn. Neotropical* **4**: 95–96. In Spanish.
Goeldi, E.A. (1894). *As Aves do Brasil*. Part 1. Livraria Clássica de Alves, Rio de Janeiro, Brazil. In Portuguese.
Goeldi, E.A. (1897). On the nesting of *Cacicus persicus*, *Cassidix oryzivora*, *Gymnomystax mexicanus* and *Todirostrum maculatum*. *Ibis* **Ser. 7, no. 3**: 361–370.
Goguen, C.B. & Mathews, N.E. (1999). Review of the causes and implications of the association between cowbirds and livestock. *Studies Avian Biol.* **18**: 10–17.
Goguen, C.B., Curson, D.R. & Mathews, N.E. (2005). Behavioral ecology of the Brown-headed Cowbird (*Molothrus ater*) in a bison-grazed landscape in New Mexico. *Orn. Monogr.* **57**: 71–83.
Goguen, C.B., Curson, D.R. & Mathews, N.E. (2009). Effects of parasitism by Brown-headed Cowbirds (*Molothrus ater*) on reproductive success of three frequent hosts in New Mexico. *Southwest. Nat.* **54(1)**: 58–67.

Golawski, A. & Dombrowski, A. (2002). Habitat use of Yellowhammers *Emberiza citrinella*, Ortolan Buntings *E. hortulana*, and Corn Buntings *Miliaria calandra* in farmland of east-central Poland. *Ornis Fenn.* **79(4)**: 164–172.

Goldstein, D.L., Williams, J.B. & Braun, E.J. (1990). Osmoregulation in the field by Salt-marsh Savannah Sparrows *Passerculus sandwichensis beldingi*. *Physiol. Zool.* **63(4)**: 669–682.

Goller, F. & Larsen, O.N. (1997). A new mechanism of sound generation in songbirds. *Proc. Natl. Acad. Sci. USA* **94(26)**: 14787–14791.

Golovatin, M.G. (1986). [On the possibility of the mutual influence of the Little Bunting and the Willow Warbler on their numbers when collecting food for their nestlings in southern Yamal]. Pp. 107–118 in: Danilov, N.N. ed. (1986). [*Regulation of Numbers and Density of Animal Populations of the Sub-Arctic*]. Academy of Sciences USSR, Urals Science Centre, Sverdlovsk [Yekaterinburg,], Russia. In Russian.

Golovatin, M.G. (1994). [Experimental study of spatial distribution of birds in the northern taiga]. *Ekologiya* **1**: 59–62. In Russian.

Golovatin, M.G. (2001). [Dynamics of habitat distribution in birds differing in the level of site tenacity]. *Ekologiya* **5**: 396–399. In Russian.

Golovatin, M.G. (2008). Formation of the spatial structure of bird populations as exemplified by the Willow Warbler and Little Bunting, species differing in site fidelity. *Russ. J. Ecol.* **39(2)**: 111–118.

Golub, V.B. (1983). [On the feeding of some species of buntings on the south of Khabarovsk Territory]. *Nauchn. Dokl. Vyssh. Shk. Biol. Nauki* **1983(5)**: 43–48. In Russian.

Gomes de Almeida, C. (2009). *Populacional e Comportamento Alimentar de* Mimus saturninus *(Lichtenstein 1823)*. Polioptila dumicola *(Vieillot 1817)* e Saltator atricollis *(Vieillot 1817)*. MSc thesis, Universidade Federal de Uberlândia, Uberlândia, Brazil. In Portuguese.

Gómez, J., Monrós, J.S. & Gil-Delgado, J.A. (2000). Notas sobre la biología reproductora de la Tangara Azuleja *Thraupis episcopus* en Santa Clara (Costa Rica). *Ardeola* **47(2)**: 265–267. In Spanish.

Gómez, L.D. (1983). Bird's nest fungi. *Brenesia* **21**: 464.

Gómez de Silva, H., González-García, F. & Casillas-Trejo, M.P. (1999). Birds of the upper cloud forest of el Triunfo, Chiapas, Mexico. *Orn. Neotropical* **10**: 1–26.

Gómez-Aiza, L. & Zuria, I. (2010). Bird visitation to maguey flowers (*Agave salmiana*) in an urban area of central Mexico. *Orn. Neotropical* **21**: 17–30.

Gonzaga, L.P. (1983). Notas sobre *Dacnis nigripes* Pelzeln, 1856 (Aves, Coerebidae). *Iheringia (Ser. Zool.)* **63**: 45–58. In Portuguese.

Gonzaga, L.P. & Castiglioni, G. (2006). Description of the nest and notes on the breeding behaviour of Brassy-breasted Tanager *Tangara desmaresti*. *Cotinga* **25**: 69–73.

González, C.E. & Torres-Mura, J.C. (2000). Nidificación de *Oreomanes fraseri* (Passeriformes, Fringillidae) en Tarapacá, Andes de Chile. *Bol. Chileno Orn.* **7**: 19–23. In Spanish with English summary.

González, O. (1997). First description of the nest of the Slender-billed Finch. *Bull. Brit. Orn. Club* **117(4)**: 314–315.

González, O. (2003). Sightings of the Great Inca-finch *Incaspiza pulchra* in the lowlands of Lima, Peru. *Cotinga* **20**: 103–104.

González, O. & Høegsaas, T.E. (1998). The immature plumages of the Slender-billed Finch *Xenospingus concolor*. *Cotinga* **10**: 43–44.

González, O. & La Torre-Cuadros, M. (2001). Análisis de hábitat del Fringilo Apizarrado (*Xenospingus concolor*) en la costa sur del Perú. *Orn. Neotropical* **12**: 153–163. In Spanish.

González Alonso, H., González Bermudez, F. & Quesada, M. (1986). Distribución y alimentación del Cabrerito de la Ciénaga (*Torreornis inexpectata*) (Aves: Fringillidae). *Poeyana* **310**: 1–24. In Spanish.

González Alonso, H., de las Pozas, G. & González Bermudez, F. (1982). Aspectos reproductivos y densidad poblacional de *Torreormis inexpectata inexpectata* (Aves: Fringillidae) en la Ciénaga de Zapata, Cuba. *Cienc. Biol. Acad. Cienc. Cuba* **8**: 123–129. In Spanish.

González-García, F. (2007). First record of Bronzed Cowbird (*Molothrus aeneus*) parasitism of the Common Bush-tanager (*Chlorospingus ophthalmicus*). *Wilson J. Orn.* **119(2)**: 312–314.

González-García, F., Contreras Reyes, A. & Straub, R. (2009). First documented record of Crimson-collared Grosbeak (*Rhodothraupis celaeno*) from central Veracruz, México. *Acta Zool. Mexicana (New Ser.)* **25(1)**: 203–205.

González-Ortega, M.A.A., Gómez, M.F.M. & Cartas Heredia, G.J. (2002). Ocurrencia, distribución y abundancia del género *Passerina* en la Reserva de la Biosfera La Sepultura, Chiapas. *Acta Zool. Mexicana (New Ser.)* **85**: 169–180. In Spanish.

Good, H.G. & Adkins, T.R. (1927). Notes on the wintering habits of the White-throated Sparrow (*Zonotrichia albicollis*). *Wilson Bull.* **39**: 75–78.

Goodfellow, W. (1901). Results of an ornithological journey through Colombia and Ecuador. *Ibis* **Ser. 8, no. 1**: 300–319.

Goodman, S.M. & Meininger, P.L. eds. (1989). *The Birds of Egypt*. Oxford University Press, Oxford, UK.

Goodman, S.M. & Watson, G.E. (1983). Bird specimen records of some uncommon or previously unrecorded forms in Egypt. *Bull. Brit. Orn. Club* **103(3)**: 101–106.

Goodpasture, K.A. (1972). A rarely reported sex-plumage association in a Rose-breasted Grosbeak. *Bird-Banding* **43**: 136.

Goodwin, R. (1959). Breeding of the Black-faced Grassquit, *Tiaris bicolor*, in captivity and some notes on the comparative behavior of the genus. *Aviculr. Mag.* **65**: 131–134.

Gordo, O. & Sanz, J.J. (2005). Phenology and climate change: a long-term study in a Mediterranean locality. *Oecologia (Berlin)* **146**: 484–495.

Gordo, O., Brotons, L., Ferrer, X. & Comas, P. (2005). Do changes in climate patterns in wintering areas affect the timing of the spring arrival of trans-Saharan migrant birds? *Global Change Biol.* **10**: 1–10.

Gore, M.E.J. & Gepp, A.R.M. (1978). *Las Aves del Uruguay*. Mosca Hnos, Montevideo. In Spanish.

Gori, D.F. (1988a). Adjustment of parental investment with mate quality by male Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*). *Auk* **105**: 672–680.

Gori, D.F. (1988b). Colony-facilitated foraging in Yellow-headed Blackbirds: experimental evidence for information transfer. *Ornis Scand.* **19**: 224–230.

Gosse, P.H. (1847). *The Birds of Jamaica*. J. van Voorst, London.

Gotie, R.F. & Kroll, J.C. (1973). Growth rate and ontogeny of thermoregulation in nestling Great-tailed Grackles. *Condor* **75**: 190–199.

Gould, J. (1839). Part 3(4) birds. Pp. 57–96, pls. 31–40 in: Darwin, C. ed. (1839). *The Zoology of the Voyage of H.M.S. Beagle, under the Command of Capt. Fitzroy, R. N., during the Years 1832 to 1836*. Part 11. Smith, Elder and Co., London.

Gould, J. (1841). Part 3(5) birds. Pp. 97–146, pls. 41–50 in: Darwin, C. ed. (1841). *The Zoology of the Voyage of H.M.S. Beagle, under the Command of Capt. Fitzroy, R. N., during the Years 1832 to 1836*. Part 15. Smith, Elder and Co., London.

Gould, P.J. (1961). Territorial relationships between Cardinals and Pyrrhuloxias. *Condor* **63**: 246–265.

Gourlay, M.P. (1974). Breeding the Blue-crowned Chlorophonia (*Chlorophonia occipitalis*). *Avicult. Mag.* **80**: 25–28.

Govoni, P.W., Summerville, K.S. & Eaton, M.D. (2009). Nest sharing between an American Robin and a Northern Cardinal. *Wilson J. Orn.* **121(2)**: 424–426.

Graber, J.W. (1968). Western Henslow's Sparrow. Pp. 779–788 in: Bent & Austin (1968).

Graber, R.R. & Graber, J.W. (1954). Comparative notes on Fuertes and Orchard Orioles. *Condor* **56**: 274–282.

Graber, R.R. & Graber, J.W. (1962). Weight characteristics of birds killed in nocturnal migration. *Wilson Bull.* **74**: 74–88.

Grace, K. (1991). Analysis of Irish Rustic and Little Bunting records. *Irish Birding News* **1(3)**: 98–103.

Graf, R.L. & Greeley, F. (1976). The nesting site of the Northern Oriole in Amherst, Mass. *Wilson Bull.* **88**: 359–360.

Graham, D.S. & Middleton, A.L.A. (1989). Conspecific recognition by juvenile Brown-headed Cowbirds. *Bird Behaviour* **8**: 14–22.

Graham, G.L., Graves, G.R., Schulenberg, T.S. & O'Neill, J.P. (1980). Seventeen bird species new to Peru from the Pampas de Heath. *Auk* **97(2)**: 366–370.

Granfors, D.A., Church, K.E. & Smith, L.M. (1996). Eastern Meadowlarks nesting in rangelands and conservation reserve program fields in Kansas. *J. Field Orn.* **67**: 222–235.

Grant, B.R. (1984). The significance of song variation in a population of Darwin's finches. *Behaviour* **89(1/2)**: 90–116.

Grant, B.R. (1985). Selection on bill characters in a population of Darwin's finches: *Geospiza conirostris* on Isla Genovesa, Galápagos. *Evolution* **39(3)**: 523–532.

Grant, B.R. (1990). The significance of subadult plumage in Darwin's finches, *Geospiza fortis*. *Behav. Ecol.* **1(2)**: 161–170.

Grant, B.R. (1996). Pollen digestion by Darwin's finches and its importance for early breeding. *Ecology* **77(2)**: 489–499.

Grant, B.R. (2003). Evolution in Darwin's finches: a review of a study on Isla Daphne Major in the Galápagos archipelago. *Zoology* **106(4)**: 255–259.

Grant, B.R. (2004). Evolutionary dynamics of sympatric Darwin's finch populations in the Galápagos Archipelago. *Curr. Zool.* [*Acta Zool. Sinica*] **50(6)**: 936–941.

Grant, B.R. & Grant, P.R. (1979). Darwin's finches: population variation and sympatric speciation. *Proc. Natl. Acad. Sci. USA* **76(5)**: 2359–2363.

Grant, B.R. & Grant, P.R. (1981). Exploitation of *Opuntia* cactus by birds on the Galápagos. *Oecologia (Berlin)* **49(2)**: 179–187.

Grant, B.R. & Grant, P.R. (1982). Niche shifts and competition in Darwin's finches: *Geospiza conirostris* and congeners. *Evolution* **36(4)**: 637–657.

Grant, B.R. & Grant, P.R. (1983). Fission and fusion in a population of Darwin's finches: an example of the value of studying individuals in ecology. *Oikos* **41(3)**: 530–547.

Grant, B.R. & Grant, P.R. (1984). Plant and finch responses on Isla Genovesa to the El Niño event of 1982–83. *Noticias de Galápagos* **39**: 12–14.

Grant, B.R. & Grant, P.R. (1987). Mate choice in Darwin's finches. *Biol. J. Linn. Soc.* **32(3)**: 247–270.

Grant, B.R. & Grant, P.R. (1989a). *Evolutionary Dynamics of a Natural Population. The Large Cactus Finch of the Galápagos*. University of Chicago Press, Chicago & London.

Grant, B.R. & Grant, P.R. (1989b). Natural selection in a population of Darwin's finches. *Amer. Naturalist* **133(3)**: 377–393.

Grant, B.R. & Grant, P.R. (1993). Evolution of Darwin's finches caused by a rare climatic event. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **251**: 111–117.

Grant, B.R. & Grant, P.R. (1996). High survival of Darwin's finch hybrids: effects of beak morphology and diets. *Ecology* **77(2)**: 500–509.

Grant, B.R. & Grant, P.R. (1997). Cultural inheritance of song and its role in the evolution of Darwin's finches. *Evolution* **50(6)**: 2471–2487.

Grant, B.R. & Grant, P.R. (2002a). Lack of premating isolation at the base of a phylogenetic tree. *Amer. Naturalist* **160(1)**: 1–19.

Grant, B.R. & Grant, P.R. (2002b). Simulating secondary contact in allopatric speciation: an empirical test of premating isolation. *Biol. J. Linn. Soc.* **76(4)**: 545–556.

Grant, B.R. & Grant, P.R. (2003). What Darwin's finches can teach us about the evolutionary origin and regulation of biodiversity. *Bioscience* **53(10)**: 965–975.

Grant, P.R. (1981). The feeding of Darwin's finches on *Tribulus cistoides* (L.) seeds. *Anim. Behav.* **29(3)**: 785–793.

Grant, P.R. (1982). Variation in the size and shape of Darwin's finches eggs. *Auk* **99**: 16–23.

Grant, P.R. (1983). Inheritance of size and shape in a population of Darwin's finches, *Geospiza conirostris*. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **220**: 219–236.

Grant, P.R. (1999). *Ecology and Evolution of Darwin's Finches*. 2nd edition. Princeton University Press, Princeton, New Jersey.

Grant, P.R. & Grant, B.R. (1980). The breeding and feeding characteristics of Darwin's finches on Isla Genovesa, Galápagos. *Ecol. Monogr.* **50(3)**: 381–410.

Grant, P.R. & Grant, B.R. (1987). The extraordinary El Niño event of 1982–83: effects on Darwin's finches in Isla Genovesa, Galápagos. *Oikos* **49(1)**: 55–66.

Grant, P.R. & Grant, B.R. (1992). Demography and the genetically effective sizes of two populations of Darwin's finches. *Ecology* **73(3)**: 766–784.

Grant, P.R. & Grant, B.R. (1994). Phenotypic and genetic effects of hybridization in Darwin's finches. *Evolution* **48(2)**: 297–316.

Grant, P.R. & Grant, B.R. (1995a). The founding of a new population of Darwin's finches. *Evolution* **49(2)**: 229–240.

Grant, P.R. & Grant, B.R. (1995b). Predicting microevolutionary responses to directional selection on heritable variation. *Evolution* **49(2)**: 241–251.

Grant, P.R. & Grant, B.R. (1997a). Mating patterns of Darwin's finch hybrids determined by song and morphology. *Biol. J. Linn. Soc.* **60(3)**: 317–343.

Grant, P.R. & Grant, B.R. (1997b). Hybridization, sexual imprinting, and mate choice. *Amer. Naturalist* **149(1)**: 1–28.

Grant, P.R. & Grant, B.R. (2000). Non-random fitness variation in two populations of Darwin's finches. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **267**: 131–138.

Grant, P.R. & Grant, B.R. (2002a). Unpredictable evolution in a 30-year study of Darwin's finches. *Science (Washington, D.C.)* **296**: 707–711.

Grant, P.R. & Grant, B.R. (2002b). Adaptive radiation of Darwin's finches. *Amer. Sci.* **90(2)**: 130–139.

Grant, P.R. & Grant, B.R. (2003). Reversed sexual dimorphism in the beak of a finch. *Ibis* **145(2)**: 341–343.

Grant, P.R. & Grant, B.R. (2006). Evolution of character displacement in Darwin's finches. *Science (Washington, D.C.)* **313**: 224–226.

Grant, P.R. & Grant, B.R. (2008). *How and Why Species Multiply: the Radiation of Darwin's Finches*. Princeton University Press, Princeton, New Jersey.

Grant, P.R. & Grant, B.R. (2009). The secondary contact phase of allopatric speciation in Darwin's finches. *Proc. Natl. Acad. Sci. USA* **106(48)**: 20141–20148.

Grant, P.R. & Grant, B.R. (2010). Natural selection, speciation and Darwin's finches. *Proc. Calif. Acad. Sci.* **61** (Suppl. 2): 245–260.

Grant, P.R., Abbott, I., Schluter, D., Curry, R. & Abbott, L. (1985). Variation in the size and shape of Darwin's finches. *Biol. J. Linn. Soc.* **25**: 1–39.

Grant, P.R., Grant, B.R., Keller, L.F. & Petren, K. (2000). Effects of El Niño on Darwin's finch productivity. *Ecology* **81(9)**: 2442–2457.

Grant, P.R., Grant, B.R., Keller, L.F., Markert, J.A. & Petren, K. (2003). Inbreeding and interbreeding in Darwin's finches. *Evolution* **57(12)**: 2911–2916.

Grant, P.R., Grant, B.R., Markert, J.A., Keller, L.F. & Petren, K. (2004). Convergent evolution of Darwin's finches caused by introgressive hybridization and selection. *Evolution* **58(7)**: 1588–1599.

Grant, P.R., Grant, B.R. & Petren, K. (2000a). The allopatric phase of speciation: the Sharp-beaked Ground Finch (*Geospiza difficilis*) on the Galápagos Islands. *Biol. J. Linn. Soc.* **69(3)**: 287–317.

Grant, P.R., Grant, B.R. & Petren, K. (2000b). Vocalizations of Darwin's finch relatives. *Ibis* **142(4)**: 680–682.

Grant, P.R., Grant, B.R. & Petren, K. (2001). A population founded by a single pair of individuals: establishment, expansion, and evolution. *Genetica* **112/113**: 359–382.

Grant, P.R., Grant, B.R., Petren, K. & Keller, L.F. (2005). Extinction behind our backs: the possible fate of one of the Darwin's finch species on Isla Floreana, Galápagos. *Biol. Conserv.* **122(3)**: 499–503.

Grant, T.A., Madden, E.M., Shaffer, T.L., Pietz, P.J., Berkey, G.B. & Kadrmas, N.J. (2006). Nest survival of Clay-colored and Vesper Sparrows in relation to woodland edge in mixed-grass prairies. *J. Wildl. Management* **70(3)**: 691–701.

Grantsau, R. (1985). Pipira azul – *Cyanicterus cyanicterus*. *SOBoletim* **7**: 1–2. In Portuguese.

Grantsau, R. (2002). Primeiro registro documentado de *Phrygilus fruticeti* (Kittlitz, 1833) para o Brasil (Rio Grande do Sul). *Ararajuba* **10(2)**: 262–263. In Portuguese with English summary.

Grapputo, A., Pilastro, A., Baker, A.J. & Marin, G. (2001). Molecular evidence for phylogenetic relationships among buntings and American sparrows (Emberizidae). *J. Avian Biol.* **32(2)**: 95–101.

Grapputo, A., Pilastro, A. & Marin, G. (1998). Genetic variation and bill size dimorphism in a passerine bird, the Reed Bunting *Emberiza schoeniclus*. *Mol. Ecol.* **7(9)**: 1173–1182.

Graul, W.D. (1967). Population movements of the Harris's Sparrow and Tree Sparrow in eastern Kansas. *Southwest. Nat.* **12(3)**: 303–310.

Graves, G.R. (1978). Predation on hummingbird by oropendola. *Condor* **80**: 251.

Graves, G.R. (1980). A new subspecies of *Diglossa* (*carbonaria*) *brunneiventris*. *Bull. Brit. Orn. Club* **100**: 230–232.

Graves, G.R. (1981). The 1980 Dusky Seaside Sparrow survey. *Florida Field Nat.* **9(4)**: 64–68.

Graves, G.R. (1982a). Speciation in the Carbonated Flower-piercer (*Diglossa carbonaria*) complex of the Andes. *Condor* **84(1)**: 1–14.

Graves, G.R. (1982b). Pollination of a *Tristerix* mistletoe (Loranthaceae) by *Diglossa* (Aves, Thraupidae). *Biotropica* **14**: 316–317.

Graves, G.R. (1983). *Elevational Correlates of Intraspecific Variation in Plumage in Andean Forest Birds*. PhD thesis, Florida State University, Tallahassee, Florida.

Graves, G.R. (1990). A new subspecies of *Diglossa gloriosissima* (Aves: Thraupinae) from the western Andes of Colombia. *Proc. Biol. Soc. Washington* **103**: 962–965.

Graves, G.R. (1991). Bergmann's rule near the equator: latitudinal clines in body size of an Andean passerine bird. *Proc. Natl. Acad. Sci. USA* **88**: 2322–2325.

Graves, G.R. (2006). Greater Antillean Grackle (*Quiscalus niger*) preys on *Anolis grahami*. *J. Caribb. Orn.* **19**: 56–58.

Graves, G.R. & Weske, J.S. (1987). *Tangara phillipsi*, a new species of tanager from the Cerros del Sira, eastern Peru. *Wilson Bull.* **99**: 1–6.

Gray, D.A. & Hagelin, J.C. (1996). Song repertoires and sensory exploitation: reconsidering the case of the Common Grackle. *Anim. Behav.* **52**: 795–800.

Gray, E.M. (1997a). Do female Red-winged Blackbirds benefit genetically from seeking extra-pair copulations? *Anim. Behav.* **53**: 605–623.

Gray, E.M. (1997b). Female Red-winged Blackbirds accrue material benefits from copulating with extra-pair males. *Anim. Behav.* **53**: 625–639.

Green, M.T., Lowther, P.E., Jones, S.L., Davis, S.K. & Dale, B.C. (2002). Baird's Sparrow (*Ammodramus bairdii*). No. **638** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.

Green, R.E., Collingham, Y.C., Willis, S.G., Gregory, R.D., Smith, K.W. & Huntley, B. (2008). Performance of climate envelope models in retrodicting recent changes in bird population size from observed climatic change. *Biol. Letters (London)* **4**: 599–602.

Greenberg, R. (1981a). Dissimilar bill shapes in New World tropical and temperate forest foliage-gleaning birds. *Oecologia (Berlin)* **49**: 143–147.

Greenberg, R. (1981b). Frugivory in some migrant tropical forest wood warblers. *Biotropica* **13**: 215–223.

Greenberg, R. (1981c). The abundance and seasonality of forest canopy birds on Barro Colorado Island, Panama. *Biotropica* **13**: 241–251.

Greenberg, R. (1984). The winter exploitation systems of Bay-breasted and Chestnut-sided Warblers in Panama. *Univ. Calif. Publ. Zool.* **116**: 1–107.

Greenberg, R. (1988). Seasonal plumage dimorphism in the Swamp Sparrow. *J. Field Orn.* **59(2)**: 149–154.

Greenberg, R. (2003). The use of nest departure calls for surveying Swamp Sparrows. *J. Field Orn.* **74(1)**: 12–16.

Greenberg, R. & Droege, S. (1990). Adaptations to tidal marshes in breeding populations of the Swamp Sparrow. *Condor* **92(2)**: 393–404.

Greenberg, R. & Droege, S. (1999). On the decline of the Rusty Blackbird and the use of ornithological literature to document long-term population trends. *Conserv. Biol.* **13**: 553–559.

Greenberg, R. & Gradwohl, J. (1980). Leaf surface specializations of birds and arthropods in a Panamanian forest. *Oecologia (Berlin)* **46**: 115–124.

Greenberg, R. & Marra, P.P. (2005). *Birds of Two Worlds: the Ecology and Evolution of Migration*. Johns Hopkins University Press, Baltimore, Maryland.

Greenberg, R. & Matsuoka, S.M. (2010). Rusty Blackbird: mysteries of a species in decline. *Condor* **112(4)**: 770–777.

Greenberg, R., Cordero, P.J., Droege, S. & Fleischer, R.C. (1998). Morphological adaptation with no mitochondrial DNA differentiation in the Coastal Plain Swamp Sparrow. *Auk* **115(3)**: 706–712.

Greenberg, R., Marra, P.P. & Wooler, M.J. (2007). Stable-isotope (C, N, H) analyses help locate the winter range of the Coastal Plain Swamp Sparrow (*Melospiza georgiana nigrescens*). *Auk* **124(4)**: 1137–1148.

Greenberg, R., Olsen, B.J. & Etterson, M.A. (2010). Patterns of seasonal abundance and social segregation in inland and Coastal Plain Swamp Sparrows in a Delaware tidal marsh. *Condor* **112(1)**: 159–167.

Greene, E., Lyon, B.E., Muehter, V.R., Ratcliffe, L., Oliver, S.J. & Boag, P.T. (2000). Disruptive sexual selection for plumage coloration in a passerine bird. *Nature (London)* **407**: 1000–1003.

Greene, E., Muehter, V.R. & Davison, W. (1996). Lazuli Bunting (*Passerina amoena*). No. **232** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 6. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington, D.C. & Philadelphia.

Greeney, H.F. (1999). Ecuadorian birds: some nesting records and egg descriptions. *Avicult. Mag.* **105(3)**: 127–129.

Greeney, H.F. (2005). The nest and eggs of the Yellow-whiskered Bush-tanager (*Chlorospingus parvirostris*) in eastern Ecuador. *Orn. Neotropical* **16(3)**: 437–438.

Greeney, H.F. (2009). The nest, eggs and nestlings of the Rufous-naped Brush-finch (*Atlapetes latinuchus latinuchus*) in southeastern Ecuador. *Orn. Colombiana* **8**: 83–87.

Greeney, H.F. & Gelis, R.A. (2006a). Observations on the nesting of the Olive Finch (*Lysurus castaneiceps*) in eastern Ecuador. *Orn. Neotropical* **17**: 147–149.

Greeney, H.F. & Gelis, R.A. (2006b). Two nests of Grass-green Tanager *Chlorornis riefferii* on the ground. *Cotinga* **25**: 86.

Greeney, H.F. & Gelis, R.A. (2008). Further breeding records from the Ecuadorian Amazonian lowlands. *Cotinga* **29**: 62–68.

Greeney, H.F. & Nunnery, T. (2006). Notes on the breeding of north-west Ecuadorian birds. *Bull. Brit. Orn. Club* **126(1)**: 38–45.

Greeney, H.F. & Sheldon, K.S. (2009). The nest and eggs of Masked Crimson Tanager *Ramphocelus nigrogularis*. *Cotinga* **30**: 80–81.

Greeney, H.F., Freeman, B., Sheldon, K.S., Dobbs, R.C. & Gelis, R.A. (2008). Notes on the nest architecture and nesting biology of Black-capped Tanager (*Tangara heinei*) in northeastern Ecuador. *Bol. Soc. Antioqueña Orn.* **18**: 10–15.

Greeney, H.F., Jaffe, D.F. & Manzaba, O.G. (2008). Incubation behavior of the Yellow-billed Cacique (*Amblycercus holosericeus australis*) in northeastern Ecuador. *Orn. Colombiana* **7**: 83–87.

Greeney, H.F., Juiña, M. & Sornoza, A.F. (2006). Nest description for *Conothraupis speculigera* and *Thlypopsis ornata* in Ecuador. *Bol. Soc. Antioqueña Orn.* **16(1)**: 245–249.

Greeney, H.F., Lysinger, M., Walla, T. & Clark, J. (1998). First description of the nest and egg of the Tanager Finch (*Oreothraupis arremonops* Sclater 1855), with additional notes on behavior. *Orn. Neotropical* **9**: 205–207.

Greeney, H.F., Simbaña, J., Sheldon, K.S., Craik, A. & Jonsson, R. (2007). Observations on the nesting and diet of the White-capped Tanager (*Sericossypha albocristata*) in eastern Ecuador. *Orn. Neotropical* **18**: 139–142.

Greenhood, W. & Norton, R.L. (1999). Novel feeding technique of the Woodpecker Finch. *J. Field Orn.* **70(1)**: 104–106.

Greenlaw, J.S. (1973). An erythristic specimen of the Rufous-sided Towhee. *Auk* **90(2)**: 428–429.

Greenlaw, J.S. (1976). Use of bilateral scratching behaviour by Emberizines and Icterids. *Condor* **78**: 94–97.

Greenlaw, J.S. (1977). Taxonomic distribution, origin, and evolution of bilateral scratching in ground-feeding birds. *Condor* **79**: 426–439.

Greenlaw, J.S. (1978). The relation of breeding schedule and clutch size to food supply in the Rufous-sided Towhee. *Condor* **80(1)**: 24–33.

Greenlaw, J.S. (1990). Foraging behavior in *Loxigilla* bullfinches, with special reference to foot-holding and to nectar-robbing in the Lesser Antillean Bullfinch. *Caribb. J. Sci.* **26(1/2)**: 62–65.

Greenlaw, J.S. (1993). Behavioral and morphological diversification in Sharp-tailed Sparrows (*Ammodramus caudacutus*) of the Atlantic coast. *Auk* **110(2)**: 286–303.

Greenlaw, J.S. (1996a). Eastern Towhee (*Pipilo erythrophthalmus*). No. **262** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Greenlaw, J.S. (1996b). Spotted Towhee (*Pipilo maculatus*). No. **263** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Greenlaw, J.S. & Engstrom, R.T. (2001). First record of Spotted Towhee in Florida. *Florida Field Nat.* **29(1)**: 26–28.

Greenlaw, J.S. & Post, W. (1985). Evolution of monogamy in Seaside Sparrows, *Ammodramus maritimus*: test of hypotheses. *Anim. Behav.* **33(2)**: 373–383.

Greenlaw, J.S. & Rising, J.D. (1994). Sharp-tailed Sparrow (*Ammodramus caudacutus*). No. **112** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Greenlaw, J.S. & Woolfenden, G.E. (2007). Wintering distributions and migration of Saltmarsh and Nelson's Sharp-tailed Sparrows. *Wilson J. Orn.* **119(3)**: 361–377.

Greenlaw, J.S., Shackelford, C.E. & Brown, R.E. (1998). Call mimicry by Eastern Towhees and its significance in relation to auditory learning. *Wilson Bull.* **110(3)**: 431–434.

Greenway, J.C. (1958). *Extinct and Vanishing Birds of the World*. Special Publication **13**. American Committee for International Wild Life Protection, New York.

Gregorie, J.A. & Gregorie, S.M. (1996). Probable extralimital breeding of Lincoln's Sparrow in Finger Lakes Highlands. *Kingbird* **46(4)**: 304–307.

Gregory, R.D., Willis, S.G., Jiguet, F., Vorísek, P., Klvanová, A., van Strien, A., Huntley, B., Collingham, Y.C., Couvet, D. & Green, R.E. (2009). An indicator of the impact of climatic change on European bird populations. *PLoS One* **4**: e4678.

Greives, T.J., Casto, J.M. & Ketterson, E.D. (2007). Relative abundance of males to females affects behaviour, condition and immune function in a captive population of Dark-eyed Juncos *Junco hyemalis*. *J. Avian Biol.* **38(3)**: 255–260.

Gressler, D.T. (2008). *Biologia e Sucesso Reprodutivo de* Sicalis citrina *Pelzen, 1870 (Aves: Emberizidae) no Distrito Federal*. MSc thesis, Universidade de Brasília, Instituto de Ciências Biológicas, Departamento de Ecologia, Brasília, Brazil.

Gridi-Papp, C.O., Gridi-Papp, M. & Rodrigues Silva, W. (2004). Differential fruit consumption of two Melastomataceae by birds in Serra da Mantiqueira, southeastern Brazil. *Ararajuba* **12**: 5–10.

Griffith, M. (1992). Clay-colored Sparrow sighted in Mason County, West Virginia. *Redstart* **59(2)**: 47–48.

Grilli, P., Moschione, F.N. & Burgos, F.G. (2006). Leucismo parcial en Pepitero de Collar *Saltator aurantiirostris* en Santa Bárbara, Jujuy, Argentina. *Cotinga* **25**: 89–90. In Spanish.

Grilli, P., Soave, G., Valqui, T. & Fraga, R.M. (2009). Observations on the distribution, ecology, behavior and nesting of Selva Caciques. Unpubl.

Grimes, L.G. (1987). *The Birds of Ghana. An Annotated Check-list*. British Ornithologists' Union Check-list **9**. British Ornithologists' Union, London.

Grimes, S.A. (1953). Black-throated Oriole (*Icterus gularis*) nesting in Texas. *Auk* **70**: 207.

Grimm, H. (2008). Über das ehemalige Vorkommen des Ortolans *Emberiza hortulana* als Brutvogel in Thüringen. *Anz. Ver. Thüring. Orn.* **6(2)**: 189–202. In German.

Grimmett, R., Inskipp, C. & Inskipp, T. (1998). *Birds of the Indian Subcontinent*. Christopher Helm & A&C Black, London.

Grindstaff, J.L., Buerkle, C.A., Casto, J.M., Nolan, V. & Ketterson, E.D. (2001). Offspring sex ratio is unrelated to male attractiveness in Dark-eyed Juncos (*Junco hyemalis*). *Behav. Ecol. Sociobiol.* **50(4)**: 312–316.

Grinnell, J. (1905). Where does the Large-billed Sparrow spend the summer? *Auk* **22**: 16–21.

Grinnell, J. (1910). Birds of the 1908 Alexander Alaska Expedition with a note on the avifaunal relationships of the Prince William Sound district. *Univ. Calif. Publ. Zool.* **5(12)**: 361–428, pls. 33–34.

Grinnell, J. (1915). *A Distributional List of the Birds of California*. Pacific Coast Avifauna **11**. Museum of Vertebrate Zoology of the University of California, Hollywood, California.

Grinnell, J. (1920). The Californian race of the Brewer Blackbird. *Condor* **22**: 152–154.

Grinnell, J. & Swarth, H.S. (1926). Geographic variation in *Spizella atrogularis*. *Auk* **48**: 475–478.

Grischtschenko, V. (2001). Die Weidenammer *Emberiza aureola* in der Ukraine. *Orn. Mitt.* **53(9)**: 303–306. In German.

Griscom, L. (1924). Descriptions of new birds from Panama and Costa Rica. *Amer. Mus. Novit.* **141**: 1–12.

Griscom, L. (1926). The ornithological results of the Maswon-Sinden Expedition to Yucatán. *Amer. Mus. Novit.* **235**: 1–19.

Griscom, L. (1929). A collection of birds from Cana, Darien. *Bull. Mus. Comp. Zool. Harvard* **69**: 149–190.

Griscom, L. (1932). The distribution of bird-life in Guatemala. A contribution to a study of the origin of Central American bird-life. *Bull. Amer. Mus. Nat. Hist.* **64**: 1–439.

Griscom, L. (1934). The ornithology of Guerrero, Mexico. *Bull. Mus. Comp. Zool. Harvard* **75**: 367–422.

Griscom, L. (1935). The rediscovery of *Chlorospingus flavovirens* (Lawrence). *Auk* **52**: 94–95.

Griscom, L. & Greenway, J.C. (1941). Birds of Lower Amazonia. *Bull. Mus. Comp. Zool. Harvard* **88**: 83–344.

Gritschik, V.V., Nemtchinov, M.J. & Sakhvon, V.V. (2002). [Pallas' Reed Bunting (*Emberiza pallasi*) – new species of Belarusian bird fauna, rare vagrant]. *Subbuteo* **5(1)**: 55. In Russian.

Groh, G. (1994). Die Zaunammer (*Emberiza cirlus*) und der Schutz ihres Lebensraumes in der Pfalz. *Mitt. Pollichia* **81**: 407–416. In German.

de Groot, M., Kmecl, P., Figelj, A., Figelj, J., Mihelic, T. & Rubinic, B. (2010). Multi-scale habitat association of the Ortolan Bunting *Emberiza hortulana* in a sun-mediterrane area in Slovenia. *Ardeola* **57(1)**: 55–68.

Groschupf, K. (1985). Changes in Five-striped Sparrow song in intra- and intersexual contexts. *Wilson Bull.* **97(1)**: 102–106.

Groschupf, K. (1992). Five-striped Sparrow (*Aimophila quinquestriata*). No. **21** in: Poole, A., Stettenheim, P. & Gill, F. eds. (1992). *The Birds of North America*. Vol. 1. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Groschupf, K. (1994). Current status of the Five-striped Sparrow in Arizona. *Western Birds* **25(4)**: 192–197.

Groschupf, K. & Mills, G.S. (1978). Intersong interval and song pattern variability of the Five-striped Sparrow. *Auk* **95(4)**: 758–760.

Groschupf, K. & Mills, G.S. (1982). Singing behaviour of the Five-striped Sparrow. *Condor* **84(2)**: 226–236.
Groschupf, K. & Thompson, C.W. (1998). Varied Bunting (*Passerina versicolor*). No. **351** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 9. The Birds of North America Inc., Philadelphia, Pennsylvania.
Groselj, P. (1988). *Emberiza rutila*, an anonymous guest from east Asia. *Acrocephalus (Ljubljana)* **9(37–38)**: 64–65. In Slovenian with English summary.
Groskin, H. (1943). Scarlet Tanagers "anting". *Auk* **60**: 55–59.
Groskin, H. (1950). Additional observations and comments on "anting" by birds. *Auk* **67**: 210–209.
Gross, A.O. (1921). The Dickcissel of the Illinois prairies. *Auk* **38**: 163–184.
Gross, A.O. (1952). Nesting of Hicks' Seedeater at Barro Colorado Island, Canal Zone. *Auk* **69**: 433–446.
Gross, A.O. (1956). The recent reappearance of the Dickcissel (*Spiza americana*) in eastern North America. *Auk* **73**: 66–70.
Gross, A.O. (1968). Dickcissel. Pp. 158–191 in: Bent & Austin (1968).
Grøtan, V., Sæther, B.E., Engen, S., van Balen, J.H., Perdeck, A.C. & Visser, M.E. (2009). Spatial and temporal variation in the relative contribution of density dependence, climate variation and migration to fluctuations in the size of Great Tit populations. *J. Anim. Ecol.* **78**: 447–459.
Grotelüschen, D. (2003). Erfolgreiche Zucht der Blaukronenorganisten. *Gefiederte Welt* **127(10)**: 294–295. In German.
Groth, J.G. (1998). Molecular phylogenetics of finches and sparrows: consequences of character state removal in cytochrome *b* sequences. *Mol. Phylogen. Evol.* **10**: 377–390.
Gruar, D., Barritt, D. & Peach, W.J. (2006). Summer utilization of oilseed rape by Reed Buntings *Emberiza schoeniclus* and other farmland birds. *Bird Study* **53(1)**: 47–54.
Grubb, T.C., White, T.A. & Wiseman, A.J. (1991). Ptilochronology: induced feather growth in Northern Cardinals varies with age, sex, ambient temperature and daylength. *Wilson Bull.* **103**: 435–445.
Gruber, T. & Nagle, L. (2010). Territorial reactions of male Yellowhammers (*Emberiza citrinella*) toward a specific song structure. *J. Orn.* **151(3)**: 645–654.
Grujbarova, Z., Kocian, L. & Nemethova, D. (2005). Habitat selection in the Sedge Warbler (*Acrocephalus schoenobaenus*) and the Reed Bunting (*Emberiza schoeniclus*). *Biologia (Bratislava)* **60(5)**: 571–577.
Grützmann, J., Moritz, V., Südbeck, P. & Wendt, D. (2002). Ortolan (*Emberiza hortulana*) und Grauammer (*Miliaria calandra*) in Niedersachsen: Brutvorkommen, Lebensräume, Rückgang und Schutz. *Vogelkdl. Ber. Niedersachsen* **34(1)**: 69–90. In German with English summary.
Gryj, E., del Rio, C.M. & Baker, I. (1990). Avian pollination and nectar use in *Combretum fruticosum* (Loefl.). *Biotropica* **22(3)**: 266–271.
Grzimek, B., Meise, W., Niethammer, G. & Steinbacher, J. eds. (1984). *Grzimek's Animal Life Encyclopedia*. Vol. 9. Birds, 3. English edition. Van Nostrand Reinhold Company, New York.
Grzybowski, J.A. (1990). The autumn migration August 1 – November 30, 1989, southern Great Plains region. *Amer. Birds* **44(1)**: 114–117.
Grzybowski, J.A. & Pease, C.M. (1999). A model of the dynamics of cowbirds and their host communities. *Auk* **116(1)**: 209–222.
Guarente, A. (2009). Le Conte's Sparrow (*Ammodramus leconteii*) in Delaware County. *Pennsylvania Birds* **23(1)**: 34.
Gubin, B.M. (1980). [On the biology of Rock Bunting (*Emberiza cia*) nidifugous in western Tien-Shan]. *Ornitologiya* **15**: 111–116. In Russian.
Gubin, B.M. (1982). Notes on the biology of the White-capped Bunting in the Talass Ala Tau (west Tien Shan). *Ornitologiya* **17**: 106–108.
Guégan, J.F., Thomas, F., Hochberg, M.E., de Meeus, T. & Renaud, F. (2003). Disease diversity and human fertility. *Evolution* **55**: 1308–1314.
Guernier, V., Hochberg, M.E. & Guégan, J.F. (2004). Ecology drives the worldwide distribution of human diseases. *PLoS Biol.* **2**: 740–746.
Guerrero, J. & Arambiza, A. (2001). *Lista Preliminar de las Aves del P. N. Kaa-Iya del Gran Chaco e Izozog*. Sociedad para la Conservación de la Vida Silvestre, Santa Cruz, Bolivia. In Spanish.
Guerrieri, G., Miglio, M. & Santucci, B. (2006). Habitat e riproduzione dell'Ortoloano, *Emberiza hortulana*, in ambienti agricoli marginali dell'Italia centrale. *Riv. Ital. Orn.* **76(1)**: 47–68. In Italian with English summary.
Guerrieri, G., Santucci, B., Biondi, M. & Pietrelli, L. (1994). Selezione di habitat e riproduzione dello Zigolo capinero, *Emberiza melanocephala* nell'Italia centrale. *Riv. Ital. Orn.* **64(1)**: 49–61. In Italian with English summary.
Guevara, E.A., Solano, A. & Buitrón, G. (2008). Noteworthy records from the eastern Andean slopes of northern Ecuador. *Orn. Colombiana* **7**: 78–82.
Guillory, H.D., Deshotels, J.H. & Guillory, C. (1981). Great-tailed Grackle reproduction in south central Louisiana. *J. Field Orn.* **52**: 325–331.
Guimarães, A.C. (1926). Ensaios sobre ornitologia. Part 1. *Rev. Mus. Paulista* **14**: 615–631. In Portuguese.
Guix, J.C. & Ruiz, X. (1998). Intensive folivory by *Thraupis sayaca* (Emberizidae: Thraupinae) in southeastern Brazil. *Ararajuba* **6(2)**: 138–140.
Güller, R. (2008). *Sporophila nigrorufa* (d'Orbigny y Lafresnaye, 1837), una nueva especie para la avifauna argentina. *Not. Faun.* **20**: 1–3. In Spanish with English summary.
Gundlach, J. (1855). Beiträge zur Ornithologie Cuba's. *J. Orn.* **3**: 465–480. In German.
Gundlach, J. (1876). *Contribución a la Ornitología Cubana*. Imprenta La Antilla, Havana, Cuba. In Spanish.
Gundlach, J. (1882). Briefliches: zur Fortpflanzungsgeschichte des *Chlorospingus speculiferus*. *J. Orn.* **30**: 161. In German.
Guo Jianrong, Wang Jianping, Wu Lirong & Gong Shulong (2002). [Notes on reproduction of *Emberiza spodocephala* in Luyashan Nature Reserve, Shanxi Province]. *Sichuan J. Zool.* **21(2)**: 98. In Chinese.
Gusinde, M. (1982). *Los Indios de Tierra del Fuego*. Vol. 1. Los Selk'nam. Centro de Etnología Americana, Buenos Aires. In Spanish.
Gustafson, J.R. (1975). A Sage Sparrow egg in a Black-throated Sparrow nest. *Auk* **92(4)**: 805–806.
Gustafson, J.R., Jehl, J., Kohfield, B., Laabs, D. & LaBerteaux, D. (1994). Inyo California Towhee. Pp. 218–219 in: Thelander, C.G. & Crabtree, M. eds. (1994). *Life on the Edge: a Guide to California's Endangered Natural Resources: Wildlife*. BioSystems Books, Santa Cruz, California.
Guth, R.W. (1971). New bird records from Guadeloupe and its dependencies. *Auk* **88**: 180–182.
Guzy, M.J., Ribic, C.A. & Sample, D.W. (2002). Helping at a Henslow's Sparrow nest in Wisconsin. *Wilson Bull.* **114(3)**: 407–409.
Gyldenstolpe, N. (1941a). On some new or rare birds, chiefly from south-western Colombia. *Ark. Zool.* **33A(6)**: 1–17.
Gyldenstolpe, N. (1941b). Preliminary diagnoses of some new birds from Bolivia. *Ark. Zool.* **33B(13)**: 1–10.
Gyldenstolpe, N. (1945a). The bird fauna of Rio Jurua in Western Brazil. *Kung. Svenska Vet. Handl.* **Ser. 3, no. 22(3)**: 1–338.
Gyldenstolpe, N. (1945b). A contribution to the ornithology of northern Bolivia. *Kung. Svenska Vet. Handl.* **Ser. 3, no. 23**: 1–300.
Gyorgypal, Z. (1980). Contributions to the ethology of the Rock Bunting (*Emberiza cia*). *Aquila* **87**: 71–78.
Haarhaus, D. (1968). Zum Tagesrhythmus des Staren (*Sturnus vulgaris*) und der Schneeammer (*Plectrophenax nivalis*). *Oecologia (Berlin)* **1**: 176–218. In German.
Haas, C.A. & Titus, R.C. (1998). Bachman's Sparrow nest and census at Fort Pickett, Blackstone, Virginia. *Raven* **69(2)**: 72–75.
Haas, F.C. (2003). Black-headed Grosbeak, Lancaster County. *Pennsylvania Birds* **17(1)**: 36.
Hackett, S.J. (1995). Molecular systematics and zoogeography of flowerpiercers in the *Diglossa baritula* complex. *Auk* **112(1)**: 156–170.
Hackett, S.J. (1996). Molecular phylogenetics and biogeography of tanagers in the genus *Ramphocelus* (Aves). *Mol. Phylogen. Evol.* **5**: 368–382.
Haemig, P.D. (1978). Aztec Emperor Auitzotl and the Great-tailed Grackle. *Biotropica* **10**: 11–17.
Haemig, P.D. (2010). Ecology and ethnobiology of the Slender-billed Grackle *Quiscalus palustris*. *J. Orn.* **151(2)**: 391–399.
Haffer, J. (1967a). On birds from the northern Chocó region, N.W.-Colombia. *Veröff. Zool. Staatssammlung München* **11**: 123–149.
Haffer, J. (1967b). Interspecific competition as a possible factor in limiting the range of some trans-Andean forest birds. *Hornero* **10**: 438–440.
Haffer, J. (1970). Art-Entstehung bei einigen Waldvögeln Amazoniens. *J. Orn.* **111(3/4)**: 285–331. In German with English summary.
Haffer, J. (1974). *Avian Speciation in Tropical South America, with a Systematic Survey of the Toucans (Ramphastidae) and Jacamars (Galbulidae)*. Publications of the Nuttall Ornithological Club **14**. The Nuttall Ornithological Club, Cambridge, Massachusetts. viii, 390 pp.
Haffer, J. (1975). Avifauna of northwestern Colombia, South America. *Bonn. Zool. Monogr.* **7**: 1–182.
Haffer, J. (1977). Secondary contact zones of birds in northern Iran. *Bonn. Zool. Monogr.* **10**: 1–64.
Haffer, J. (1989). Parapatrische Vogelarten der Paläarktischen Region. *J. Orn.* **130**: 475–512. In German.
Hafner, D.J. & Petersen, K.E. (1985). Song dialects and gene flow in the White-crowned Sparrow, *Zonotrichia leucophrys nuttalli*. *Evolution* **39(3)**: 687–694.
Hagan, J.M. (1993). Decline of the Rufous-sided Towhee in the eastern United States. *Auk* **110(4)**: 863–874.
Hagemeijer, W.J.M. & Blair, M.J. eds. (1997). *The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance*. T.&A.D. Poyser, London.
Hagen, Y. (1952). *The Birds of Tristan da Cunha*. Results of the Norwegian Scientific Expedition to Tristan da Cunha 1937–1938 **20**. Norske Videnskaps-Akademi, Oslo. 248 pp.
Haggerty, T.M. (1988). Aspects of the breeding biology and productivity of Bachman's Sparrow in central Arkansas. *Wilson Bull.* **100(2)**: 247–255.
Haggerty, T.M. (1992). Effects of nestling age and brood size on nestling care in the Bachman's Sparrow (*Aimophila aestivalis*). *Amer. Midl. Nat.* **128(1)**: 115–125.
Haggerty, T.M. (1995). Nest-site selection, nest design and nest-entrance orientation in Bachman's Sparrow. *Southwest. Nat.* **40(1)**: 62–67.
Haggerty, T.M. (1998). Vegetation structure of Bachman's Sparrow breeding habitat and its relationship to home range. *J. Field Orn.* **69(1)**: 45–50.
Haggerty, T.M. (2000). A geographic study of the vegetation structure of Bachman's Sparrow (*Aimophila aestivalis*) breeding habitat. *J. Ala. Acad. Sci.* **71(3)**: 120–129.
Haglund, B. (1935). Några bidrag till videsparvens biologi *Emberiza rustica*. *Fauna och Flora* (Uppsala) **1935**: 134–138. In Swedish.
Hagvar, S., Glesne, O. & Ostbye, E. (2009). Food habits and niche overlap in three alpine passerine birds, south Norway. *Ornis Nor.* **32(1)**: 56–73.
Hahn, D.C. & Fleischer, R.C. (1995). DNA fingerprint similarity between female and juvenile Brown-headed Cowbirds trapped together. *Anim. Behav.* **49**: 1577–1580.
Hahn, T.P., Sockman, K.W., Breuner, C.W. & Morton, M.L. (2004). Facultative altitudinal movements by mountain White-crowned Sparrows (*Zonotrichia leucophrys oriantha*) in the Sierra Nevada. *Auk* **121(4)**: 1269–1281.
Haiiser, D.G. (1960). A record of *Pipilo erythrophthalmus arcticus* in North Carolina. *Auk* **77**: 349.
Hainsworth, F.R., Moonan, T., Voss, M.A., Sullivan, K.A. & Weathers, W.W. (1998). Time and heat allocations to balance conflicting demands during intermittent incubation by Yellow-eyed Juncos. *J. Avian Biol.* **29(2)**: 113–120.
Hale, M. (1993). Red/Black-headed Bunting: the first record for Hong Kong. *Hong Kong Bird Rep.* **1992**: 134–138.
Hale, M. (2010). Jankowski's Bunting *Emberiza jankowskii*: the next species to become extinct in east Asia? *Birding Asia* **13**: 71–72.
Hales, H. (1896). Peculiar traits of some Scarlet Tanagers. *Auk* **13**: 261–263.
Halkin, S.L. (1997). Nest-vicinity song exchanges may coordinate biparental care of Northern Cardinals. *Anim. Behav.* **54**: 189–198.
Halkin, S.L. & Linville, S.U. (1999). Northern Cardinal (*Cardinalis cardinalis*). No. **440** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 11. The Birds of North America Inc., Philadelphia, Pennsylvania.
Hall, G.A. (1965). Flame-colored Tanager parasitized by Bronzed Cowbird. *Auk* **82**: 101.
Hallinan, T. (1924). Notes on some Panama Canal Zone birds with special reference to their food. *Auk* **41(2)**: 304–326.
Hamblin, N.L. (1984). *Animal Use by the Cozumel Maya*. University of Arizona Press, Tucson, Arizona.
Hamilton, J.F. (1871). Notes on birds from the province of São Paulo, Brazil. *Ibis* **Ser. 3, no. 1**: 301–309.
Hamilton, W.J. (1951). The food of nestling Bronzed Grackles, *Quiscalus quiscula versicolor*, in Central New York. *Auk* **68**: 213–217.
Hamilton, W.J. (1998). Tricolored Blackbird itinerant breeding in California. *Condor* **100**: 218–226.
Hamilton, W.J. & Orians, G.H. (1966). Evolution of brood parasitism in altricial birds. *Condor* **67**: 361–382.
Handford, P. (1980). Aspects of the annual cycle in highland populations of the Rufous-collared Sparrow, *Zonotrichia capensis*. *Auk* **97(2)**: 400–404.
Handford, P. (1981). Vegetational correlates of variation in the song of *Zonotrichia capensis*. *Behav. Ecol. Sociobiol.* **8(3)**: 203–206.
Handford, P. (1985). Morphological relationships among subspecies of the Rufous-collared Sparrow, *Zonotrichia capensis*. *Can. J. Zool.* **63(10)**: 2383–2388.
Handford, P. (1988). Trill rate dialects in the Rufous-collared Sparrow, *Zonotrichia capensis*, in northwestern Argentina. *Can. J. Zool.* **66(12)**: 2658–2670.
Handford, P. & Lougheed, S.C. (1991). Variation in duration and frequency characters in the song of the Rufous-collared Sparrow, *Zonotrichia capensis*, with respect to habitat, trill dialects and body size. *Condor* **93(3)**: 644–658.
Handford, P. & Nottebohm, F. (1976). Allozymic and morphological variation in population samples of Rufous-collared Sparrow, *Zonotrichia capensis* in relation to vocal dialects. *Evolution* **30(4)**: 802–817.
Handtke, K. & Hrncirik, H.J. (1979). Ornithologische Beobachtungen in der zentralen Mongolei während einer Sammelreise 1977. *Orn. Jber. Mus. Heineanum* **4**: 39–72. In German.
Hänel, K. (2004). Zur Populationsstruktur und Habitatpräferenz des Ortolans (*Emberiza hortulana*). Untersuchungen in der Moritzburger Kuppenlandschaft/Sachsen. *Mitt. Vereins Sächsischer Orn.* **9(3)**: 317–357. In German with English summary.
Haney, J.C., Lee, D.S. & Wilbert, M. (2001). A half-century comparison of breeding birds in the southern Appalachians. *Condor* **103(2)**: 268–277.
Hansen, P. (1984). Neighbour-stranger song discrimination in territorial Yellowhammer *Emberiza citrinella* males, and a comparison with responses to own and alien song dialects. *Ornis Scand.* **15(4)**: 240–247.
Hanson, T. (2008). First observation of duetting in the Olive-backed Euphonia (*Euphonia gouldi*). *Wilson J. Orn.* **120(1)**: 200–201.
Hansson, P. & Andersson, L. (2008). Snöbyar av snösparv: bakslag tvingade stora flockar av snösparv rasta i Umedeltat. *Vår Fågelvärld* **67(3)**: 20–21. In Swedish.
Hardi, M. (1989). Zur Winterökologie der Goldammer *Emberiza citrinella* in der Schweiz. *Orn. Beob.* **86(3)**: 209–217. In German.
Hardy, D.R. & Hardy, S.P. (2008). White-winged Diuca Finch (*Diuca speculifera*) nesting on Quelccaya Ice Cap, Perú. *Wilson J. Orn.* **120(3)**: 613–617.
Hardy, J.W. (1967). Evolutionary and ecological relationships between three species of blackbirds (Icteridae) in Central Mexico. *Evolution* **21**: 196–197.

Hardy, J.W. (1980). The Oaxaca Sparrow (*Aimophila notosticta*) has a chatter vocalization. *Condor* **82(1)**: 111.
Hardy, J.W. & Dickerman, R.W. (1965). Relationships between two forms of the Red-winged Blackbird in Mexico. *Living Bird* **4**: 107–129.
Hardy, J.W., Reynard, G.B. & Taylor, T. (1998). *Voices of the Troupials, Blackbirds and their Allies*. Two cassettes with booklets. ARA Records, Gainsville, Florida.
Hargrove, L. (2010). Black-chinned Sparrow: notes on breeding behavior and nesting ecology in San Diego County, California. *Western Birds* **41(1)**: 62–67.
Harkins, C.E. (1937). Harris's Sparrow in its winter range. *Wilson Bull.* **49**: 286–292.
Harmeson, J. (1974). Breeding ecology of the Dickcissel. *Auk* **91**: 348–359.
Harms, K.E., Beletsky, L.D. & Orians, G.H. (1991). Conspecific nest parasitism in three species of New World blackbirds. *Condor* **93**: 967–974.
Harper, D. (1995). Studies of West Palearctic birds. **194**. Corn Bunting *Miliaria calandra*. *British Birds* **88**: 401–420.
Harper, F. (1930). A historical sketch of Botteri's Sparrow. *Auk* **47**: 177–185.
Harper, F. (1958). *Birds of the Ungava Peninsula*. Miscellaneous Publications **17**. Museum of Natural History, University of Kansas, Lawrence, Kansas.
Harrap, K.S. (1970). Breeding of the Lark-like Bunting. *Avicult. Mag.* **76(1)**: 4–5.
Harris, C.G. (1983). Sight record of a Golden-crowned Sparrow (*Zonotrichia atricapilla*) in Ontario. *Ontario Birds* **1(2)**: 70–71.
Harris, G. (1998). *A Guide to the Birds and Mammals of Coastal Patagonia*. Princeton University Press, Princeton, New Jersey.
Harris, H. (1919). Historical notes on Harris's Sparrow (*Zonotrichia querula*). *Auk* **36**: 180–190.
Harris, M.A. & Lemon, R.E. (1972). Songs of Song Sparrows (*Melospiza melodia*): individual variation and dialects. *Can. J. Zool.* **50(3)**: 301–309.
Harris, M.A. & Lemon, R.E. (1976). Responses of male Song Sparrows *Melospiza melodia* to neighbouring and non-neighbouring individuals. *Ibis* **118(3)**: 421–424.
Harris, M.P. (1972). *Coereba flaveola* and the Geospizinae. *Bull. Brit. Orn. Club* **92(6)**: 164–168.
Harris, M.P. (1973). The Galápagos avifauna. *Condor* **75(3)**: 265–278.
Harris, R.D. (1944). The Chestnut-collared Longspur in Manitoba. *Wilson Bull.* **56**: 105–115.
Harrison, C.J.O. (1973). Observations on the behaviour and breeding of the Saffron Finch. *Avicult. Mag.* **79(6)**: 207–213.
Harrison, H.H. (1975). *A Field Guide to Birds' Nests of 285 Species Found Breeding in the United States East of the Mississippi River*. The Peterson Field Guide Series **21**. Houghton Mifflin, Boston.
Harrison, H.H. (1979). *A Field Guide to Western Birds' Nests*. Houghton Mifflin, Boston, Massachusetts.
Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V. & Brown, C.J. eds. (1997). *The Atlas of Southern African Birds Including Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe*. Vol. 2. Passerines. BirdLife South Africa, Johannesburg, South Africa.
Harrison, J.M. (1934). Status of the Reed Buntings. *Ibis* **Ser. 13, no. 4**: 200–208.
Harrison, M.L., Green, D.J. & Krannitz, P.G. (2009). Conspecifics influence the settlement decisions of male Brewer's Sparrows at the northern edge of their range. *Condor* **111(4)**: 722–729.
Harrop, H. (1993). Identification of female and juvenile Yellow-breasted Bunting. *Birding World* **6(8)**: 317–319.
Hart, J.D., Milsom, T.P., Fisher, G., Wilkins, V., Moreby, S.J., Murray, A.W.A. & Robertson, P.A. (2006). The relationship between Yellowhammer breeding performance, arthropod abundance and insecticide applications on arable farmland. *J. Appl. Ecol.* **43(1)**: 81–91.
Hartert, E.J.O. (1898). On a collection of birds from north-western Ecuador, collected by Mr. W. F. H. Rosenberg. *Novit. Zool.* **5**: 477–505.
Hartert, E.J.O. (1901). On some birds from north-west Ecuador. *Novit. Zool.* **8**: 369–371.
Hartert, E.J.O. (1916). On the forms of *Rhodinocichla rosea*. *Novit. Zool.* **23**: 229.
Hartert, E.J.O. & Venturi, S. (1909). Notes sur les oiseaux de la République Argentine. *Novit. Zool.* **16**: 159–267. In French.
Hartman, F.A. (1955). Heart weights in birds. *Condor* **57**: 221–238.
Hartman, F.A. & Brownell, K.A. (1961). Adrenal and thyroid weights in birds. *Auk* **78**: 397–422.
Hartup, B., Kollias, G. & Ley, D. (2000). Mycoplasmal conjunctivitis in songbirds from New York. *J. Wildl. Diseases* **36(2)**: 257–264.
Harvey, G.F. (1903). The diary of a Cardinal's nest. *Auk* **20**: 54–57.
Harwood, J. (2009). White-crowned Sparrow, St Michaels, Fife, 17 May 2008 – the second record for Scotland. *Scottish Birds* **29(3)**: 260–261.
Hasse, H. (1995). *Die Goldammer* Emberiza citrinella. Die Neue Brehm-Bücherei **316**. 2nd edition. A. Ziemsen, Wittenberg Lutherstadt, Germany. In German.
Hatch, S.A. (1983). Nestling growth relationships of Brown-headed Cowbirds and Dickcissels. *Wilson Bull.* **95**: 671–672.
Hathcock, C.R. & Brush, T. (2004). Breeding abundance and nest-site distribution of the Altamira Oriole at Santa Ana National Wildlife Refuge, Texas. *Southwest. Nat.* **49(1)**: 33–38.
Hauber, M.E. (2009). Does the removal of avian brood parasite eggs increase host productivity? A case study with Brown-headed Cowbirds *Molothrus ater* and Song Sparrows *Melospiza melodia* near Ithaca, New York, USA. *Conserv. Evid.* **6**: 83–88.
Haukioja, E. (1971a). Short-distance dispersal in the Reed Bunting *Emberiza schoeniclus*. *Ornis Fenn.* **48(2)**: 45–67.
Haukioja, E. (1971b). Flightlessness in some moulting passerines in Northern Europe. *Ornis Fenn.* **48(3/4)**: 101–116.
Hausch, J. (1999). Zippammern (*Emberiza cia*) im Rheingau. *Jahrb. Nassau. Ver. Naturk.* **120**: 105–111. In German.
Haverschmidt, F. (1948). Bird weights from Surinam. *Wilson Bull.* **60**: 230–239.
Haverschmidt, F. (1951). Notes on *Icterus nigrogularis* and *I. chrysocephalus* in Surinam. *Wilson Bull.* **63**: 45.
Haverschmidt, F. (1952). More bird weights from Surinam. *Wilson Bull.* **64**: 234–241.
Haverschmidt, F. (1954a). Zur Brutbiologie von *Thraupis episcopus* in Suriname. *J. Orn.* **95**: 48–54. In German.
Haverschmidt, F. (1954b). *Conirostrum bicolor* parasitized by *Molothrus bonariensis* in Surinam. *Auk* **71**: 328–329.
Haverschmidt, F. (1955). Notes on some Suriname breeding birds. *Ardea* **43**: 137–144.
Haverschmidt, F. (1956). The nest and egg of *Tachyphonus phoenicius*. *Wilson Bull.* **68**: 322–323.
Haverschmidt, F. (1966a). Notes on *Icterus chrysocephalus* and *Icterus cayanensis* in Surinam. *Bull. Brit. Orn. Club* **86**: 33–35.
Haverschmidt, F. (1966b). The eggs of the Giant Cowbird. *Bull. Brit. Orn. Club* **86**: 144–147.
Haverschmidt, F. (1967). Additional notes on the eggs of the Giant Cowbird. *Bull. Brit. Orn. Club* **87**: 136–137.
Haverschmidt, F. (1968). *Birds of Surinam*. Oliver and Boyd, Edinburgh, UK.
Haverschmidt, F. (1970a). Rufous-crowned Tanagers feeding on fruit-bowl. *Wilson Bull.* **82**: 228.
Haverschmidt, F. (1970b). The nest of the Red-breasted Blackbird. *Auk* **87**: 167.
Haverschmidt, F. (1972a). Bird records from Surinam. *Bull. Brit. Orn. Club* **92**: 49–53.
Haverschmidt, F. (1972b). More notes on interspecific cacique and oropendola colonies in Surinam. *Auk* **89(3)**: 676.
Haverschmidt, F. (1975). More bird records from Surinam. *Bull. Brit. Orn. Club* **95**: 74–77.
Haverschmidt, F. & Mees, G.F. (1994). *Birds of Suriname*. 2nd edition. Vaco Uitgeversmaatschappij, Paramaribo, Suriname.
Hawksley, O. & McCormack, A.P. (1951). Doubly-occupied nests of the Eastern Cardinal, *Richmondena cardinalis*. *Auk* **68**: 515–516.
Haydock, E.L. (1949). A study of the Cinnamon-breasted Bunting *Fringillaria tahapisi tahapisi*. *Ostrich* **20**: 126–130.
Hayes, F.E. (1995). *Status, Distribution and Biogeography of the Birds of Paraguay*. Monographs in Field Ornithology **1**. American Birding Association, Albany & Colorado Springs.
Hayes, F.E. (2003). Geographic variation in the Great Pampa-finch *Embernagra platensis* complex: evidence for two species. *Ardeola* **50(2)**: 223–235.
Hayes, F.E. & Areco de Medina, F.E. (1988). Notes on the ecology of the avifauna of Choré, Department of San Pedro, Paraguay. *Hornero* **13**: 59–70.
Hayes, F.E. & Sewlal, J.A.N. (2004). The Amazon River as a dispersal barrier to passerine birds: effects of river width, habitat and taxonomy. *J. Biogeogr.* **31(11)**: 1809–1818.
Hayes, F.E., Scharf, P.A. & Ridgely, R.S. (1994). Austral bird migrants in Paraguay. *Condor* **96**: 83–97.
Hayes, F.E., White, S.A., ffrench, R.P. & Bodnar, S. (2004). Geographic variation in body mass of the Bananaquit (*Coereba flaveola*) in the Trinidad and Tobago archipelago. *J. Caribb. Orn.* **17**: 18–22.
Hays, W.S.T. & Conant, S. (2007). Biology and impacts of Pacific Island invasive species. 1. A worldwide review of effects of the small Indian mongoose, *Herpestes javanicus* (Carnivora: Herpestidae). *Pacific Sci.* **61(1)**: 3–16.
Hayward, C.L. (1935). Observations on some breeding birds of Mount Timpanogos, Utah. *Wilson Bull.* **47**: 161–162.
Heath, M.F. & Long, A.J. (1991). Habitat, distribution and status of the Azure-rumped Tanager *Tangara cabanisi* in Mexico. *Bird Conserv. Int.* **1**: 223–254.
Heck, B.A. (2010). First record for Snow Bunting in southeastern Oklahoma. *Bull. Okla. Orn. Soc.* **43(2)**: 11.
Heckenlively, D.B. (1967). Role of song in territoriality of Black-throated Sparrows. *Condor* **69**: 429–430.
Heckenlively, D.B. (1970). Song in a population of Black-throated Sparrows. *Condor* **72**: 24–36.
Heckenlively, D.B. (1976). Variation in cadence of Field Sparrow songs. *Wilson Bull.* **88(4)**: 588–602.
Hedenström, A. (2006). Scaling of migration and the annual cycle of birds. *Ardea* **94**: 399–408.
Hellack, J.J. (1976). Phenetic variation in the avian subfamily Cardinalinae. *Occas. Pap. Mus. Nat. Hist. Univ. Kansas* **57**: 1–22.
Hellack, J.J. & Schnell, G.D. (1977). Phenetic analysis of the sub-family Cardinalinae using external and skeletal characters. *Wilson Bull.* **89**: 130–148.
Heller, E. & Snodgrass, R. (1901). Descriptions of two new species and three new subspecies of birds from the eastern Pacific, collected by the Hopkins-Stanford expedition to the Galápagos Islands. *Condor* **3**: 74–77.
Heller, S. & Hughes, K. (1997). Song activity of Henslow's Sparrow and Grasshopper Sparrow over a 24-hour period. *Indiana Audubon Quarterly* **75(2)**: 61–67.
Hellmayr, C.E. (1908). An account of the birds collected by Mons. G. A. Baer in the State of Goyaz, Brazil. *Novit. Zool.* **15**: 13–102.
Hellmayr, C.E. (1910). The birds of the Rio Madeira. *Novit. Zool.* **17**: 257–428.
Hellmayr, C.E. (1915). Ein kleiner Beitrag zur Ornithologie des Staates Espírito Santo, Südostbrasilien. *Verh. Orn. Ges. Bayern* **12**: 126–159. In German.
Hellmayr, C.E. (1929). A contribution to the ornithology of north-eastern Brazil. *Field Mus. Nat. Hist. (Zool. Ser.)* **12(18)**: 235–501.
Hellmayr, C.E. (1932). The birds of Chile. *Field Mus. Nat. Hist. (Zool. Ser.)* **19**: 1–472.
Hellmayr, C.E. (1935). Catalogue of birds of the Americas and the adjacent islands in Field Museum of Natural History. Alaudidae–Compsothlypidae. *Field Mus. Nat. Hist. (Zool. Ser.)* **13(8)**: 218–331.
Hellmayr, C.E. (1936). Catalogue of birds of the Americas and the adjacent islands in Field Museum of Natural History. Tersinidae–Thraupidae. *Field Mus. Nat. Hist. (Zool. Ser.)* **13(9)**: i–v, 1–458.
Hellmayr, C.E. (1937). Catalogue of birds of the Americas and the adjacent islands in Field Museum of Natural History. Icteridae. *Field Mus. Nat. Hist. (Zool. Ser.)* **13(10)**: i–v, 1–228.
Hellmayr, C.E. (1938). Catalogue of birds of the Americas and the adjacent islands in Field Museum of Natural History. Ploceidae–Catamblyrhynchidae–Fringilidae. *Field Mus. Nat. Hist. (Zool. Ser.)* **13(11)**: i–vi, 1–662.
Hemetsberger, J. (2005). Frühe Brutnachweise bei Steinlerche *Ammomanes isabellina*, Saharasteinschmätzer *Oenanthe leucopyga*, Akaziendrossling *Turdoides fulvus* und Hausammer *Emberiza stiolata* in der zentralen Sahara Algeriens. *Vogelwarte* **43(4)**: 271–272. In German with English summary.
Hémon, D. & Jougla, E. (2003). *Estimation de la Surmortalité et des Principales Caractéristiques Épidémiologiques*. Rapport. Ministère de la Santé, de la Famille et des Personnes Handicapées, Paris. In French.
Hempel, A. (1949). Estudo da alimentação natural de aves silvestres do Brasil. *Arq. Inst. Biol. (São Paulo)* **19**: 237–268. In Portuguese.
Hendricks, P. (1987). Breeding biology and nestling development of Golden-crowned Sparrows in Alaska. *Wilson Bull.* **99(4)**: 693–696.
Hendry, A.P., Grant, P.R., Grant, B.R., Ford, H.A., Brewer, M.J. & Podos, J. (2006). Possible human impacts on adaptive radiation: beak size bimodality in Darwin's finches. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **273**: 1887–1894.
Hendry, A.P., Huber, S.K., de Leon, L.F., Herrel, A. & Podos, J. (2009). Disruptive selection in a bimodal population of Darwin's finches. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **276**: 753–759.
Henise, D. (1997). Pale form of Field Sparrow (*Spizella pusilla*). *Pennsylvania Birds* **11(2)**: 60.
Hennessey, A.B. (1998). Audio recordings of *Hemithraupis flavicollis*, from Serranía Pilon, Beni, Bolivia. Xeno-Canto. XC3055. Unpubl.
Hennessey, A.B. & Gomez, M.I. (2003). Four bird species new to Bolivia: an ornithological survey of the Yungas Site Tokoaque, Madidi National Park. *Cotinga* **19**: 25–33.
Hennessey, A.B., Herzog, S.K. & Sagot, F. (2003). *Lista Anotada de las Aves de Bolivia*. Asociación Armonía, Santa Cruz de la Sierra, Bolivia.
Henriques, L.M.P., Wunderle, J.M. & Willig, M.R. (2003). Birds of the Tapajos National Forest, Brazilian Amazon: a preliminary assessment. *Orn. Neotropical* **14**: 1–32.
Henry, J.D. (2009). Division of labour in a pair of Snow Buntings while raising offspring on the Arctic tundra. *Blue Jay* **67(1)**: 55–57.
Herbert, P.D.N., Stoeckle, M.Y., Zemlak, T.S. & Francis, C.M. (2004). Identification of birds through DNA barcodes. *PLoS Biol.* **2(10)**: e312.
Herkert, J.R. (1997). Bobolink *Dolichonyx oryzivorus* population decline in agricultural landscapes in the midwestern USA. *Biol. Conserv.* **80(1)**: 107–112.
Herkert, J.R. (1998). The influence of the CRP on Grasshopper Sparrow population trends in the mid-continental United States. *Wildl. Soc. Bull.* **26(2)**: 227–231.
Herkert, J.R. (2007). Evidence for a recent Henslow's Sparrow population increase in Illinois. *J. Wildl. Management* **71(4)**: 1229–1233.
Herkert, J.R. & Glass, W.D. (1999). Henslow's Sparrow response to prescribed fire in an Illinois prairie remnant. *Studies Avian Biol.* **19**: 160–164.
Herkert, J.R., Vickery, P.D. & Kroodsma, D.E. (2002). Henslow's Sparrow (*Ammodramus henslowii*). No. **672** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 17. The Birds of North America Inc., Philadelphia, Pennsylvania.
Herklots, G.A.C. (1961). *The Birds of Trinidad and Tobago*. Collins, London, UK.
Herklots, G.A.C. (1969). *The Birds of Trinidad and Tobago*. Revised edition. Collins, London.
Hermann, H. (1983). Ökologie und Verhalten der Rohrammer *Emberiza schoeniclus* in den Amperauen bei Emmering. *Verh. Orn. Ges. Bayern* **23(5/6)**: 459–477. In German.
Hernandez, A.M., Pfaff, J.A., MacDougall-Shackleton, E.A. & MacDougall-Shackleton, S.A. (2009). The development of geographic song preferences in female Song Sparrows *Melospiza melodia*. *Ethology* **115(6)**: 513–521.
Herrando, S., Brotons, L., Estrada, J., Guallar, S. & Anton, M. eds. (2011). *Atles dels Ocells de Catalunya a l'Hivern 2006–2009*. Institut Català d'Ornitologia & Lynx Edicions, Barcelona. In Catalan.

Herrel, A., Soons, J., Aerts, P., Dirckx, J., Boone, M., Jacobs, P., Adriaens, D. & Podos, J. (2010). Adaptation and function of the bills of Darwin's finches: divergence by feeding type and sex. *Emu* **110**: 39–47.

Herremo, C. (2009). Nya arter för landet: under 2008 påträffades två nya arter för landet. *Vår Fågelvärld* **49** (Suppl.): 180–183. In Swedish.

Herrera, L.G., Hobson, K.A., Martínez, J.C. & Méndez, G. (2006). Tracing the origin of dietary protein in tropical dry forest birds. *Biotropica* **38(6)**: 735–742.

Herrera, L.G., Rodríguez, M. & Hernández, P. (2009). Sources of assimilated protein in a specialized tropical frugivorous bird, the Yellow-throated Euphonia (*Euphonia hirundinacea*). *Auk* **126(1)**: 175–180.

Herrera, M. & Maillard, O. (2007). Registros significativos de aves para el departamento del Beni, Bolivia. *Kempffiana* **3(1)**: 28–34. In Spanish.

Herrera, M. & Vidoz, J.Q. (2009). Registros significativos de aves para el departamento del Beni, Bolivia: Parte 3. *Kempffiana* **5(1)**: 65–71. In Spanish.

Hertzel, A. (1989). First Black-headed Grosbeak record for southeastern Minnesota. *Loon* **61(2)**: 84.

Herzog, S.K. (2009). Distribution of orioles of the *Icterus cayanensis* complex in Bolivia. Unpubl.

Herzog, S.K., Soria, R. & Matthysen, E. (2003). Seasonal variation in avian community composition in a High-Andean *Polylepis* (Rosaceae) forest fragment. *Wilson Bull.* **115**: 438–445.

Hesse, C. (2006). Audio recordings of *Tangara meyerdeschauensee*, from Sandia, Puno, Peru. Xeno-Canto, XC10664. Unpubl.

Hesse, E. (1913). Bemerkung über das weibliche Alterskleid von *Emberiza godlewskii* Tacz. *Orn. Monatsber.* **21**: 161–162. In German.

Hesse, M. (1980a). Viel Freude an der Blauflügelbergtangare (*Compsocoma flavinucha*). *Gefiederte Welt* **104(2)**: 22–23. In German.

Hesse, M. (1980b). Zucht und Haltung der Flammengesichttangare (*Tangara parzudakii lunigera*). *Gefiederte Welt* **104(12)**: 228–230. In German.

Hesse, M. & Hesse, W. (1982). Der Gelbschnabel-Grünorganist *Chlorophonia flavirostris*. *Trochilus* **3(3)**: 76–78. In German.

Hewes, W.J. (1971). Black-throated Sparrow in Virginia. *Atlantic Naturalist* **26**: 78–79.

Hickling, R., Roy, D.B., Hill, J.K., Fox, R. & Thomas, C.D. (2006). The distributions of a wide range of taxonomic groups are expanding polewards. *Global Change Biol.* **12**: 450–455.

Hickman, S. (1981). Evidence for aerodynamic advantages of tail keeling in the Common Grackle. *Wilson Bull.* **93**: 500–505.

Hietakangas, H. & Tenovuo, R. (1965). Über die Wanderungen der Schneeammer (*Plectrophenax nivalis*) im Spätwinter. *Ornis Fenn.* **42**: 69–75. In German.

Hijmans, R.J. & Graham, C.H. (2006). The ability of climate envelope models to predict the effect of climate change on species distributions. *Global Change Biol.* **12**: 2272–2281.

Hill, C.E. & Post, W. (2005). Extra-pair paternity in Seaside Sparrows. *J. Field Orn.* **76(2)**: 119–126.

Hill, C.E., Campbell, S.E., Nordby, J.C., Burt, J.M. & Beecher, M.D. (1999). Song sharing in two populations of Song Sparrows (*Melospiza melodia*). *Behav. Ecol. Sociobiol.* **46(5)**: 341–349.

Hill, C.E., Gjerdrum, C. & Elphick, C.S. (2010). Extreme levels of multiple mating characterize the mating system of the Saltmarsh Sparrow (*Ammodramus caudacutus*). *Auk* **127(2)**: 300–307.

Hill, D.P. (1998). An apparent case of between-brood sibling competition in Chestnut-collared Longspurs, *Calcarius ornatus*. *Can. Field-Nat.* **112(1)**: 161–163.

Hill, D.P. & Gould, L.K. (1997). Chestnut-collared Longspur (*Calcarius ornatus*). No. **288** in: Poole, A. & Gill, F. eds. (1997). *The Birds of North America*. Vol. 8. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.

Hill, G.E. (1986). Severe aggression between female Black-headed Grosbeaks. *Wilson Bull.* **98(3)**: 486–488.

Hill, G.E. (1987). Aging and sexing Black-headed Grosbeaks in alternate plumage. *J. Field Orn.* **58**: 311–317.

Hill, G.E. (1988a). The function of delayed plumage maturation in male Black-headed Grosbeaks. *Auk* **105**: 1–10.

Hill, G.E. (1988b). Age, plumage brightness, territory quality, and reproductive success in the Black-headed Grosbeak. *Condor* **90(2)**: 379–388.

Hill, G.E. (1989). Late spring arrival and dull nuptial plumage: aggression avoidance by yearling males? *Anim. Behav.* **37**: 665–673.

Hill, G.E. (1994). Testis mass and subadult plumage in Black-headed Grosbeaks. *Condor* **96**: 626–630.

Hill, G.E. (1995). Black-headed Grosbeak (*Pheucticus melanocephalus*). No. **143** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 4. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington, D.C. & Philadelphia.

Hill, G.E. & Kevin, J.M. (2006). *Bird Coloration. 1. Mechanisms and Measurements*. Harvard University Press, Cambridge, Massachusetts & London.

Hill, N.P. & Hagan, J.M. (1991). Population trends of some northeastern North American landbirds: a half-centure of data. *Wilson Bull.* **103**: 165–182.

Hilton, G.M., Atkinson, P.W., Gray, G.A.L., Arendt, W.J. & Gibbons, D.W. (2003). Rapid decline of the volcanically threatened Montserrat Oriole. *Biol. Conserv.* **111**: 79–89.

Hilty, S.L. (1974). Notes on birds at swarms of army ants in the highlands of Colombia. *Wilson Bull.* **86**: 479–481.

Hilty, S.L. (1977). *Chlorospingus flavovirens* rediscovered, with notes on other Pacific Colombian and Cauca Valley birds. *Auk* **94(1)**: 44–49.

Hilty, S.L. (1981). Flowering and fruiting periodicity in a premontane rain forest in Pacific Colombia. *Biotropica* **12**: 292–306.

Hilty, S.L. (1985). Distributional changes in the Colombian avifauna: preliminary blue list. Pp. 992–1004 in: Buckley *et al.* (1985).

Hilty, S.L. (1994). *Birds of Tropical America. A Watcher's Introduction to Behavior, Breeding and Diversity*. Chapters Publishing Ltd., Shelburne, Vermont.

Hilty, S.L. (1997). Seasonal distribution of birds at a cloud-forest locality, the Anchicayá Valley, in western Colombia. Pp. 321–343 in: Remsen (1997a).

Hilty, S.L. (1999). Three bird species new to Venezuela and notes on the behaviour and distribution of other poorly known species. *Bull. Brit. Orn. Club* **119**: 220–235.

Hilty, S.L. (2003). *Birds of Venezuela*. 2nd edition. Princeton University Press & Christopher Helm, Princeton & London.

Hilty, S.L. (2009a). Foraging behavior data on *Tangara*, *Chlorochrysa*, *Dacnis*, *Chlorophonia*, and *Euphonia*. Unpubl.

Hilty, S.L. (2009b). Natural history notes and voice recordings of Thraupidae. Unpubl.

Hilty, S.L. & Brown, W.L. (1983). Range extensions of Colombian birds as indicated by the M. A. Carriker, Jr. collection at the National Museum of Natural History, Smithsonian Institution. *Bull. Brit. Orn. Club* **103**: 5–17.

Hilty, S.L. & Brown, W.L. (1986). *A Guide to the Birds of Colombia*. Princeton University Press, Princeton, New Jersey.

Hilty, S.L. & Simon, D. (1977). The Azure-rumped Tanager in Mexico with comparative remarks on the Gray-and-gold Tanager. *Auk* **94**: 605–606.

Hilty, S.L., Parker, T.A. & Silliman, J. (1979). Observations on Plush-capped Finches in the Andes with a description of the juvenil and immature plumages. *Wilson Bull.* **91**: 145–148.

Hinds, D.S. & Calder, W.A. (1973). Temperature regulation of the Pyrrhuloxia and the Arizona Cardinal. *Physiol. Zool.* **46**: 55–71.

Hirokawa, J., Hamada, T. & Higuchi, T. (2003). Return of the Reed Bunting *Emberiza schoeniclus* to its breeding grounds in western Hokkaido. *J. Yamashina Inst. Orn.* **35(1)** (Suppl. 109): 45–51.

Hirschfeld, E. ed. (2007). *Rare Birds Yearbook 2008*. BirdLife International & MagDig Media, Shrewsbury, UK.

Hirschfeld, E. ed. (2008). *Rare Birds Yearbook 2009*. BirdLife International & MagDig Media, Shrewsbury, UK.

Hitch, A.T. & Leberg, P.L. (2007). Breeding distributions of North American bird species moving north as a result of climate change. *Conserv. Biol.* **21**: 534–539.

Hobart, H.H., Gunn, S.J. & Bickham, J.W. (1982). Karyotypes of six species of North American blackbirds (Icteridae: Passeriformes). *Auk* **99**: 514–518.

Hobson, K.A., Greenberg, R., Van Wilgenburg, S.L. & Mettke-Hofmann, C. (2010). Migratory connectivity in the Rusty Blackbird: isotopic evidence from feathers of historical and contemporary specimens. *Condor* **112(4)**: 778–788.

Hock, R. (1973). Weisskehlammer (*Zonotrichia albicollis*) brütet in Hamburg. *Orn. Mitt.* **25(5)**: 96. In German.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. eds. (2005). *Roberts' Birds of Southern Africa*. 7th edition. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Hockey, P.A.R., Sirami, C., Ridley, A.R., Midgley, G.F. & Babiker, H.A. (2011). Interrogating recent range changes in South African birds: confounding signals from land use and climate change present a challenge for attribution. *Divers. Distr.* **17**: 254–261.

Hodgman, T.P., Shriver, W.G. & Vickery, P.D. (2002). Redefining range overlap between the sharp-tailed sparrows of coastal New England. *Wilson Bull.* **114(1)**: 38–43.

Hoffman, K. & Hoffman, M. (1982). Minnesota's first Rusty Blackbird nest. *Loon* **54**: 141–143.

Hoffman, W., Sawicki, R., Thompson, C. & Carrington, M. (1991). Golden-crowned Sparrow appears in Florida. *Florida Field Nat.* **19(1)**: 19–21.

Hoffmann, D., Lopes, L.E. & de Vasconcelos, M.F. (2009). Natural history notes on the Pale-throated Serra-finch (*Embernagra longicauda*) in eastern Brazil. *Orn. Neotropical* **20(4)**: 597–607.

Hofmann, C.M., Cronin, T.W. & Omland, K.E. (2008a). Evolution of sexual dichromatism. 1. Convergent losses of elaborate female coloration in New World orioles (*Icterus* spp.). *Auk* **125(4)**: 778–789.

Hofmann, C.M., Cronin, T.W. & Omland, K.E. (2008b). Evolution of sexual dichromatism. 2. Carotenoids and melanins contribute to sexual dichromatism in New World orioles (*Icterus* spp.). *Auk* **125(4)**: 790–795.

Hofmann, C.M., McGraw, K.J., Cronin, T.W. & Omland, K.E. (2007). Melanin coloration in New World orioles 1: carotenoid masking and pigment dichromatism in the Orchard Oriole complex. *J. Avian Biol.* **38(2)**: 163–171.

Hofslund, P.B. (1969). A nesting record of Lincoln's Sparrow. *Loon* **41**: 93–94.

Hofstad, E., Espmark, Y., Moksnes, A., Haugan, T. & Ingebrigtsen, M. (2002). The relationship between song performance and male quality in Snow Buntings (*Plectrophenax nivalis*). *Can. J. Zool.* **80(3)**: 524–531.

Höhn, E.O. (1984). Buntings. Pp. 349–366 in: Grzimek *et al.* (1984).

Holberton, R.L., Boswell, T. & Hunter, M.J. (2008). Circulating prolactin and corticosterone concentrations during the development of migratory condition in the Dark-eyed Junco, *Junco hyemalis*. *Gen. Comp. Endocrinol.* **155(3)**: 641–649.

Holcomb, L.C. & Twiest, G. (1970). Growth rates and sex ratios of Red-winged Blackbird nestlings. *Wilson Bull.* **82**: 294–303.

Holdgate, M.W. (1957). Gough Island – a possible sanctuary. *Oryx* **4**: 168–176.

Holdgate, M.W. (1958). *Mountains in the Sea*. Macmillan, London.

Holimon, W.C., Doster, R.H., James, D.A., Mlodinow, M.A., Neal, J.C. & Shepherd, W.M. (2004). First documentation that Henslow's Sparrow regularly occurs during the breeding and wintering seasons in Arkansas. *J. Arkansas Acad. Sci.* **58**: 111–116.

Hollom, P.A.D. (1962). Studies of less familiar birds: Rock Bunting and Rock Sparrow. *British Birds* **55**: 158–164.

Hollom, P.A.D., Porter, R.F., Christensen, S. & Willis, I. (1988). *Birds of the Middle East and North Africa*. T.&A.D. Poyser, Calton, UK.

Holloway, J. (1998). The Cretzschmar's Bunting on Stronsay. *Birding World* **11(5)**: 192–193.

Holloway, S. (1996). *The Historical Atlas of Breeding Birds in Britain and Ireland 1875–1900*. T.&A.D. Poyser, London.

Holman, D. (1990). Britain's first Yellow-browed Bunting. *British Birds* **83(10)**: 430–432.

Holmes, R.T. (1986). Foraging patterns of forest birds: male-female differences. *Wilson Bull.* **98(2)**: 196–213.

Holmes, W.G. & Dirks, S.J. (1978). Daily song patterns in Golden-crowned Sparrows at 62° latitude. *Condor* **80(1)**: 92–94.

Holt, E.G. (1928). An ornithological survey of the Serra do Itatiaya, Brazil. *Bull. Amer. Mus. Nat. Hist.* **57**: 251–326.

Holyoak, D.T. & Thibault, J.C. (1975). Introduced tanagers on Tahiti, Society Islands. *Bull. Brit. Orn. Club* **95(3)**: 106.

Hölzinger, J. (1995). The Cinereous Bunting *Emberiza cineracea* breeding on Skyros (Greece). *Zool. Middle East* **11**: 31–36.

Homan, H.J., Linz, G.M., Bleier, W.J. & Carlson, R.B. (1996). Colony-site and nest-site use by Common Grackles in North Dakota. *Wilson Bull.* **108**: 104–114.

Hongell, H. (1977). Yellow-breasted Bunting imitating the songs of the Yellowhammer and Ortolan Bunting. *Ornis Fenn.* **54(3)**: 138.

Honkala, J. & Niiranen, S. (2010). *A Birdwatching Guide to South-east Brazil*. Portal de Bosque Association, Portal de Bosque, Brazil.

Hopkins, M., Baker, W.W. & Snow, F. (2004). Boat-tailed Grackles nest in Ben Hill County: a further extension of breeding range for interior Georgia. *Oriole* **69(3/4)**: 62–63.

Horn, A. & Falls, J.B. (1988). Structure of Western Meadowlark (*Sturnella neglecta*) song repertoires. *Can. J. Zool.* **66(2)**: 284–288.

Horn, A.G., Dickinson, T.E. & Falls, J.B. (1993). Male quality and song repertoires in Western Meadowlarks (*Sturnella neglecta*). *Can. J. Zool.* **71**: 1059–1061.

Horn, H.S. (1968). The adaptive significance of colonial nesting in the Brewer's Blackbird (*Euphagus cyanocephalus*). *Ecology* **49**: 682–694.

Horn, H.S. (1970). Social behavior of nesting Brewer's Blackbirds. *Condor* **72**: 15–23.

Horn, J.A., Ward, M.P., Alessi, M.G., Danner, T.A. & Novak, R.J. (2007). Observation of a Northern Cardinal nest reused by a Gray Catbird in the same season. *Wilson J. Orn.* **119(4)**: 761–762.

Horvath, E.G. & Sullivan, K.A. (1988). Facultative migration in Yellow-eyed Juncos. *Condor* **90(2)**: 482–484.

Horváth, L. (1960). The phylogenetic significance of the brown moustachial stripe of the Yellow Bunting (*Emberiza citrinella* L.). *Ann. Hist.-Nat. Mus. Nat. Hungarici* **52**: 464–467.

Horváth, L. (1977). [New bird genus]. *Búvár* **32(2)**: 71–73. In Hungarian.

Hoset, K.S., Espmark, Y., Lier, M., Haugan, T., Wedege, M.I. & Moksnes, A. (2009). The effects of male mating behaviour and food provisioning on breeding success in Snow Buntings *Plectrophenax nivalis* in the High Arctic. *Polar Biol.* **32(11)**: 1649–1656.

Hoset, K.S., Espmark, Y., Moksnes, A., Haugan, T., Ingebrigtsen, M. & Lier, M. (2004). Effect of ambient temperature on food provisioning and reproductive success in Snow Buntings *Plectrophenax nivalis* in the High Arctic. *Ardea* **92(2)**: 239–246.

Hough, G.E., Nelson, D.A. & Volman, S.F. (2000). Re-expression of songs deleted during vocal development in White-crowned Sparrows, *Zonotrichia leucophrys*. *Anim. Behav.* **60(3)**: 279–287.

Hough, J. (1994). Identification and status of Black-faced Bunting. *Birding World* **7(3)**: 98–101.

Hough, J. (1998). Pallas's Bunting *Emberiza pallasi*: a new species for Nepal and the Indian subcontinent. *Forktail* **14**: 72–73.

Housse, R. (1945). *Las Aves de Chile en su Clasificación Moderna*. Ediciones de la Universidad de Chile, Santiago, Chile. In Spanish.

Houston, C.S. & Houston, M.I. (2001). Slow northward spread of the Lark Sparrow. *Blue Jay* **59(1)**: 40–42.
Houtman, A.M. & Falls, J.B. (1994). Negative assortative mating in the White-throated Sparrow, *Zonotrichia albicollis*: the role of mate choice and intra-sexual competition. *Anim. Behav.* **48(2)**: 377–383.
Howe, H.F. (1976). Egg size, hatching asynchrony, sex, and brood reduction in the Common Grackle. *Ecology* **57**: 1195–1207.
Howe, H.G. (1979). Evolutionary aspects of parental care in the Common Grackle *Quiscalus quiscula* L. *Evolution* **33**: 41–51.
Howell, S.N.G. (1989). Additional information on the birds of the Campeche Bank, Mexico. *J. Field Orn.* **60**: 504–509.
Howell, S.N.G. (1999). *A Bird-finding Guide to Mexico*. Comstock Publishing Associates of Cornell University Press, Ithaca, New York.
Howell, S.N.G. (2004). An update on status of birds from Isla Cozumel, Mexico. *Cotinga* **22**: 15–19.
Howell, S.N.G. (2010). *Molt in North American Birds*. Houghton Mifflin Harcourt, Boston & New York.
Howell, S.N.G. & Sibley, D.A. (1998). Variation in the sharp-tailed sparrows. *Western Birds* **29(2)**: 131–132.
Howell, S.N.G. & Webb, S. (1995). *A Guide to the Birds of Mexico and Northern Central America*. Oxford University Press, Oxford, UK.
Howell, S.N.G., Webb, S. & de Montes, B.M. (1992). Colonial nesting of the Orange Oriole. *Wilson Bull.* **104**: 189–190.
Howell, T.R. (1957). Birds of a second growth rain forest area of Nicaragua. *Condor* **59**: 73–111.
Howell, T.R. (1964). Mating behavior of the Montezuma Oropendola. *Condor* **66**: 511.
Howell, T.R. (1965). New subspecies of birds from the lowland pine savanna of northeastern Nicaragua. *Auk* **82**: 438–464.
Howell, T.R. (1972). Birds of the lowland pine savanna of northeastern Nicaragua. *Condor* **74**: 316–340.
Howell, T.R. & Bartholomew, G.A. (1952). Experiments on the mating behavior of the Brewer Blackbird. *Condor* **54**: 140–151.
Howell, T.R. & Bartholomew, G.A. (1954). Experiments on social behavior in nonbreeding Brewer Blackbirds. *Condor* **56**: 33–37.
Hoy, G. (1968). *Icterus jamacaii paraguayae* (Brodkorb): un icterido (Aves) nuevo para la fauna argentina. *Neotrópica* **14**: 118. In Spanish.
Hoy, G. (1971). Über Brutbiologie und Eier einiger Vögel aus Nordwest-Argentinien II. *J. Orn.* **112**: 158–163. In German.
Hoy, G. (1978). *Sicalis flaveola koenigi* (Aves, Fringillidae), eine neue Subspecies des Safranfinken aus den Anden. *Stuttgarter Beitr. Naturk.* **305**: 1–4. In German.
Hoy, G. (1980). Notas nidobiológicas del noroeste argentino. Part 2. *Continentes y Organismos Terrestres (Sec. C)* **39**: 63–66. In Spanish with English summary.
Hoy, G. & Ottow, J. (1964). Biological and oological studies of the Molothrine Cowbirds (Icteridae) of Argentina. *Auk* **81**: 186–203.
Hoy, G., Contino, F.A. & Blake, E.R. (1963). Adendas a la avifauna argentina. *Bol. Acad. Nac. Cienc.* **43**: 295–308. In Spanish.
del Hoyo, J. (2005). Glossy Flowerpiercer, *Diglossa lafresnayii*: a male feeding from two hummingbird feeders. Video clip. URL: http://ibc.lynxeds.com/video/glossy-flowerpiercer-diglossa-lafresnayii/male-feeding-two-hummingbird-feeders (download 05 October 2010).
Huanca, N.E., Hosner, P.A. & Hennessey, A.B. (2009). Nests, vocalizations, and conservation status of endangered Cochabamba Mountain-finches (*Compsospiza garleppi*). *J. Field Orn.* **80**: 215–223.
Hubbard, J.P. (1965). The summer birds of the forests of the Mogollon Mountains, New Mexico. *Condor* **67**: 404–415.
Hubbard, J.P. (1972a). Notes on Arizona birds. *Nemouria* **5**: 1–22.
Hubbard, J.P. (1972b). The nomenclature of *Pipilo aberti* Baird (Aves: Fringillidae). *Proc. Biol. Soc. Washington* **85**: 131–138.
Hubbard, J.P. (1975). Geographic variation in non-California populations of the Rufous-crowned Sparrow. *Nemouria* **15**: 1–28.
Hubbard, J.P. (1977). The status of Cassin's Sparrow in New Mexico and adjacent states. *Amer. Birds* **31(5)**: 933–941.
Hubbard, J.P. & Crossin, R.S. (1974). Notes on northern Mexican birds: an expedition report. *Nemouria* **14**: 1–41.
Hubbard, J.P. & Hubbard, C.L. (1969). Meadowlarks feeding on road-kills. *Wilson Bull.* **81**: 107–108.
Huber, S.K. & Podos, J. (2006). Beak morphology and song features covary in a population of Darwin's finches (*Geospiza fortis*). *Biol. J. Linn. Soc.* **88(3)**: 489–498.
Huber, S.K., De Leon, L.F., Hendry, A.P., Bermingham, E. & Podos, J. (2007). Reproductive isolation of sympatric morphs in a population of Darwin's finches. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **274**: 1709–1714.
Huber, W. (1929). A northern form of *Tachyphonus delatrii* from Nicaragua. *Proc. Acad. Nat. Sci. Philadelphia* **81**: 471–472.
Huber, W. (1932). Birds collected in northeastern Nicaragua in 1922. *Proc. Acad. Nat. Sci. Philadelphia* **84**: 205–249.
Hudon, J. (1991). Unusual carotenoid use by the Western Tanager (*Piranga ludoviciana*) and its evolutionary implications. *Can. J. Zool.* **69**: 2311–2320.
Hudon, J. (1999). Western Tanager (*Piranga ludoviciana*). No. **432** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 11. The Birds of North America Inc., Philadelphia, Pennsylvania.
Hudon, J. & Muir, A.D. (1996). Characterization of the reflective materials and organelles in the bright irides of North American blackbirds (Icterinae). *Pigment Cell Res.* **9(2)**: 96–104.
Hudson, M.A., Leckie, S., Gahbauer, M. & Frei, B. (2008). Unusually extensive preformative molt in hatching-year Song Sparrows. *North Amer. Bird Bander* **33(1)**: 1–6.
Hudson, P.J., Cattadori, I.M., Boag, B. & Dobson, A.P. (2006). Climate disruption and parasite-host dynamics: patterns and processes associated with warming and the frequency of extreme climatic events. *J. Helminthol.* **80**: 175–182.
Hudson, W.H. (1870). Letter from Mr. W. H. Hudson. *Proc. Zool. Soc. London* **1870(1)**: 112–114.
Hudson, W.H. (1920). *Birds of La Plata*. 2 vols. Dent, London & Toronto.
Hughes, E. (1992). Yellow-shouldered Grassquit. *Gosse Bird Club Broadsheet* **59**: 24.
Hughes, J.P., Robel, R.J., Kemp, K.E. & Zimmerman, J.L. (1999). Effects of habitat on Dickcissel abundance and nest success in conservation reserve program fields in Kansas. *J. Wildl. Management* **63**: 523–529.
Hughes, R.A. (1970). Notes on the birds of the Mollendo district, southwest Peru. *Ibis* **112**: 285–331.
Hughes, R.A. (1980). Midwinter breeding by some birds in the High Andes of southern Peru. *Condor* **82(2)**: 229.
Humbird, S.K. & Neudorf, D.L.H. (2008). The effects of food supplementation on extraterritorial behavior in female Northern Cardinals. *Condor* **110(2)**: 392–395.
Humphrey, P.S., Bridge, D., Reynolds, P.W. & Peterson, R.T. (1970). *Birds of Isla Grande (Tierra del Fuego)*. Smithsonian Institution, Washington, D.C.
Humphreys, S., Elphick, C.S., Gjerdrum, C. & Rubega, M.A. (2007). Testing the function of the domed nests of Saltmarsh Sharp-tailed Sparrows. *J. Field Orn.* **78(2)**: 152–158.
Hunn, E.S. (1978). Black-throated Sparrow vagrants in the Pacific northwest. *Western Birds* **9(2)**: 85–89.
Huntley, B., Barnard, P., Altwegg, R., Chambers, L., Coetzee, B.W.T., Gibson, L., Hockey, P.A.R., Hole, D.G., Midgley, G.F., Underhill, L.G. & Willis, S.G. (2010). Beyond bioclimatic envelopes: dynamic species' range and abundance modelling in the context of climatic change. *Ecography* **33**: 1–6.
Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. (2007). *A Climatic Atlas of European Breeding Birds*. Durham University, Royal Society for the Protection of Birds & Lynx Edicions, Barcelona.
Hurley, R.J. & Franks, E.C. (1976). Changes in the breeding ranges of two grassland birds. *Auk* **93(1)**: 108–115.
Hurly, T.A. & Robertson, R.J. (1984). Aggressive and territorial behaviour in female Red-winged Blackbirds. *Can. J. Zool.* **62**: 148–153.
Hurly, T.A. & Robertson, R.J. (1985). Do female Red-winged Blackbirds limit harem size? *Auk* **102**: 205–209.
Hurly, T.A., Ratcliffe, L., Weary, D.M. & Weisman, R. (1992). White-throated Sparrows (*Zonotrichia albicollis*) can perceive pitch change in conspecific song by using the frequency ratio independent of the frequency difference. *J. Comp. Psychol.* **106(4)**: 388–391.
Hurly, T.A., Ratcliffe, L. & Weisman, R. (1990). Relative pitch recognition in White-throated Sparrows, *Zonotrichia albicollis*. *Anim. Behav.* **40(1)**: 176–181.
Hurly, T.A., Weisman, R.G., Ratcliffe, L. & Johnsrude, I.S. (1991). Absolute and relative pitch production in the song of the White-throated Sparrow (*Zonotrichia albicollis*). *Bioacoustics* **3(2)**: 81–91.
Hurrell, J.W. & Trenberth, K.E. (2010). Climate change. Pp. 9–20 in: Møller, Fiedler & Berthold (2010).
Husby, A., Kruuk, L.E.B. & Visser, M.E. (2009). Decline in the frequency and benefits of multiple brooding in Great Tits as a consequence of a changing environment. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **276**: 1845–1854.
Hussell, D.J.T. (1972). Factors affecting clutch size in Arctic passerines. *Ecol. Monogr.* **42**: 317–364.
Hussell, D.J.T. & Montgomerie, R. (2002). Lapland Longspur (*Calcarius lapponicus*). No. **656** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 17. The Birds of North America Inc., Philadelphia, Pennsylvania.
Hustings, F., Post, F. & Schepers, F. (1990). Verdwijnt de Grauwe Gors *Miliaria calandra* als broedvogel uit Nederland? *Limosa* **63**: 103–111. In Dutch.
Hutto, R.L. (1980). Winter habitat distribution of migratory land birds in western Mexico, with special reference to small foliage-gleaning insectivors. Pp. 181–203 in: Keast, A. & Morton, E.S. eds. (1980). *Migrant Birds in the Neotropics: Ecology, Behavior, Distribution, and Conservation*. Smithsonian Institution Press, Washington D.C.
Hutto, R.L. (1989). The effect of habitat alteration on migratory land birds in a west Mexico tropical deciduous forest. A conservation perspective. *Conserv. Ecol.* **3(2)**: 138–148.
Hutto, R.L. (1994). The composition and social organization of mixed-species flocks in a tropical deciduous forest in western Mexico. *Condor* **96(1)**: 105–118.
Hwang Bo-Yeon & Park Shi-Ryong (1996). Neighbor-stranger discrimination of Yellow-throated Buntings (*Emberiza elegans*) and Gray-headed Buntings (*Emberiza fucata*) to playback of song. *Korean J. Zool.* **39(1)**: 89–97.
Hyde, A.S. (1939). *The Life History of Henslow's Sparrow* Passerherbulus henslowi *(Audubon)*. Miscellaneous Publications **41**. University of Michigan Museum of Zoology, University of Michigan Press, Ann Arbor, Michigan.
Hylton, R. & Godard, R.D. (2001). Song properties of Indigo Buntings in open and forested habitats. *Wilson Bull.* **113(2)**: 243–245.
Ibáñez-Hernández, G. (2000). Nuevos registros de aves para la costa este del estado de Yucatán, México. *Cotinga* **14**: 52–56. In Spanish.
Ibarra Portillo, R. (2009). Registro de "Cacique Mexicano" (*Cacicus melanicterus*) en El Salvador. *Zeledonia* **13(1)**: 6–15. In Spanish.
Igl, L.D. (2007). First record of a Brewer's Sparrow in Minnesota during the breeding season. *Loon* **79(2)**: 108–110.
Igl, L.D. & Johnson, D.H. (1995). Dramatic increase of Le Conte's Sparrow in Conservation Reserve Program fields in the northern Great Plains. *Prairie Nat.* **27(2)**: 89–94.
Igl, L.D. & Johnson, D.H. (1999). Le Conte's Sparrows breeding in Conservation Reserve Program fields: precipitation and patterns of population change. *Studies Avian Biol.* **19**: 178–186.
Ihering, H. von (1900). Catálogo critico-comparativo dos ninhos e ovos das aves do Brasil. *Rev. Mus. Paulista* **4**: 191–300. In Portuguese.
Ihering, H. von (1902). Contribuições para o conhecimento da ornitologia de São Paulo. *Rev. Mus. Paulista* **9**: 411–448. In Portuguese.
Iijima, K. (1973). A comparative study on the wintering ecology of four species of *Emberiza* in the basin of Chikuma River. *Misc. Rep. Yamashina Inst. Orn.* **7(2)**: 179–201. In Japanese with English summary.
Il'ichev, V.D. (1962). [Difference of osteology in the buntings *Emberiza leucocephalos* Gm. and *Emberiza citrinella* L.]. *Nauchn. Dokl. Vyssh. Shk. Biol. Nauki* **196(12)**: 49–54. In Russian.
Iliff, M.J. (2003). A vagrant Bell's Sparrow in Baja California Sur. *Western Birds* **34(4)**: 256–259.
Ilinskii, I.V. (1976). [On the reproduction biology of the Taiga Bunting (*Emberiza tristrami*)]. *Vest. Leningr. Univ. Ser. Biol.* **1976(2)**: 42–48. In Russian.
Ilinskii, I.V. (1981). [Changes in the bird fauna of Bikin River Basin (*Emberiza* as example) due to man's influences]. Pp. 131–134 in: Bromlei, G.F., Kostenko, V.A., Yudin, V.G. & Nechaev, V.A. eds. (1981). *Redkie i ischezayushchie zhivotnye sushi Dal'nego Vostoka SSSR (materialy konferentsii)*. [Far-East Scientific Center], Akademiya nauk SSSR, Vladivostok. In Russian.
Imberti, S. (2003). Notes on the distribution and natural history of some birds in Santa Cruz and Tierra del Fuego provinces, Patagonia, Argentina. *Cotinga* **19**: 15–24.
Imberti, S. (2005). *Aves de Los Glaciares. Inventario Ornitológico del Parque Nacional Los Glaciares, Santa Cruz, Patagonia, Argentina*. Aves Argentinas & Administración de Parques Nacionales, Buenos Aires, Argentina. In Spanish.
Imberti, S. (2006). Field notes on the birds of Isla Riesco, Chile. Unpubl.
Ingels, J. (1971a). Breeding Mrs. Wilson's Tanagers and Purple-throated Euphonias. *Avicult. Mag.* **77**: 11–14.
Ingels, J. (1971b). Notes on the breeding of tanager hybrids. *Avicult. Mag.* **77**: 129–131.
Ingels, J. (1974a). Rare tanagers imported into Belgium and the Netherlands in 1973. *Avicult. Mag.* **80**: 20–25.
Ingels, J. (1974b). The ear-covert display of the Golden-eared Tanager *Tangara chrysotis*. *Avicult. Mag.* **80**: 109–112.
Ingels, J. (1974c). The behavior and nesting of the Turquoise Tanager (*Tangara mexicana*). *Avicult. Mag.* **80**: 168–171.
Ingels, J. (1975). Rare tanagers imported into Belgium and the Netherlands during 1974. *Avicult. Mag.* **81**: 98–104.
Ingels, J. (1977). Unusual nesting of the Silver-beaked Tanager *Ramphocelus carbo*. *Avicult. Mag.* **83**: 85–87.
Ingels, J. (1978). The nesting of three tanagers common in French Guiana. *Avicult. Mag.* **84**: 105–110.
Ingels, J. (1979). Remarks on specimens, holotype, description and subspecies of *Chlorophonia flavirostris* Sclater. *Bull. Brit. Orn. Club* **99**: 77–80.
Ingels, J. (1981). The plumage of the Blue-backed Tanager, *Cyanicterus cyanicterus*. *Gerfaut* **71**: 157–162.
Ingels, J. (1983). Habitat preferences of Blue-grey, *Thraupis episcopus*, and Palm, *Thraupis palmarum*, Tanagers in Surinam. *Gerfaut* **73(1)**: 85–97.
Ingels, J. (1985). Beobachtungen an Blautangaren (*Thraupis episcopus*) in Suriname. *Trochilus* **6(4)**: 134–138. In German.
Ingels, J. (1987). Beobachtungen an Silberschnabeltangaren (*Ramphocelus carbo*) in Suriname. *Trochilus* **8(1)**: 15–18. In German.
Ingels, J. (2007). Additional information on the breeding biology of the Black-and-white Tanager (*Conothraupis speculigera*) in Ecuador. *Bol. Soc. Antioqueña Orn.* **17(2)**: 98–103.
Ingels, J., Cleere, N. & Pelletier, V. (2003). Noteworthy observations on some French Guianan birds. *Alauda* **71(1)**: 59–67.
Ingels, J., Maroy, J. & Norgaard-Olesen, E. (1976). Notes on establishing and breeding euphonies. *Avicult. Mag.* **82**: 8–11.
Ingold, D.J., Dooley, J.L. & Cavender, N. (2009). Return rates of breeding Henslow's Sparrows on mowed versus unmowed areas on a reclaimed surface mine. *Wilson J. Orn.* **121(1)**: 194–197.

Ingold, J.L. (1993). Blue Grosbeak (*Guiraca caerulea*). No. **79** in: Poole, A.F. & Gill, F.B. eds. (1993). *The Birds of North America*. Vol. 2. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington, D.C. & Philadelphia.
Íñigo-Elías, E.E., Rosenberg, K.V. & Wells, J.V. (2002). The danger of beauty. *Birdscope* **16(3)**: 1, 14–15.
Innes, R.C. (1979). Club-tipped feathers in some South American tanagers. *Auk* **96**: 808–809.
Irving, L. (1960). Birds of Anaktuvuk Pass, Kobuk, and Old Crow: a study in Arctic adaption. *Bull. US Natl. Mus.* **217**: 1–409.
Irving, L. (1961). The migration of Lapland Longspurs to Alaska. *Auk* **78**: 327–342.
Irwin, D.E., Rubtsov, A.S. & Panov, E.N. (2009). Mitochondrial introgression and replacement between Yellowhammers (*Emberiza citrinella*) and Pine Buntings (*Emberiza leucocephalos*) (Aves: Passeriformes). *Biol. J. Linn. Soc.* **98(2)**: 422–438.
Irwin, M.P.S. (1981). *The Birds of Zimbabwe*. Quest Publishing, Salisbury [Harare], Zimbabwe.
Irwin, R.E. (1989). "Spotted" Towhee in Michigan. *Jack-Pine Warbler* **67(2)**: 72.
Irwin, R.E. (1990). Directional sexual selection cannot explain variation in song repertoire size in the New World blackbirds (Icterinae). *Ethology* **85**: 212–224.
Irwin, R.E. (1994). The evolution of plumage dichromatism in the New World blackbirds: social selection on female brightness? *Amer. Naturalist* **144**: 890–907.
Isenmann, P. (1990). Comportement alimentaire original chez le Bruant des Roseaux, *Emberiza schoeniclus witherbyi*, sur l'île de Majorque. *Nos Oiseaux* **40(5)**: 308. In French.
Isenmann, P. & Moali, A. (2000). *Oiseaux d'Algérie. Birds of Algeria*. Société d'Études Ornithologiques de France, Paris. In French and English.
Ishimoto, A. (1992). Sexing of juv. (1W) Black-faced Bunting *Emberiza spodocephala personata*. *J. Yamashina Inst. Orn.* **24(1)**: 1–12. In Japanese with English summary.
Isler, M.F. & Isler, P.R. (1999). *The Tanagers: Natural History, Distribution, and Identification*. 2nd edition. Smithsonian Institution Press, Washington, D.C.
Ivor, H.R. (1944). Bird study and semi-captive birds: the Rose-breasted Grosbeak. *Auk* **56**: 91–104.
Jackson, J.A. (1985). A mutualistic feeding association between Boat-tailed Grackles and Pied-billed Grebes. *Condor* **87**: 147–148.
Jackson, M. (1955). The song of the Oregon Towhee. *Victorian Naturalist* **12(2)**: 16–17.
Jackson, N.H. & Roby, D.D. (1992). Fecundity and egg-laying patterns of captive yearling Brown-headed Cowbirds. *Condor* **94**: 585–589.
Jacobs, M.D. & Walker, J.S. (1999). Density estimates of birds inhabiting fragments of cloud forest in southern Ecuador. *Bird Conserv. Int.* **9(1)**: 73–79.
Jacobsen, F., Friedman, N.R. & Omland, K.E. (2010). Congruence between nuclear and mitochondrial DNA: combination of multiple nuclear introns resolves a well-supported phylogeny of New World orioles (*Icterus*). *Mol. Phylogen. Evol.* **56**: 419–427.
Jacomelli, J.A. (2008). Audio recordings of *Nemosia rourei* from Caetés, Vargem Alta, Espirito Santo, Brazil. Xeno-Canto, 31887. Unpubl.
Jahn, H. (1939). *Emberiza variabilis* Temminck und *Falco s. subbuteo* L.: Brutvögel auf Hokkaido. *Orn. Monatsber.* **47**: 148. In German.
Jahn, H. (1942). Zur Oekologie und Biologie der Vögel Japans. *J. Orn.* **90(1/2)**: 6–302. In German.
Jahn, O., Moore, J.V., Valenzuela, P.M., Krabbe, N., Coopmans, P., Lysinger, M. & Ridgely, R.S. (2002). *The Birds of Northwest Ecuador*. Vol. 2. The lowlands and lower foothills. John V. Moore Nature Recordings, San José, California.
Jaksic, F.M. (1997). *Ecología de los Vertebrados de Chile*. Ediciones Universidad Católica de Chile, Santiago, Chile. In Spanish.
Jaksic, F.M. & Lazo, I. (1999). Response of a bird assemblage in semiarid Chile to the 1997–1998 El Niño. *Wilson Bull.* **111**: 527–535.
James, F.C. (1983). Environmental component of morphological differentiation in birds. *Science (Washington, D.C.)* **221**: 184–186.
Jannssen, R.B. (1974). A Black-throated Sparrow in Minnesota. *Loon* **46(3)**: 100.
Janos, M. (1991). First record of Pyrrhuloxia (*Cardinalis sinuatus*) from Colorado. *CFO Journal* **25(2)**: 41–42.
Janzen, D. (1971). Birds and the ant × acacia interaction in Central America, with notes on birds and other myrmecophytes. *Condor* **71**: 240–256.
Janzen, P. (2002). Revisions to the status of the Rufous-crowned Sparrow in Kansas. *Kansas Orn. Soc. Bull.* **53(3)**: 29–33.
Jaramillo, A. (2003). *Birds of Chile*. Princeton University Press, Princeton, New Jersey.
Jaramillo, A. & Burke, P. (1999). *New World Blackbirds. The Icterids*. Christopher Helm & A&C Black Publishers, London.
Jarvi, E. & Marjakangas, A. (1985). Observations on winter resting sites of the Yellowhammer *Emberiza citrinella*. *Ornis Fenn.* **62(4)**: 171.
Jawor, J.M. (2007). Testosterone in Northern Cardinals (*Cardinalis cardinalis*): possible influence of prolonged territorial behavior. *Auk* **124(1)**: 331–338.
Jawor, J.M. & Breitwisch, R. (2003). A unique ornament display in female Northern Cardinals. *Wilson Bull.* **115(4)**: 464–467.
Jawor, J.M. & Breitwisch, R. (2004). Multiple ornaments in male Northern Cardinals, *Cardinalis cardinalis*, as indicators of condition. *Ethology* **110(2)**: 113–126.
Jawor, J.M. & Breitwisch, R. (2006). Is mate provisioning predicted by ornamentation? A test with Northern Cardinals (*Cardinalis cardinalis*). *Ethology* **112(9)**: 888–895.
Jawor, J.M. & Gray, N. (2003). Use of Northern Cardinal nest by fledgling Carolina Wrens. *Wilson Bull.* **115**: 95–96.
Jawor, J.M. & MacDougall-Shackleton, S.A. (2008). Seasonal and sex-related variation in song control nuclei in a species with near-monomorphic song, the Northern Cardinal (*Cardinalis cardinalis*). *Neurosci. Letters* **443(3)**: 169–173.
Jawor, J.M., Gray, N., Beall, S.M. & Breitwisch, R. (2004). Multiple ornaments correlate with aspects of condition and behaviour in female Northern Cardinals, *Cardinalis cardinalis*. *Anim. Behav.* **67(5)**: 875–882.
Jawor, J.M., Linville, S.U., Beall, S.M. & Breitwisch, R. (2003). Assortative mating by multiple ornaments in Northern Cardinals (*Cardinalis cardinalis*). *Behav. Ecol.* **14(4)**: 515–520.
Jeffrey-Smith, J. (1956). *Bird-watching in Jamaica*. The Pioneer Press, Kingston, Jamaica.
Jeffs, C. & Evans, A. (2004). Cirl Bunting: the road to recovery. *Biologist (London)* **51(4)**: 189–193.
Jehl, J.R. (1968). The breeding biology of Smith's Longspur. *Wilson Bull.* **80**: 123–149.
Jehl, J.R. (2004). *Birdlife of the Churchill Region: Status, History, Biology*. Trafford Publishing, Victoria, British Columbia.
Jehl, J.R. & Hussell, D.J.T. (1966). Incubation periods of some subarctic birds. *Can. Field-Nat.* **80**: 179–180.
Jehl, J.R. & Smith, B.A. (1970). *Birds of the Churchill Region, Manitoba*. Special Publication **1**. Manitoba Museum of Man and Nature, Winnipeg, Manitoba.
Jehle, G., Savidge, J.A. & Kotliar, N.B. (2006). Green-tailed Towhee response to prescribed fire in montane shrubland. *Condor* **108(3)**: 634–646.
Jenkins, C.N., Powell, R.D., Bass, O.L. & Pimm, S.L. (2003). Demonstrating the destruction of the habitat of the Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*). *Anim. Conserv.* **6(1)**: 29–38.
Jenkins, K.D. & Cristol, D.A. (2002). Evidence of differential migration by sex in White-throated Sparrows (*Zonotrichia albicollis*). *Auk* **119(2)**: 539–543.
Jenkins, R.E. (1969). *Ecology of Three Species of Saltators with Special Reference to their Frugivorous Diet*. PhD thesis, Harvard University, Cambridge, Massachusetts.
Jenni, L. & Kéry, M. (2003). Timing of autumn bird migration under climate change: advances in long-distance migrants, delays in short-distance migrants. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **270**: 1467–1471.
Jennings, M.C. (2010). *Atlas of the Breedings Birds of Arabia*. Fauna of Arabia **25**. King Abdulaziz City for Science and Technology, Saudi Wildlife Commission & Senckenberg Forschungsinstitut und Naturmuseum, Riyadh & Frankfurt am Main.
Jennings, M.R. (1984). Predation on Sonoran spotted whiptails, *Cnemidophorus sonorae* (Teiidae), by the Great-tailed Grackle. *Southwest. Nat.* **29**: 514.
Jennings, S., Gardali, T., Seavy, N.E. & Geupel, G.R. (2009). Effects of mist netting on reproductive performance of Wrentits and Song Sparrows in central coastal California. *Condor* **111(3)**: 488–496.
Jenouvrier, S., Barbraud, C. & Weimerskirch, H. (2003). Effects of climate on the temporal population dynamics of Southern Fulmars. *J. Anim. Ecol.* **72**: 576–587.
Jenouvrier, S., Caswell, H., Barbraud, C., Holland, M., Stroeve, J. & Weimerskirch, H. (2009). Demographic models and IPCC climate projections predict the decline of an Emperor Penguin population. *Proc. Natl. Acad. Sci. USA* **106**: 1844–1847.
Jenouvrier, S., Weimerskirch, H., Barbraud, C., Park Young-Hyang & Cazelles, B. (2005). Evidence of a shift in the cyclicity of Antarctic seabird dynamics linked to climate. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **272**: 887–895.
Jensen, A.A. (1988). *Sistemas Indígenas de Classificação de Aves: Aspectos Comparativos, Ecológicos e Evolutivos*. Museu Paraense Emilio Goeldi, Belém, Brazil. In Portuguese.
Jensen, W.E. & Cully, J.F. (2005). Geographic variation in Brown-headed Cowbird (*Molothrus ater*) parasitism on Dickcissels (*Spiza americana*) in Great Plains tallgrass prairie. *Auk* **122(2)**: 648–660.
Jensen, W.E. & Finck, E.J. (2004). Edge effects on nesting Dickcissels (*Spiza americana*) in relation to edge type of remnant tallgrass prairie in Kansas. *Amer. Midl. Nat.* **151(1)**: 192–199.
Jerrard, J. (2005). Breeding the Golden-breasted Bunting. *Avicult. Mag.* **111**: 161–163.
Jetz, W., Wilcove, D.S. & Dobson, A.P. (2007). Projected impacts of climate and land-use change on the global diversity of birds. *PLoS Biol.* **5**: 1211–1219.
van der Jeugd, H.P., Eichhorn, G., Litvin, K.E., Stahl, J., Larsson, K., van der Graaf, A.J. & Drent, R.H. (2009). Keeping up with early springs: rapid range expansion in an avian herbivore incurs a mismatch between reproductive timing and food supply. *Global Change Biol.* **15(5)**: 1057–1071.
Jiang Yunlei, Gao Wei, Lei Fumin, Wang Haitao, Wan Dongmei & Zhao Jiang (2008). Nesting biology and population dynamics of Jankowski's Bunting *Emberiza jankowskii* in Western Jilin, China. *Bird Conserv. Int.* **18(2)**: 153–163.
Jiguet, F. (2003). Hybrid Yellowhammer × Pine Bunting in central France in May–June 2002. *Dutch Birding* **25(5)**: 323–326.
Jiguet, F. (2007). Première mention française du Bruant à sourcils jaunes *Emberiza chrysophrys*. *Ornithos* **14(3)**: 172–175. In French with English summary.
Jiguet, F. & Julliard, R. (2005). The status and distribution of the Cirl Bunting in France in 2003. *British Birds* **98(4)**: 216–217.
Jiguet, F., Gadot, A.S., Julliard, R., Newson, S.E. & Couvet, D. (2007). Climate envelope, life history traits and the resilience of birds facing global change. *Global Change Biol.* **13**: 1672–1684.
Jiguet, F., Julliard, R., Thomas, C.D., Dehorter, O., Newson, S.E. & Couvet, D. (2006). Thermal range predicts bird population resilience to extreme high temperatures. *Ecol. Letters* **9(12)**: 1321–1330.
Joern, A. (1988). Foraging behavior and switching by the Grasshopper Sparrow *Ammodramus savannarum* searching for multiple prey in a heterogenous environment. *Amer. Midl. Nat.* **119(2)**: 225–234.
Joern, A. (2002). Context-dependent foraging and enemy-free space: Grasshopper Sparrows (*Ammodramus savannarum*) searching for grasshoppers (Acrididae). *Ecoscience* **9(2)**: 231–240.
Johansen, H. (1905). *Emberiza cia godlewskii* Tacz. bei Tomsk erbeutet. *Orn. Jahrb.* **16**: 201–205. In German.
Johansen, H. (1944). Die Vogelfauna Westsibiriens – Fringillidae. *J. Orn.* **92**: 67–92.
Johansson, S. (1980). Strömstare tar adulta bäcksländor på snön. *Vår Fågelvärld* **39(2)**: 103. In Swedish with English summary.
Johnsen, A., Rindal, E., Ericson, P.G.P., Zuccon, D., Kerr, K.C.R., Stoeckle, M.Y. & Lifjeld, J.T. (2010). DNA barcoding of Scandinavian birds reveals divergent lineages in trans-Atlantic species. *J. Orn.* **151(3)**: 565–578.
Johnson, A.W. & Goodall, J.D. (1967). *The Birds of Chile and Adjacent Regions of Argentina, Bolivia and Peru*. Part 2. Platt Establecimientos Gráficos, Buenos Aires, Argentina.
Johnson, B. & Usyk, L.M. (2009). Unusual recovery and longevity record of a banded Le Conte's Sparrow. *North Amer. Bird Bander* **34(2)**: 46–49.
Johnson, E.I., DiMiceli, J.K. & Stouffer, P.C. (2009). Timing of migration and patterns of winter settlement by Henslow's Sparrows. *Condor* **111(4)**: 730–739.
Johnson, E.I., DiMiceli, J.K., Stouffer, P.C. & Brooks, M.E. (2011). Habitat use does not reflect habitat quality for Henslow's Sparrows (*Ammodramus henslowii*) wintering in fire-managed longleaf pine savannas. *Auk* **128(3)**: 564–576.
Johnson, J. (1998). Seasonal migration and site fidelity in Cape Buntings *Emberiza capensis*. *Safring News* **27**: 33–34.
Johnson, K. & Peer, B.D. (2001). Great-tailed Grackle (*Quiscalus mexicanus*). No. **576** in: Poole, A.F. & Gill, F.B. eds. (2001). *The Birds of North America*. Vol. 15. The Birds of North America Inc., Philadelphia, Pennsylvania.
Johnson, K., DuVal, E., Kielt, M. & Hughes, C. (2000). Male mating strategies and the mating system of Great-tailed Grackles. *Behav. Ecol.* **11(2)**: 132–141.
Johnson, K.P. & Lanyon, S.M. (1999). Molecular systematics of the grackles and allies, and the effect of additional sequence (*Cyt b* and *ND2*). *Auk* **116(3)**: 759–768.
Johnson, M.J. & van Riper, C. (2004). Brown-headed Cowbird parasitism of the Black-throated Sparrow in central Arizona. *J. Field Orn.* **75(3)**: 303–311.
Johnson, M.J., van Riper, C. & Pearson, K.M. (2002). Black-throated Sparrow (*Amphispiza bilineata*). No. **637** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.
Johnson, N.K. & Brush, A.H. (1972). Analysis of polymorphism in the Sooty-capped Tanager. *Syst. Zool.* **21**: 245–262.
Johnson, N.K. & Marten, J.A. (1992). Macrogeographic patterns of morphometric and genetic variation in the Sage Sparrow complex. *Condor* **94(1)**: 1–19.
Johnson, O.W. & Ohmart, R.D. (1973). Some features of water economy and kidney microstructure in the Large-billed Savannah Sparrow (*Passerculus sandwichensis rostratus*). *Physiol. Zool.* **46(4)**: 276–284.
Johnson, R.R. & Haight, L.T. (1996). Canyon Towhee (*Pipilo fuscus*). No. **264** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Johnson, V.R. (1964). Three winter records in the central valley of California. *Condor* **66**: 517–518.
Johnston, D.W. (1965). Ecology of the Indigo Bunting in Florida. *Quart. J. Florida Acad. Sci.* **28**: 199–211.
Johnston, D.W. (1967). The identification of autumnal Indigo Buntings. *Bird-Banding* **38**: 211–214.
Johnston, D.W. (1970). Age and sex distribution of Indigo Buntings. *Bird-Banding* **41**: 113–118.
Johnston, D.W. (1993). Unusually late nesting of a Rufous-sided Towhee. *Raven* **64(2)**: 88–89.
Johnston, D.W. & Downer, A.C. (1968). Migratory features of the Indigo Bunting in Jamaica and Florida. *Bird-Banding* **39**: 277–293.
Johnston, R.F. (1954). Variation in breeding season and clutch size in Song Sparrows of the Pacific coast. *Condor* **56**: 268–273.
Johnston, R.F. (1956a). Population structure in Salt Marsh Song Sparrows. Part 1. Environment and annual cycle. *Condor* **58(1)**: 24–44.
Johnston, R.F. (1956b). Population structure in Salt Marsh Song Sparrows. Part 2. Density, age structure, and maintenance. *Condor* **58(4)**: 254–272.
Johow, J.C. (2000). Primero registro de *Pheucticus aureoventris* (Passeriformes, Emberizidae) para Chile. *Bol. Chileno Orn.* **7**: 34. In Spanish.

Jones, H.L. (2003). *Birds of Belize*. University of Texas Press, Austin, Texas.
Jones, J.M. (1859). *The Naturalist in Bermuda: a Sketch of the Geology, Zoology, and Botany, of that Remarkable Group of Islands, Together with Meteorological Observations*. Reeves & Turner, London.
Jones, J.M.B. (1994). Concentration of Larklike Buntings in Kuburi Wilderness, Kariba. *Honeyguide* **40(1)**: 31.
Jones, S.G., Gordon, D.H., Phillips, G.M. & Richardson, B.R.D. (2005). Avian community response to a golf-course landscape unit gradient. *Wildl. Soc. Bull.* **33(2)**: 422–434.
Jones, S.L. & Cornely, J.E. (2002). Vesper Sparrow (*Pooecetes gramineus*). No. **624** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.
Jones, S.L., Green, M.T. & Geupel, G.R. (1998). Rare, local, little-known, and declining North American breeders. A closer look: Baird's Sparrow. *Birding (USA)* **30(2)**: 108–116.
Jones, T.M., Rodewald, A.D. & Shustack, D.P. (2010). Variation in plumage coloration of Northern Cardinals in urbanizing landscapes. *Wilson J. Orn.* **122(2)**: 326–333.
Jones, Z.F. & Bock, C.E. (2005). The Botteri's Sparrow and exotic Arizona grasslands: an ecological trap or habitat regained? *Condor* **107(4)**: 731–741.
Jonsson, K. & Fjeldså, J. (2005). A phylogenetic supertree of oscine passerine birds (Aves: Passeri). *Zool. Scr.* **35**: 149–186.
Jonsson, P.E. (1992). The Corn Bunting *Miliaria calandra* in Scania, S Sweden, 1990–1991: a report from a conservation project. *Anser* **34**: 101–108.
Jonzén, N., Hedenström, A. & Lundberg, P. (2007). Climate change and the optimal arrival of migratory birds. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **274**: 269–274.
Jonzén, N., Lindén, A., Ergon, T., and 14 other authors (2006). Rapid advance of spring arrival dates in long-distance migratory birds. *Science (Washington, D.C.)* **312**: 1959–1961.
Joseph, L. (1996). Preliminary climatic overview of migration patterns in South American austral migrant passerines. *Ecotropica* **2**: 185–193.
Joseph, L. (1997). Towards a broader view of Neotropical migrants: consequences of a re-examination of austral migration. *Orn. Neotropical* **8**: 31–36.
Joseph, L. (2001). The type-locality of *Sturnella magna quinta* Dickerman 1989: a correction to the original publication. *Bull. Brit. Orn. Club* **121**: 69–71.
Judd, W.W. (1962). Insects and other invertebrates from nests of the Cardinal, *Richmondena cardinalis* (L.), at London, Ontario. *Can. Entomol.* **94**: 92–95.
Jukema, J. (1992). Seasonal change of bill-length in Snow Bunting *Plectrophenax nivalis*. *Limosa* **65(1)**: 30–31. In Dutch with English summary.
Jukema, J. (2005). Balgen van Sneeuwgorzen bestudeerd: hoe betrouwbaar zijn geslachtsbepalingen in musea. *Limosa* **78(2)**: 75–78. In Dutch with English summary.
Jukema, J. & Fokkema, J. (1992). Origin of Snow Buntings *Plectrophenax nivalis* wintering in The Netherlands. *Limosa* **65(2)**: 67–72. In Dutch with English summary.
Julliard, R., Jiguet, F. & Couvet, D. (2003). Common birds facing global changes: what makes a species at risk? *Global Change Biol.* **10**: 148–154.
Junge, G.C.A. & Mees, G.F. (1958). The avifauna of Trinidad and Tobago. *Zool. Verhand. Leiden* **37**: 1–172.
Kaiser, M. (2006). Erfolgreiche Bruten des Rotkopfstärlings im Tierpark Berlin. *Gefiederte Welt* **130(1)**: 14–16. In German.
Kajtoch, L. (2008). Efemeryczna populacja Potrzeszcza *Emberiza calandra* w Beskidzie Wyspowym w roku 2007. *Notatki Ornitologiczne* **49(4)**: 256–257. In Polish with English summary.
Kale, H.W. (1983). A status report on the Dusky Seaside Sparrow. *Bird Conserv.* **1**: 128–132.
Kale, H.W. (1988). Florida birds. House finches, and other "unusuals". *Florida Nat.* **61(1)**: 16.
Kaluthota, C.D., Samarasinghe, D., de Silva, D. & de Silva, H. (2010). Grey-necked Bunting *Emberiza buchanani*: first record for Sri Lanka. *Birding Asia* **13**: 99.
Kanegae, M.F., Valim, M., da Fonseca, M.A., Marini, M.Â. & Freire, N.M.S. (2008). Ácaros plumícolas (Acari: Astigmata) em aves do Cerrado do Distrito Federal, Brasil. *Biota Neotropica* **8(1)**: 31–39. In Portuguese with English summary.
Kaneko, Y. (1976). Age and sexual difference of measurements in Rustic and Reed Buntings, *Emberiza rustica* and *E. schoeniclus*. *Misc. Rep. Yamashina Inst. Orn.* **8(29)**: 206–212.
Kanerva, J. (1967). The White-throated Sparrow (*Zonotrichia albicollis*) seen for the first time in Finland (Kotka, south-eastern Finland). *Ornis Fenn.* **44**: 108.
Kanouchi, T., Abe, N. & Ueda, H. (1998). [*Wild Birds of Japan*]. Yaka-Kei, Tokyo. In Japanese.
Kantak, G.E. (1979). Observations on some fruit-eating birds in Mexico. *Auk* **96**: 183–186.
Kapanen, M. (1995). Suuntana Suomi? – Kultakulmasirkku. *Alula* **1(2)**: 82–85. In Finnish with English summary.
Kaplan, J. & Moore, J. (1988). First documented record of LeConte's Sparrow in Connecticut. *Connecticut Warbler* **8(2)**: 25–27.
Karnas, A. (1988). Rock Bunting – *Emberiza cia*. *Ptaki Slaska* **6**: 133, 135. In Polish with English summary.
Karr, J.R. (1971). Ecological behavioral, and distributional notes on some central Panama birds. *Condor* **73**: 107–111.
Karr, J.R. (1977). Ecological correlates of rarity in a tropical forest bird community. *Auk* **94**: 240–247.
Karell, P., Ahola, K., Karstinen, T., Valkama, J. & Brommer, J.E. (2011). Climate change drives microevolution in a wild bird. *Nature Communications* **2(208)**: 1–7.
Kasparek, M. (1979). Zum Ablauf der postnuptialen Vollmauser der Rohrammer (*Emberiza schoeniclus*). *J. Orn.* **120(3)**: 247–264. In German.
Kasparek, M. (1980). Jahreszeitliche Aspekte der Mauser der Rohrammer *Emberiza schoeniclus* (L.). *Ökol. Vögel* **2(1)**: 1–36. In German.
Kasparek, M. (1986). On records of the Pine Bunting, *Emberiza leucocephalos* in Turkey from the last century. *Zool. Middle East* **1**: 56–59.
Kaspari, M. (1991). Prey preparation as a way that Grasshopper Sparrows (*Ammodramus savannarum*) increase the nutrient concentration of their prey. *Behav. Ecol.* **2(3)**: 234–241.
Kaspari, M. & O'Leary, H. (1988). Nonparental attendants in a north-temperate migrant. *Auk* **105**: 792–793.
Kattan, G.H. (1995). Mechanisms of short incubation period in brood-parasitic cowbirds. *Auk* **112**: 335–342.
Kattan, G.H. (1996). Growth and provisioning of Shiny Cowbird and House Wren host nestlings. *J. Field Orn.* **67**: 434–441.
Kattan, G.H. (1997). Shiny Cowbirds follow the 'shotgun' strategy of brood parasitism. *Anim. Behav.* **53**: 647–654.
Kaufman, K. (1983). Identifying Streak-backed Orioles: a note of caution. *Amer. Birds* **37(2)**: 140–141.
Kayser, Y. (1999). Premier cas d'hivernage du Bruant à calotte blanche *Emberiza leucocephalos* en France. *Ornithos* **6(4)**: 198–200. In French with English summary.
Kazama, T. (1987). A Golden-crowned Sparrow *Zonotrichia atricapilla* found in Niigata Prefecture. *J. Yamashina Inst. Orn.* **19(1)**: 77.
Keiser, J.T., Ziegenfus, C.W.S. & Cristol, D.A. (2005). Homing success of migrant versus nonmigrant Dark-eyed Juncos (*Junco hyemalis*). *Auk* **122(2)**: 608–617.
Keith, A.R. (1997). *The Birds of Saint Lucia, West Indies: an Annotated Checklist*. British Ornithologists' Union Checklist **15**. British Ornithologists' Union, Tring, UK.
Keith, A.R., Wiley, J.W., Latta, S.C. & Ottenwalder, J.A. (2003). *The Birds of Hispaniola, Haiti and the Dominican Republic. An Annotated Checklist*. British Ornithologists' Union Checklist **21**. British Ornithologists' Union, Tring, UK.
Keller, L.F. (1998). Inbreeding and its fitness effects in an insular population of Song Sparrows (*Melospiza melodia*). *Evolution* **52(1)**: 240–250.
Keller, L.F. & Arcese, P. (1998). No evidence for inbreeding avoidance in a natural population of Song Sparrows (*Melospiza melodia*). *Amer. Naturalist* **152(3)**: 380–392.
Keller, L.F., Grant, P.R., Grant, B.R. & Petren, K. (2001). Heritability of morphological traits in Darwin's finches: misidentified paternity and maternal effects. *Heredity* **87(3)**: 325–336.
Keller, L.F., Grant, P.R., Grant, B.R. & Petren, K. (2002). Environmental conditions affect the magnitude of inbreeding depression in survival of Darwin's finches. *Evolution* **56(6)**: 1229–1239.
Keller, L.F., Reid, J.M. & Arcese, P. (2008). Testing evolutionary models of senescence in a natural population: age and inbreeding effects on fitness components in Song Sparrows. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **275**: 597–604.
Kemsies, E. (1968). Smith's Longspur. Pp. 1628–1635 in: Bent & Austin (1968).
Kemsies, E. & Randle, W. (1964). A distributional summary and some behavioral notes for Smith's Longspur, *Calcarius pictus*. *Can. Field-Nat.* **78**: 28–31.
Kennard, F.H. (1920). Notes on the breeding habits of the Rusty Blackbird in northern New England. *Auk* **37**: 412–422.
Kennard, F.H. & Peters, J.L. (1927). New birds from Panama (*Lanio, Psilorhinus*). *Proc. New England Zool. Club* **10**: 1–2.
Kennedy, R.J. (1969). Sunbathing behaviour of birds. *British Birds* **62**: 249–258.
Kennedy, R.S. (1984). Notes on Philippine birds. 5. The re-identification of an *Emberiza* specimen from the Island of Catanduanes. *Bull. Brit. Orn. Club* **104(4)**: 149–150.
Kenyon, K.W. (1961). Birds of Amchitka Island, Alaska. *Auk* **78**: 305–326.
Kenyon, K.W. & Phillips, R.E. (1965). Birds from the Pribilof Islands and vicinity. *Auk* **82(4)**: 624–635.
Kerèek, M. (2009). Gnezdilke kopenskega dela zadrzevalnika Medvedce (SV Slovenija). *Acrocephalus (Ljubljana)* **30(141–143)**: 165–179. In Slovenian with English summary.
Kern, M.D. (1979). Seasonal changes in the reproductive system of the female White-crowned Sparrow, *Zonotrichia leucophrys gambelii*, in captivity and in the field. 2. The incubation patch. *Cell & Tissue Res.* **202(3)**: 379–398.
Kershner, E.L., Walk, J.W. & Warner, R.E. (2004a). Breeding-season decisions, renesting, and annual fecundity of female Eastern Meadowlarks (*Sturnella magna*) in southeastern Illinois. *Auk* **121(3)**: 796–805.
Kershner, E.L., Walk, J.W. & Warner, R.E. (2004b). Postfledging movements and survival of juvenile Eastern Meadowlarks (*Sturnella magna*) in Illinois. *Auk* **121(4)**: 1146–1154.
Kessel, B. & Gibson, D.D. (1978). Status and distribution of Alaska birds. *Studies Avian Biol.* **1**: 1–100.
Kessler, M. & Herzog, S.K. (1998). Conservation status in Bolivia of timberline habitats, elfin forest and their birds. *Cotinga* **10**: 50–54.
Ketterson, E.D. & Nolan, V. (1976). Geographic variation and its climatic correlates in the sex ratio of eastern-wintering Dark-eyed Juncos (*Junco hyemalis hyemalis*). *Ecology* **57(4)**: 679–693.
Ketterson, E.D. & Nolan, V. (1978). Overnight weight loss in Dark-eyed Juncos (*Junco hyemalis*). *Auk* **95(4)**: 735–758.
Ketterson, E.D. & Nolan, V. (1979). Seasonal, annual, and geographic variation in sex ratio of wintering populations of Dark-eyed Juncos (*Junco hyemalis*). *Auk* **96(3)**: 532–536.
Ketterson, E.D., Parker, P.G., Raouf, S.A., Nolan, V., Ziegenfus, C. & Chandler, C.R. (1998). The relative impact of extra-pair fertilizations on variation in male and female reproductive success in Dark-eyed Juncos (*Junco hyemalis*). *Orn. Monogr.* **49**: 81–101.
Keyser, A.J. & Hill, G.E. (1999). Condition-dependent variation in the blue-ultraviolet coloration of a structurally based plumage ornament. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **266**: 771–777.
Keyser, A.J. & Hill, G.E. (2000). Structurally based plumage coloration is an honest signal of quality in male Blue Grosbeaks. *Behav. Ecol.* **11(2)**: 202–209.
Khakhlov, V.A. (1991). [To the problem of intermediate forms between the Yellowhammer (*Emberiza citrinella*) and the Pine Bunting (*Emberiza leucocephalos*)]. *Ornitologiya* **25**: 214–215. In Russian.
Kidono, H. (1977). Foraging-sites of Reed Bunting *Emberiza schoeniclus* and Ussurian Yellow-breasted Bunting *E. aureola* in the breeding season. *Misc. Rep. Yamashina Inst. Orn.* **9(3)**: 271–279. In Japanese with English summary.
Kienzle, W. & Erkert, H.G. (1980). Die circadiane Aktivitätsperiodik neotropischer Vögel im Vergleich zu den arktischen Arten. *Ökol. Vögel* **2(1)**: 93–126. In German with English summary.
Kiere, L.M., Hoffmann, C.M., Tracy, I.E., Cronin, T.W., Leips, J. & Omland, K.E. (2007). Using color to define species boundaries: quantitative analysis in the Orchard Oriole complex supports the recognition of two species. *Condor* **109**: 692–697.
Kieser, J.A. & Kieser, G.A. (1978). Birds of the De Aar district. *Southern Birds* **5**: 1–46.
Kiff, L.F. (1973). New host records for the Bronzed Cowbird. *Wilson Bull.* **85(2)**: 240–242.
Kilgo, J.C. & Moorman, C.E. (2009). Patterns of cowbird parasitism in the Southern Atlantic Coastal Plain and Piedmont. *Wilson Bull.* **115(3)**: 277–284.
Kilin, S.V. (1983). [Sex/age structure and variation in reproductive indicators of a population of Yellow-breasted Bunting in central Ob region]. Pp. 140–141 in: Bolotnikov, A.M., Irisov, N.L., Kuchin, A.P., Malkov, N.P., Moskvitin, S.S., Ravkin, Y.S. & Smekhova, G.E. eds. (1983). [*Birds of Siberia. Papers & Theses from the Second Siberian Ornithological Conference*]. Akademiya nauk SSSR, Gorno-Altaisk. In Russian.
Kiltie, R.A. & Fitzpatrick, J.W. (1984). Reproduction and social-organization of the Black-Capped Donacobius (*Donacobius atricapillus*) in Southeastern Peru. *Auk* **101**: 804–811.
Kim, D.H. (2005). First Nebraska nest record for Henslow's Sparrow. *Prairie Nat.* **37(3)**: 171–173.
Kim, D.H., Newton, W.E., Lingle, G.R. & Chavez-Ramirez, F. (2008). Influence of grazing and available moisture on breeding densities of grassland birds in the central Platte River Valley, Nebraska. *Wilson J. Orn.* **120(4)**: 820–829.
Kim Kil-Won & Park Shi-Ryong (1993). Intraindividual and interindividual variations of stereotyped songs in Gray-headed Bunting (*Emberiza fucata*). *Korean J. Zool.* **36(4)**: 476–486.
King, A.P. & West, M.J. (1983). Dissecting cowbird song potency: assessing a song's geographic identity and relative appeal. *Z. Tierpsychol.* **63**: 37–50.
King, A.P., West, M.J. & Eastzer, D.H. (1986). Female cowbird song perception: evidence for different developmental programs within the same subspecies. *Ethology* **72**: 89–98.
King, J.R. (1972). Variation in the song of the Rufous-collared Sparrow, *Zonotrichia capensis*, in north-western Argentina. *Z. Tierpsychol.* **30(4)**: 344–373.
King, J.R. (1973a). Reproductive relationships of the Rufous-collared Sparrow and the Shiny Cowbird. *Auk* **90**: 19–34.
King, J.R. (1973b). The annual cycle of the Rufous-collared Sparrow (*Zonotrichia capensis*) in three biotopes in north-western Argentina. *J. Zool., London* **170(2)**: 163–188.
King, J.R. (1974). Notes on geographical variation and annual cycle in Patagonian populations of the Rufous-collared Sparrow *Zonotrichia capensis*. *Ibis* **116(1)**: 74–83.
King, J.R. (1990). Polymorphism in *Diglossa humeralis aterrima* in southern Ecuador. *Bull. Brit. Orn. Club* **110(2)**: 77–79.
King, J.R. & Mewaldt, L.R. (1982). The average rate of travel by migrating White-crowned Sparrows, *Zonotrichia leucophrys gambelii* in spring. *North Amer. Bird Bander* **6(3)**: 98–100.
King, J.R., Barker, S. & Farner, D.S. (1963). A comparison of energy reserves during autumnal and vernal migratory periods in the White-crowned Sparrow, *Zonotrichia leucophrys gambelii*. *Ecology* **44**: 513–521.
King, W.B. (1970). Active anting in the Puerto Rican Tanager. *Auk* **87**: 376–378.
Kingery, H.E. (1997). Pyrrhuloxia (*Cardinalis sinuatus*) in the mountains of Park County. *Colorado Field Orn. J.* **31**: 60–61.
Kingery, H.E. & Julian, P.R. (1971). Cassin's Sparrow parasitized by cowbird. *Wilson Bull.* **83(4)**: 439.
Kinkade, B.R. (2002). Black-headed Grosbeak in Becker County. *Loon* **74(1)**: 55.
Kirk, D.A., Diamond, A.W., Smith, A.R., Holland, G.E. & Chytyk, P. (1997). Population changes in boreal forest birds in Saskatchewan and Manitoba. *Wilson Bull.* **109(1)**: 1–27.
Kirkpatrick, C. & Conway, C.J. (2010). Importance of montane riparian forest and influence of wildfire on nest-site selection of ground-nesting birds. *J. Wildl. Management* **74(4)**: 729–738.

Kirkpatrick, C., Conway, C.J. & Ali, M.H. (2009). Sanitation of entire broods of dead nestlings may bias cause-specific nest failure rates. *Ibis* **151(1)**: 207–211.
Kirmse, P. (1969). Cnemidocoptiasis (scaly-leg) in a Buff-throated Saltator (*Saltator maximus*) from Panama. *J. Field Orn.* **40(1)**: 51–52.
Kirwan, G.M. (2007). Rusty-collared Seedeater *Sporophila collaris* in Bahia, Brazil, with some comments on morphological variation in the species. *Cotinga* **28**: 67–70.
Kirwan, G.M. (2009). Interesting bird observations from the Araguaia river valley, Central Brazil. Unpubl.
Kirwan, G.M. & Areta, J.I. (2009). Black-and-tawny Seedeater *Sporophila nigrorufa* in the cerrados of western Mato Grosso, Brazil. *Neotropical Birding* **4**: 69–72.
Kirwan, G.M. & Shirihai, H. (2007). Species limits in the House Bunting complex. *Dutch Birding* **29(1)**: 1–19.
Kirwan, G.M., Boyla, K.A., Castell, P., Demirci, B., Özen, M., Welch, H. & Marlow, T. (2008). *The Birds of Turkey – the Distribution, Taxonomy and Breeding of Turkish Birds*. Christopher Helm, London.
Kirwan, G.M., Martins, R.P., Morton, K.M. & Showler, D.A. (1996). The status of birds in Socotra and 'Abd Al-Kuri and the records of the OSME survey in spring 1993. *Sandgrouse* **17**: 83–101.
Kirwan, G.M., Mazar Barnett, J., de Vasconcelos, M.F., Raposo, M.A., D'Angelo Neto, S. & Roesler, I. (2004). Further comments on the avifauna of the Middle São Francisco Valley, Minas Gerais, Brazil. *Bull. Brit. Orn. Club* **124(3)**: 207–220.
Kissling, W.D., Böhning-Gaese, K. & Jetz, W. (2009). The global distribution of frugivory in birds. *Global Ecol. Biogeogr.* **18(2)**: 150–162.
Kitson, A.R. (1979). Identification of Olive-backed Pipit, Blyth's Pipit and Pallas's Reed Bunting. *British Birds* **72(3)**: 94–100.
Kitson, A.R. (1982). Lesser coverts of Pallas's Reed Bunting: correction. *British Birds* **75(1)**: 40.
Kitson, A.R. & Robertson, I.S. (1983). Yellow-browed Bunting: new to Britain and Ireland. *British Birds* **76(5)**: 217–225.
Kjonaas, C. & Rengifo, C. (2006). Differential effects of avian nectar-robbing on fruit set of two Venezuelan Andean cloud forest plants. *Biotropica* **38(2)**: 276–279.
Klaas, E.E. (1968). Summer birds from the Yucatán Peninsula, Mexico. *Univ. Kansas Publ. Mus. Nat. Hist.* **17**: 579–611.
Klatt, P.H., Stutchbury, B.J.M. & Evans, M.L. (2008). Incubation feeding by male Scarlet Tanagers: a mate removal experiment. *J. Field Orn.* **79(1)**: 1–10.
Kleefisch, T. (1991). Die Zucht der Rotbauchtangare *Tangara velia* (Linne, 1758). *Gefiederte Welt* **115(10)**: 338–340. In German.
Kleefisch, T. (1995). Zucht der Goldnackentangare *Tangara ruficervix* (Prevost & Des Murs 1846). *Gefiederte Welt* **119(3)**: 90–92. In German.
Kleefisch, T. (2011). Südamerikanische Kostbarkeiten – die Grünorganisten. *Gefiederte Welt* **135(1)**: 8–11; **135(2)**: 19–21. In German.
Klein, N.K. & Rosenberg, K.V. (1986). Feeding of Brown-headed Cowbird (*Molothrus ater*) fledglings by more than one "host" species. *Auk* **103**: 213–214.
Klein, N.K., Marin, M., Schulenberg, T.S. & Kiff, L.F. (1991). Eggs, nests, and nest building behavior of the Large-footed Finch (*Pezopetes capitalis*) in Costa Rica. *Condor* **93**: 447–448.
Kleindorfer, S. & Dudaniec, R.Y. (2006). Increasing prevalence of avian poxvirus in Darwin's finches and its effect on male pairing success. *J. Avian Biol.* **37(1)**: 69–76.
Kleindorfer, S., Chapman, T.W., Winkler, H. & Sulloway, F.J. (2006). Adaptive divergence in contiguous populations of Darwin's Small Ground Finch (*Geospiza fuliginosa*). *Evol. Ecol. Research* **8(2)**: 357–372.
Kleindorfer, S., Sulloway, F.J. & O'Connor, J. (2009). Mixed species nesting associations in Darwin's Tree Finches: nesting pattern predicts predation outcome. *Biol. J. Linn. Soc.* **98(2)**: 313–324.
Kleven, O., Marthinsen, G. & Lifjeld, J.T. (2006). Male extraterritorial forays, age and paternity in the socially monogamous Reed Bunting (*Emberiza schoeniclus*). *J. Orn.* **147(3)**: 468–473.
Klicka, J. & Banks, R.C. (2011). A generic name for some sparrows (Aves: Emberizidae). *Zootaxa* **2793**: 67–68.
Klicka, J. & Spellman, G.M. (2007). A molecular evaluation of the North American "grassland" sparrow clade. *Auk* **124**: 537–551.
Klicka, J., Burns, K.J. & Spellman, G.M. (2007). Defining a monophyletic Cardinalini: a molecular perspective. *Mol. Phylogen. Evol.* **45(3)**: 1014–1032.
Klicka, J., Fry, A.J., Zink, R.M. & Thompson, C.W. (2001). A cytochrome-*b* perspective on *Passerina* bunting relationships. *Auk* **118(3)**: 610–623.
Klicka, J., Johnson, K.P. & Lanyon, S.M. (2000). New World nine-primaried oscine relationships: constructing a mitochondrial DNA framework. *Auk* **117(2)**: 321–336.
Klicka, J., Zink, R.M., Barlow, J.C., McGillivray, W.B. & Doyle, T.J. (1999). Evidence supporting the recent origin and species status of the Timberline Sparrow. *Condor* **101(3)**: 577–588.
Klicka, J., Zink, R.M. & Winker, K. (2003). Longspurs and Snow Buntings: phylogeny and biogeography of a high-latitude clade (*Calcarius*). *Mol. Phylogen. Evol.* **26**: 165–175.
Klimaitis, J.F. (1973). Estudio descriptivo de una colonia de Tordos Varilleros (*Agelaius ruficapillus*). *Hornero* **11**: 193–202. In Spanish.
Klimkiewicz, M.K. & Futcher, A.G. (1987). Longevity records of North American birds: Coerebinae through Estrildidae. *J. Field Orn.* **58**: 318–333.
Klinge, F., Buissink, F. & Ebels, E.B. (1997). Cretzschmar's Bunting on Ameland in May 1994. *Dutch Birding* **19(1)**: 8–11.
Klug, P.E., Wolfenbarger, L.L. & McCarthy, J.P. (2010). Snakes are important nest predators of Dickcissels in an agricultural landscape. *Wilson J. Orn.* **122(4)**: 799–803.
Knapton, R.W. (1978). Sex and age determination in the Clay-colored Sparrow. *Bird-Banding* **49(2)**: 152–156.
Knapton, R.W. (1979a). Breeding ecology of the Clay-colored Sparrow. *Living Bird* **17**: 137–158.
Knapton, R.W. (1979b). Optimal size of territory in the Clay-coloured Sparrow, *Spizella pallida*. *Can. J. Zool.* **57(7)**: 1358–1370.
Knapton, R.W. (1982). Geographic similarity and year-to-year retention of song in the Clay-colored Sparrow (*Spizella pallida*). *Behaviour* **79(2/4)**: 189–200.
Knapton, R.W. (1988). Nesting success is higher for polygynously mated females than for monogamously mated females in the Eastern Meadowlark. *Auk* **105(2)**: 325–329.
Knapton, R.W. (1994). Clay-colored Sparrow (*Spizella pallida*). No. **120** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Knapton, R.W. & Falls, J.B. (1983). Differences in parental contribution among pair types in the polymorphic White-throated Sparrow. *Can. J. Zool.* **61**: 1288–1292.
Knight, R.L. & Temple, S.A. (1988). Nest-defense behavior in the Red-winged Blackbird. *Condor* **90**: 193–200.
de Knijff, P. (1991). Little-known West Palearctic birds: Cinereous Bunting. *Birding World* **4**: 384–391.
Knowlton, G.F. & Maddock, D.R. (1943). Insect food of the Western Meadowlark. *Great Basin Nat.* **4**: 101–102.
Knowlton, J.L. (2010). Breeding records from the Tumbesian region of Ecuador. *Orn. Neotropical* **21**: 109–129.
Knystautas, A. & Liutkus, A. (1984). *In the World of Birds*. Mokslas, Vilnius, Lithuania.
Knystautas, A. & Sibnev, J.B. [= Shibnev, Y.] (1987). *Die Vogelwelt Ussuriens. Avifaunistisches zwischen Amur und Japanischem Meer*. A. Ziemsen, Wittenberg Lutherstadt, Germany. In German.
Koblik, E.A. (1993). Mystery bunting from the collection of Kozlov's expedition. *Russ. Orn. Zhurnal* **2(4)**: 409–414. In Russian with English summary.
Koblik, E.A., Mosalov, A.A. & Mikhailov, K.E. (1997). [The Polar Bunting *Emberiza pallasi* – a new breeding bird for Primorye]. *Russ. Orn. Zhurnal Ekspress Vypusk* **23**: 13–16. In Russian.
Koblik, E.A., Red'kin, Y.A. & Arkhipov, V.Y. (2006). *Checklist of the Birds of [the] Russian Federation*. KMK Scientific Press, Moscow. In Russian with English summary.
Koce, U., Basle, T., Premzl, M., Rozman, R. & Zaksek, B. (2008). The distribution of Cirl Bunting *Emberiza cirlus* and Yellowhammer *E. citrinella* in the east of Haloze (NE Slovenia) and agricultural use in the area of their occurrence. *Acrocephalus (Ljubljana)* **29(136)**: 5–11. In Slovenian with English summary.
Koenen, M.T. & Koenen, S.G. (2000). Effects of fire on birds in páramo habitat of northern Ecuador. *Orn. Neotropical* **11**: 155–163.
Koenig, W.D. (1985). Dunking of prey by Brewer's Blackbirds: a novel source of water for nestlings. *Condor* **87**: 444–445.
Koepcke, M. (1954). Corte ecológico transversal en los Andes del Perú central con especial consideración de las aves. Part 1. Costa, vertientes occidentales y región altoandina. *Mem. Mus. Hist. Nat. Javier Prado* **3**: 1–119. In Spanish.
Koepcke, M. (1963). Zur Kenntnis einiger Finken des peruanischen Küstengebietes. *Beitr. Neotrop. Fauna* **3**: 2–19. In German.
Koepcke, M. (1970). *The Birds of the Department of Lima, Peru*. 2nd English language translation. Harrowood Books, Newton Square, Pennsylvania.
Koepcke, M. (1972). Über die Resistenzformen der Vogelnester in einem begrenzten Gebiet des tropischen Regenwaldes in Peru. *J. Orn.* **113**: 138–160. In German.
Koepcke, M. & Koepcke, H.W. (1961). Birds of the western slope of the Andes of Peru. *Amer. Mus. Novit.* **2028**: 1–31.
Koiwai, A. (2003). Mate guarding in the Black-faced Bunting *Emberiza spodocephala*. *Jap. J. Orn.* **52(1)**: 13–23. In Japanese with English summary.
Kok, O.B. (1971). Vocal behaviour of the Great-tailed Grackle (*Quiscalus mexicanus prosopidicola*). *Condor* **73**: 348–363.
Kok, O.B. (1972). Breeding success and territorial behavior of male Boat-tailed Grackles. *Auk* **89**: 528–540.
Kok, O.B., van Ee, C.A. & Nel, D.G. (1991). Daylength determines departure date of the Spotted Flycatcher *Muscicapa striata* from its winter quarters. *Ardea* **79**: 63–66.
Kokko, H. (1999). Competition for early arrival in migratory birds. *J. Anim. Ecol.* **68**: 940–950.
Kolomiitsev, N.P. (1986). [Some remarkable accidental birds in the environs of Lazovsky Reserve]. *Trudy Zool. Inst. (Leningr.)* **150**: 84–85. In Russian.
Komar, O. & Domínguez, J.P. (2001). *Lista de Aves de El Salvador*. Salva Natura, San Salvador, El Salvador. In Spanish.
Komar, O. & Thurber, W.A. (2003). Predation on birds by a cuckoo (Cuculidae), mockingbird (Mimidae), and saltator (Cardinalidae). *Wilson Bull.* **115(2)**: 205–208.
Komar, O., Rodríguez, W. & Ibarra, R. (2000). Black-vented Oriole nests inside a cabin in El Salvador. *Wilson Bull.* **112**: 551–553.
Komeda, S. (1987). [*Bird Banding Manual. Identification Guide to Japanese Birds*]. Yamashina Institute for Ornithology, Shibuya, Tokyo. In Japanese.
Komeda, S. & Ueki, Y. (2002). Long term monitoring of migratory birds at Otayama Banding Station (1973–1996). *J. Yamashina Inst. Orn.* **34(1)**: 96–111. In Japanese with English summary.
Kondo, B. & Omland, K.E. (2007). Ancestral state reconstruction of migration: multistate analysis reveals rapid changes in New World Orioles. *Auk* **124**: 410–419.
Kondo, B., Baker, J.M. & Omland, K.E. (2004). Recent speciation between the Baltimore and the Black-backed Oriole. *Condor* **106**: 674–680.
König, C. (1996). Eine weibliche Fichtenammer *Emberiza leucocephalos* in Baden-Württemberg und ihre Bestimmung. *Limicola* **10(3)**: 134–137. In German.
Königstedt, D. & Müller, H.E.J. (1988). Die Schwingenformeln von Zwergammer (*Emberiza pusilla*) und Rohrammer (*E. schoeniclus*) (Aves, Passeriformes, Emberizidae). *Zool. Abh. Mus. Tierk. Dresden* **43(2)**: 143–147. In German.
Königstedt, D. & Robel, F. (1987). Rohrammer oder Zwergammer? *Falke* **34(2)**: 42–46. In German.
Konno, S. & Fujimaki, Y. (2001). Birds on Rishiri Island during breeding season. *Res. Bull. Obihiro Univ. Nat. Sci.* **22(3)**: 125–133.
Kontogiannis, J.E. (1967). Day and night changes in body weight of White-throated Sparrow *Zonotrichia albicollis*. *Aves (Liège)* **84**: 390–395.
Kopachena, J.G. & Crist, C.J. (2000a). Microhabitat features associated with the song perches of Painted and Indigo Buntings (Passeriformes: Cardinalidae) in northeast Texas. *Texas J. Sci.* **52(2)**: 133–144.
Kopachena, J.G. & Crist, C.J. (2000b). Macro-habitat features associated with Painted and Indigo Buntings in northeast Texas. *Wilson Bull.* **112(1)**: 108–114.
Kopachena, J.G. & Falls, J.B. (1993a). Re-evaluation of morph-specific variations in parental behavior of the White-throated Sparrow. *Wilson Bull.* **105**: 48–59.
Kopachena, J.G. & Falls, J.B. (1993b). Aggressive performance as a behavioral correlate of plumage polymorphism in the White-throated Sparrow (*Zonotrichia albicollis*). *Behaviour* **124(3/4)**: 249–266.
Kopachena, J.G. & Falls, J.B. (1993c). Postfledging parental care in the White-throated Sparrow (*Zonotrichia albicollis*). *Can. J. Zool.* **71(2)**: 227–232.
Korzyukov, A.I. (1982). [The Pine Bunting and Pallas' Warbler occurrence in the north western Black Sea region]. *Vestnik Zoologii* **1982(4)**: 75–76. In Russian.
Kostecke, R.M., Ellison, K. & Summers, S.G. (2004). Continued range expansion by Bronzed Cowbirds in the southwestern United States. *Southwest. Nat.* **49(4)**: 487–492.
Koster, F. (1985). Darwin's finch 'ploughs' for water. *Noticias de Galápagos* **41**: 23–24.
Kovshar, A.F., Ivashchenko, A.A. & Kovshar, V.A. (1986). [Biology of the Red-headed Bunting in Talass Ala-Tau (west Tien-Shan). Communication 1. Residence character. Habitat. Position and structure of nests]. *Vestnik Zoologii* **1986(5)**: 36–40. In Russian.
Kovshar, A.F., Ivashchenko, A.A. & Kovshar, V.A. (1987). [Biology of the Red-headed Bunting in Talass Ala-Tau (west Tien-Shan). Communication 2. Reproduction cycle. Nesting terms. Fertility]. *Vestnik Zoologii* **1987(1)**: 57–64. In Russian.
Kovshar, V.A. & Gavrilov, E.I. (1999). [About moult of *Emberiza bruniceps*]. *Selevinia* **1996/1997**: 247–248. In Russian.
Kozlova, E.V. (1933). The birds of southwestern Transbaikalia, northern Mongolia and central Gobi. *Ibis* **Ser. 13, no. 3**: 59–87.
Krabbe, N. (2004). Pale-headed Brush-finch *Atlapetes pallidiceps*: notes on population size, habitat, vocalizations, feeding, interference competition and conservation. *Bird Conserv. Int.* **14(2)**: 77–86.
Krabbe, N. (2008). *Birds of the Sierra Nevada de Santa Marta, Colombia*. CD 2. John V. Moore Nature Recordings, San José, California.
Krabbe, N. & Nilsson, J. (2003). *Birds of Ecuador*. DVD-ROM. Bird Songs International BV, Westernieland, The Netherlands.
Krabbe, N. & Stejskal, D.J. (2008). A new subspecies of Black-striped Sparrow *Arremonops conirostris* from south-eastern Ecuador. *Bull. Brit. Orn. Club* **128(2)**: 126–130.
Krabbe, N., Flórez, P., Suárez, G., Castaño, J., Arango, J. & Duque, A. (2006). The birds of Páramo de Frontino, Western Andes of Colombia. *Orn. Colombiana* **4**: 39–50.
Krabbe, N., Juiña, M. & Sornoza, A.F. (2011). Marked population increase in Pale-headed Brush-finch *Atlapetes pallidiceps* in response to cowbird control. *J. Orn.* **152(2)**: 219–222.
Krabbe, N., Moore, J.V., Coopmans, P., Lysinger, M. & Ridgely, R.S. (2001). *Birds of the Ecuadorian Highlands. The Upper Montane and Paramo Zones of Ecuador*. CD 3/4. J.V. Moore Nature Recordings, San José, California.
Kramer, H.G. & Lemon, R.E. (1983). Dynamics of territorial singing between neighboring Song Sparrows (*Melospiza melodia*). *Behaviour* **85(3/4)**: 198–223.

Kratter, A.W. (1993). Geographic variation in the Yellow-billed Cacique, *Amblycercus holosericeus*, a partial bamboo specialist. *Condor* **95**: 641–651.
Kratter, A.W. & Nice, B. (2001). A partial albino Red-legged Honeycreeper *Cyanerpes cyaneus* in Costa Rica. *Cotinga* **15**: 15–16.
Kratter, A.W., Sillett, T.S., Chesser, R.T., O'Neill, J.P., Parker, T.A. & Castillo, A. (1993). Avifauna of a Chaco locality in Bolivia. *Wilson Bull.* **105(1)**: 114–141.
Krech, S. (2009). *Spirits of the Air: Birds & American Indians in the South*. University of Georgia Press, Athens & London.
Krementz, D.G. & Christie, J.S. (2000). Clearcut stand size and scrub-successional bird assemblages. *Auk* **117(4)**: 913–924.
Krementz, D.G. & Powell, L.A. (2000). Breeding season demography and movements of Eastern Towhees at the Savannah River Site, South Carolina. *Wilson Bull.* **112(2)**: 243–248.
Kretchmar, E.A. (1993). [The breeding biology of the Little Bunting *Emberiza pusilla* in the middle reaches of Anadyr River]. *Russ. Orn. Zhurnal* **2(4)**: 415–426. In Russian.
Kreutzer, M.L. (1979). Étude du chant chez le Bruant zizi (*Emberiza cirlus*). Le répertoire, caractéristiques et distribution. *Behaviour* **71(3/4)**: 291–321. In French.
Kreutzer, M.L. (1983). L'asymétrie entre le codage et le décodage du tempo, facteur d'évolution des chants chez le Bruant zizi (*Emberiza cirlus*). *Compt. Rend. Séances Acad. Sci. Paris (Sér. III)* **297(2)**: 71–74. In French.
Kreutzer, M.L. (1987). Reactions of Cirl Buntings (*Emberiza cirlus*) to playback of an atypical natural song: the use of own and neighbors repertoires for song recognition. *J. Comp. Psychol.* **101(4)**: 382–286.
Kreutzer, M.L. (1990a). La durée du chant des oscines: le rôle des processus cognitifs et moteurs chez le Bruant zizi (*Emberiza cirlus*). *Compt. Rend. Séances Acad. Sci. Paris (Sér. III)* **310(9)**: 423–428. In French.
Kreutzer, M.L. (1990b). Diversité et spécificité des chants du Bruant zizi (*Emberiza cirlus*). *Rev. Écol. (Terre Vie)* **45(2)**: 147–164. In French.
Kreutzer, M.L. (1991). Song syllable variation tolerance and motor theory of song perception: the territorial reaction of Cirl Bunting *Emberiza cirlus* to homologue syllables. *Behav. Processes* **24(2)**: 133–142.
Kreutzer, M.L. & Guttinger, H.R. (1991). Konkurrenzbeziehungen und Verhaltensantworten gegenüber dem Gesang: Artnorm und individuelle Variabilitat bei der Zaunammer (*Emberiza cirlus*). *J. Orn.* **132(2)**: 165–177. In German.
Kroodsma, D.E. (1971). Song variations and singing behaviour in the Rufous-sided Towhee, *Pipilo erythrophthalmus oregonus*. *Condor* **73**: 303–308.
Kroodsma, D.E. (1972). Variations in songs of Vesper Sparrows in Oregon. *Wilson Bull.* **84(2)**: 173–178.
Kroodsma, D.E. & James, F.C. (1994). Song variation within and among populations of Red-winged Blackbirds. *Wilson Bull.* **106**: 156–162.
Kroodsma, R.L. (1974a). Hybridization in grosbeaks (*Pheucticus*) in North Dakota. *Wilson Bull.* **86(3)**: 230–236.
Kroodsma, R.L. (1974b). Species-recognition behavior of territorial male Rose-breasted and Black-headed Grosbeaks (*Pheucticus*). *Auk* **91(1)**: 54–64.
Kroodsma, R.L. (1975). Hybridization in buntings (*Passerina*) in North Dakota and eastern Montana. *Auk* **92**: 66–80.
Krueger, T.R. & Williams, D.A. (2006). Microsatellite loci for Cherrie's Tanager (*Ramphocelus costaricensis*). *Mol. Ecol. Notes* **6(3)**: 853–855.
Krüger, L. & Petry, M.V. (2010). Black-and-white Monjita (*Xolmis dominicanus*) followed by the Saffron-cowled Blackbird (*Xanthopsar flavus*): statistical evidence. *Orn. Neotropical* **21(2)**: 299–303.
Kuleshovar, L.V. (1970). [The Bunting (*Emberiza tristrami* Swinhoe) in the middle Sikhote-Alin mountains]. *Biologicheskie Nauki* **1968(12)**: 23–30. In Russian.
Kumar, V. (1988). Investigations of photoperiodically induced fattening in migratory Blackheaded Bunting (*Emberiza melanocephala*) (Aves). *J. Zool., London* **216(2)**: 253–263.
Kumar, V. (1997). Effects of complete and skeleton photoperiods in altering the timing of spontaneous fat depletion and gonadal regression in migratory male Blackheaded Bunting *Emberiza melanocephala*. *Indian J. Exper. Biol.* **35(11)**: 1161–1165.
Kumar, V. & Tewary, P.D. (1982). The Blackheaded Bunting at Varanasi: annual gonadal and body weight cycles. *Pavo* **20(1–2)**: 10–21.
Kumar, V., Rani, S. & Singh, B.P. (2006). Biological clocks help reduce the physiological conflicts in avian migrants. *J. Orn.* **147(2)**: 281–286.
Kumar, V., Singh, S., Misra, M. & Malik, S. (2001). Effects of duration and time of food availability on photoperiodic responses in the migratory male Blackheaded Bunting (*Emberiza melanocephala*). *J. Exper. Biol.* **204(16)**: 2843–2848.
Kunzmann, M.R., Ellison, K., Purcell, K.L., Johnson, R.R. & Haight, L.T. (2002). California Towhee (*Pipilo crissalis*). No. **632** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.
Kuroda, N. (1932). A revision of the types of birds described by Japanese authors during the years 1923 to 1931. *Novit. Zool.* **37**: 384–405.
Kuroda, N. (1964). [Comparison of migratory adaptations in the Rustic and Black-faced Buntings]. *Misc. Rep. Yamashina Inst. Orn.* **4**: 76–90. In Japanese.
Kushlan, J.A. (1983). Bill-shoving feeding behavior in Darwin's finches. *J. Field Orn.* **54(4)**: 421–422.
Kutubidze, M.E. (1965). [The Pine Bunting (*Emberiza leucocephalos* Gmel.) in suburbs of Tbilisi]. *Soobshch. Akad. Nauk Gruzii* **39**: 197–198. In Russian.
Kuzniak, S., Dombrowski, A., Golawski, A. & Tryjanowski, P. (1997). Stan i zagrozenia polskiej populacji Ortolana *Emberiza hortulana* na tle sytuacji gatunku w Europie. *Notatki Ornitologiczne* **38(2)**: 141–150. In Polish with English summary.
Kvist, L., Ponnikas, S., Belda, E.J., Encabo, I., Martínez, E., Onrubia, A., Hernández, J.M., Vera, P., Neto, J.N. & Monrós, J.S. (2011). Endangered subspecies of the Reed Bunting (*Emberiza schoeniclus witherbyi* and *E. s. lusitanica*) in Iberian Peninsula have different genetic structures. *J. Orn.* **152(3)**: 681–693.
Kyrkos, A., Wilson, J.D. & Fuller, R.J. (1998). Farmland habitat change and abundance of Yellowhammers *Emberiza citrinella*: an analysis of Common Birds Census data. *Bird Study* **45(2)**: 232–246.
La Puma, D.A., Lockwood, J.L. & Davis, M.J. (2007). Endangered species management requires a new look at the benefit of fire: the Cape Sable Seaside Sparrow in the Everglades ecosystem. *Biol. Conserv.* **136(3)**: 398–407.
La Rivers, I. (1944). Observations on the nesting mortality of the Brewer Blackbird, *Euphagus cyanocephalus*. *Amer. Midl. Nat.* **32**: 417–437.
La Touche, J.D. (1906). Field-notes on the birds of Chinkiang, Lower Yangtze Basin. [Part 2]. *Ibis* **Ser. 8, no. 6**: 617–641.
La Touche, J.D. (1925–1930). *A Handbook of the Birds of Eastern China*. Vol. 1. Taylor & Francis, London.
Laabs, D.M., Allaback, M.L. & LaPre, L.F. (1995). Census of the Inyo California Towhee in the eastern third of its range. *Western Birds* **26(4)**: 189–196.
Lack, D. (1947). *Darwin's Finches*. Cambridge University Press, Cambridge, UK.
Lack, D. (1954). *The Natural Regulation of Animal Numbers*. Clarendon Press, Oxford, UK.
Lack, D. (1976). *Island Biology, Illustrated by the Land Birds of Jamaica*. University of California Press, Berkeley & Los Angeles.
Lack, D. & Emlen, J.T. (1939). Observations on breeding behavior in Tricolored Red-wings. *Condor* **41**: 225–230.
Lack, D. & Lack, A. (1973). Birds on Grenada. *Ibis* **115**: 53–59.
Lack, P. (1985). The ecology of the land-birds of Tsavo East National Park, Kenya. *Scopus* **9**: 57–96.
Lacombe, D., Cyr, A. & Bergeron, J.M. (1986). The effects of the chemosterilant Ornitrol on the nesting success of Red-winged Blackbirds. *J. Appl. Ecol.* **23**: 773–779.
Lam Chiuying & Costin, R. (1991). Meadow Bunting on Lantau. A species new to Hong Kong. *Hong Kong Bird Rep.* **1990**: 123–124.
Lambert, F. (2006). Audio recordings of *Hemispingus calophrys* from Cotapata, La Paz, Bolivia. Xeno-Canto, 38930. Unpubl.
Lamm, D.W. (1948). Notes on the birds of the States of Pernambuco and Paraiba, Brazil. *Auk* **65**: 261–283.
Lamm, D.W. & Luepke, J.C. (1982). Iris changes in hatching year Yellow-eyed Juncos. *North Amer. Bird Bander* **7(3)**: 93.
Land, H.C. (1970). *Birds of Guatemala*. Livingston Publishing Company, Wynnewood, Pennsylvania.
Landestoy, M.A., Rodríguez, P.G. & Latta, S.C. (2006). Three new migratory bird species reported from Hispaniola. *J. Caribb. Orn.* **19(2)**: 113–115.
Landsdown, P. & Charlton, T.D. (1990). The Sizewell Bunting: a hybrid Pine Bunting × Yellowhammer in Suffolk. *British Birds* **83(6)**: 240–242.
Langley, P.J.W. (1976). *The Breeding Behaviour and Reproductive Strategy of the Rose-breasted Grosbeak (*Pheucticus ludovicianus *L.)*. MSc thesis, University of Western Ontario, London, Ontario.
Lanyon, S.M. (1992). Interspecific brood parasitism in blackbirds (Icterinae): a phylogenetic perspective. *Science (Washington, D.C.)* **255**: 77–79.
Lanyon, S.M. (1994). Polyphyly of the blackbird genus *Agelaius* and the importance of assumptions of monophyly in comparative studies. *Evolution* **48**: 679–693.
Lanyon, S.M. & Omland, K.E. (1999). A molecular phylogeny of the blackbirds (Icteridae): five lineages revealed by cytochrome-*b* sequence data. *Auk* **116**: 629–639.
Lanyon, S.M. & Thompson, C.F. (1984). Visual displays and their context in the Painted Bunting. *Wilson Bull.* **96**: 396–407.
Lanyon, S.M. & Thompson, C.F. (1986). Site fidelity and habitat quality as determinants of settlement pattern in male Painted Buntings. *Condor* **88**: 206–210.
Lanyon, W.E. (1956). Territory in the meadowlarks, genus *Sturnella*. *Ibis* **98**: 485–489.
Lanyon, W.E. (1962). Specific limits and distribution of meadowlarks on a desert grassland. *Auk* **79**: 183–207.
Lanyon, W.E. (1966). Hybridization in meadowlarks. *Bull. Amer. Mus. Nat. Hist.* **134**: 5–26.
Lanyon, W.E. (1979). Hybrid sterility in meadowlarks. *Nature (London)* **279**: 557–558.
Lanyon, W.E. (1994). Western Meadowlark (*Sturnella neglecta*). No. **104** in: Poole, A.F. & Gill, F.B. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Lanyon, W.E. (1995). Eastern Meadowlark (*Sturnella magna*). No. **160** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 4. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Lanz, U. (2009). Die Uhr tickt – auch in Franken: vage Erfolgsaussichten im Ortolanschutz. *Falke* **56(11)**: 426–431. In German.
LaPointe, G. & Bedard, J. (1986). Savannah Sparrow, *Passerculus sandwichensis*, reproductive success. *Can. Field-Nat.* **100(2)**: 264–267.
Larionov, G.P. & Germogenov, N.I. (1980). [Materials on ecology of *Emberiza aureola* Pall., *E. spodocephala* Pall., *E. chrysophrys* Pall. (Aves, Emberizidae) from the Middle Lena Valley]. *Vestnik Zoologii* **1980(2)**: 12–17. In Russian.
Larsen, O.N. & Goller, F. (2002). Direct observation of syringeal muscle function in songbirds and a parrot. *J. Exper. Biol.* **205(1)**: 25–35.
Laskey, A.R. (1934). Eastern Field Sparrow migration in Tennessee. *Bird-Banding* **5**: 172–175.
Laskey, A.R. (1944). A study of the Cardinal in Tennessee. *Wilson Bull.* **56**: 27–44.
Laskey, A.R. (1969). Bilaterial gynandrism in a Cardinal and a Rufous-sided Towhee. *Auk* **86**: 760.
Latta, S.C. (2005). Complementary areas for conserving avian diversity on Hispaniola. *Anim. Conserv.* **8**: 69–81.
Latta, S.C., Rimmer, C.C., Keith, A.R., Wiley, J.W., Raffaele, H., McFarland, K. & Fernandez, E.M. (2006). *Birds of the Dominican Republic and Haiti*. Princeton University Press, Princeton, New Jersey.
Lattin, C. & Ritchison, G. (2009). Intra- and intersexual functions of singing by male Blue Grosbeaks: the role of within-song variation. *Wilson J. Orn.* **121(4)**: 714–721.
Laubmann, A. (1936). Beiträge zur Avifauna von Santa Catharina, Südbrasilien. *Verh. Orn. Ges. Bayern* **21**: 19–46. In German.
LaVerde, O., Stiles, F.G. & Múnera, C. (2005). Nuevos registros e inventario de la avifauna de la Serranía de las Quinchas, un área importante para la conservación de las aves (AICA) en Colombia. *Caldasia* **27**: 247–265.
Lawson, P.C. & Edmonds, J.A. (1983). Birds of Kangwane (Mswati District). *Southern Birds* **11**: 1–84.
Layard, E.L. (1873). Notes on birds observed at Pará. *Ibis* **Ser. 3, no. 3**: 374–396.
Lazo, I. (1996). Efecto del hábitat sobre tamaño de nidada y sobrevivencia en aves granívoras de Chile central. *Bol. Chileno Orn.* **3**: 10–16. In Spanish with English summary.
Lazo, I. & Anabalón, J. (1991). Nesting of the Common Diuca Finch in the central Chilean scrub. *Wilson Bull.* **103**: 143–146.
Le Febvre, E.A. & Warner, D.W. (1959). Molts, plumages and age groups in *Piranga bidentata* in Mexico. *Auk* **76**: 208–217.
Leader, P.J. (1994). Eurasian Reed Bunting – a brief review of its identification. *Hong Kong Bird Rep.* **1993**: 193–194.
Leader, P.J. (1996). Black-headed Bunting: the first records for Hong Kong. *Hong Kong Bird Rep.* **1995**: 129–133.
Leak, J. & Robinson, S.K. (1989). Notes on the social behavior and mating system of the Casqued Oropendola. *Wilson Bull.* **101**: 134–137.
Leary, J. & Sullivan, K.A. (1991). Intruders on Yellow-eyed Junco territories. *Wilson Bull.* **103(2)**: 292–295.
Lebbin, D.J. (2005). Aberrant plumage in a Black-and-white Tanager (*Conothraupis speculigera*). *Bol. Soc. Antioqueña Orn.* **15(2)**: 100–104.
Lebbin, D.J. (2006a). Correction of "aberrant plumage" in a Black-and-white Tanager (*Conothraupis speculigera*). *Bol. Soc. Antioqueña Orn.* **16**: 100–101.
Lebbin, D.J. (2006b). Notes on birds consuming *Gradua* bamboo seeds. *Orn. Neotropical* **17(4)**: 609–612.
Lebbin, D.J., Parr, M.J. & Fenwick, G.H. (2010). *The American Bird Conservancy Guide to Bird Conservation*. Lynx Edicions & The University of Chicago Press, Barcelona, Chicago & London.
Leberman, R.C. (1984). Rose underwings in female Rose-breasted Grosbeaks. *J. Field Orn.* **55**: 486–487.
Lebreton, P. & Thévenot, M. (2009). Comparaison de l'avifaune de sapinières et de pinèdes médio-européennes et méditerranéennes. *Rev. Écol. (Terre Vie)* **64(2)**: 171–188. In French with English summary.
Leck, C.F. (1971a). Measurement of social attractions between tropical passerine birds. *Wilson Bull.* **83**: 278–283.
Leck, C.F. (1971b). Overlap in the diet of some Neotropical birds. *Living Bird* **10**: 89–106.
Leck, C.F. (1972a). Observations of birds at *Cecropia* trees in Puerto Rico. *Wilson Bull.* **84**: 498–500.
Leck, C.F. (1972b). The impact of some North American migrants at fruiting trees in Panamá. *Auk* **89**: 842–850.
Leck, C.F. (1972c). Seasonal changes in feeding pressures of fruit- and nectar-eating birds in Panama. *Condor* **74**: 54–60.
Leck, C.F. (1974). Further observations of nectar feeding by orioles. *Auk* **91**: 162–163.
Leck, C.F. (1975). Weights of migrants and resident birds in Panamá. *Bird-Banding* **46**: 201–203.
Leck, C.F. & Hilty, S.L. (1968). A feeding congregation of local and migratory birds in the mountains of Panama. *Bird-Banding* **39**: 318.

Lee, D.S., Hallett, B. & Haney, J.C. (1999). Additions to the West Indian regional avifauna and other interesting bird records from the Bahamas. *Bahamas J. Sci.* **7(1)**: 36–39.
Lee, P.L.M., Collins, K.P., Bradbury, R.B. & Richardson, L. (2001). Loss of genetic variation in the declining Irish population of Yellowhammers *Emberiza citrinella*. *Irish Birds* **6(4)**: 590–592.
Lee, P.L.M., Richardson, L.J. & Bradbury, R.B. (2001). The phylogenetic status of the Corn Bunting *Miliaria calandra* based on mitochondrial control-region DNA sequences. *Ibis* **143(2)**: 299–303.
Lee Cinty & Birch, A. (1998). Field identification of female and immature Bullock's and Baltimore Orioles. *Birding (USA)* **30(4)**: 282–295.
Lee Won-Ho & Kwon Ki-Chung (2006). Song themes and variation of Yellow-throated Bunting (*Emberiza elegans*). *J. Ecol. & Field Biol.* **29(3)**: 219–225. In Korean with English summary.
Lees-Smith, D.T. & Madge, S.C. (1982). Aberrant Corn Bunting suggesting 'lost' male plumage. *Bull. Orn. Soc. Middle East* **9**: 5–6.
Lefebvre, G., Poulin, B. & McNeil, R. (1992). Settlement period and function of long-term territory in tropical mangrove passerines. *Condor* **94(1)**: 83–92.
Lefebvre, L., Templeton, J., Brown, K. & Koelle, M. (1997). Carib Grackles imitate conspecific and *Zenaida* dove tutors. *Behaviour* **134**: 1003–1017.
Leftwich, C. & Ritchison, G. (2008). Singing behavior of male Henslow's Sparrows (*Ammodramus henslowii*). *Bird Behaviour* **17(2)**: 35–41.
Legare, M.L., McNair, D.B., Conway, W.C. & Legare, S.A. (2000). Swamp Sparrow winter site fidelity records in Florida. *Florida Field Nat.* **28(2)**: 73–74.
LeGrand, H.E. (2005). First documented record of the Green-tailed Towhee in North Carolina. *Chat* **69(1)**: 38–40.
Lehikoinen, A., Byholm, P., Ranta, E., Saurola, P., Valkama, J., Korpimäki, E., Pietiäinen, H. & Henttonen, H. (2009). Reproduction of the Common Buzzard at its northern range margin under climatic change. *Oikos* **118**: 829–836.
Lehikoinen, E. & Sparks, T.H. (2010). Changes in migration. Pp. 89–112 in: Møller, Fiedler & Berthold (2010).
Lehikoinen, E., Sparks, T.H. & Zalakevicius, M. (2004). Arrival and departure dates. Pp. 1–31 in: Møller *et al.* (2004).
Lehmann, V.F.C. (1957). Contribuciones al estudio de la fauna de Colombia XII. *Noved. Colombianas* **3**: 101–156. In Spanish.
Leidolf, A., Nuttle, T. & Wolfe, M.L. (2007). Spatially scaled response of a Lazuli Bunting population to fire. *West. North Amer. Nat.* **67(1)**: 1–7.
Lein, M.R. & Corbin, K.W. (1990). Song and plumage phenotypes in a contact zone between subspecies of the White-crowned Sparrow (*Zonotrichia leucophrys*). *Can. J. Zool.* **68(12)**: 2625–2629.
Leitch, L. (1970). Breeding Black-crested Finches or Pigmy Cardinals (*Lophospingus pusillus*). *Aviculr. Mag.* **76**: 174–176.
Lemoine, N. & Böhning-Gaese, K. (2003). Potential impact of global climate change on species richness of long-distance migrants. *Conserv. Biol.* **17**: 577–586.
Lemoine, N., Schaefer, H.C. & Böhning-Gaese, K. (2007). Species richness of migratory birds is influenced by global climate change. *Global Ecol. Biogeogr.* **16**: 55–64.
Lemon, R.E. (1965). The song repertoires of Cardinals (*Richmondena cardinalis*) at London, Ontario. *Can. J. Zool.* **43**: 559–569.
Lemon, R.E. (1966). Geographic variation in the song of Cardinals. *Can. J. Zool.* **44**: 413–428.
Lemon, R.E. (1967). The response of Cardinals to songs of different dialects. *Anim. Behav.* **15**: 538–545.
Lemon, R.E. (1968a). The displays and call notes of Cardinals. *Can J. Zool* **46**: 141–151.
Lemon, R.E. (1968b). The relation between organisation and function of the song in Cardinals. *Behaviour* **32**: 158–178.
Lemon, R.E. (1971). Differentiation of song dialects in Cardinals. *Ibis* **113(3)**: 373–377.
Lemon, R.E. (1974). Song dialects, song matching and species recognition by Cardinals *Richmondena cardinalis*. *Ibis* **116**: 545–548.
Lemon, R.E. & Chatfield, C. (1971). Organization of song in Cardinals. *Anim. Behav.* **19**: 1–17.
Lemon, R.E. & Chatfield, C. (1973). Organization of song of Rose-breasted Grosbeaks. *Anim. Behav.* **21**: 28–44.
Lemon, R.E. & Herzog, A. (1969). The vocal behavior of Cardinals and Pyrrhuloxias in Texas. *Condor* **71**: 1–15.
Lemon, R.E. & Scott, D.M. (1966). On the development of song in young Cardinals. *Can. J. Zool.* **44**: 191–197.
Lenington, S. & Scola, R. (1982). Competition between Red-winged Blackbirds and Common Grackles. *Wilson Bull.* **94**: 90–93.
Lentino, M. & Restall, R. (2003). A new species of *Amaurospiza* blue seedeater from Venezuela. *Auk* **120**: 600–606.
Leonard, M.L. & Picman, J. (1986). Why are nesting Marsh Wrens and Yellow-headed Blackbirds spatially segregated? *Auk* **103(1)**: 135–140.
Leopold, A. & Enyon, A.E. (1961). Avian daybreak and evening song in relation to time and light intensity. *Condor* **63**: 269–293.
Ler, P.A. ed. (1989). *Redkie pozvonochnye zhivotnye sovetskogo Dal'nego Vostoka i ikh okhrana*. [*Rare Vertebrates of the Soviet Far East and their Protection*]. Nauka, Leningrad, Russia. In Russian with English summary.
Leslie, D.M. (2009). An unusual Northern Cardinal nest: cooperative breeding or nest sharing? *Bull. Okla. Orn. Soc.* **42(2)**: 5–8.
Leston, L.F.V. & Rodewald, A.D. (2006). Are urban forests ecological traps for understory birds? An examination using Northern Cardinals. *Biol. Conserv.* **131(4)**: 566–574.
Leukering, T. (2000). Ageing Green-tailed Towhees by eye color. *North Amer. Bird Bander* **25(1)**: 13–15.
Lever, C. (2005). *Naturalised Birds of the World*. T.&A.D. Poyser, London.
Levey, D.J. (1987). Seed size and fruit-handling techniques of avian frugivores. *Amer. Naturalist* **129(4)**: 471–485.
Levey, D.J. & Stiles, F.G. (1992). Evolutionary precursors of long-distance migration: resource availability and movement patterns in Neotropical landbirds. *Amer. Naturalist* **140(3)**: 447–476.
Levy, C. (1997). Nesting of an endemic Orangequit, *Euneornis campestris* (Emberizidae) in Jamaica. *Caribb. J. Sci.* **33(3/4)**: 283–284.
Levy, G. (2009). *Uso e Seleção de Habitat por* Saltator atricollis *(Aves: Cardinalidae) e* Cypsnagra hirundinacea *(Aves: Thraupidae) no Cerrado da Estação Ecológica de Itirapina. São Paulo*. MSc thesis, Universidade de São Paulo, São Paulo, Brazil. In Portuguese.
Lewin, R. (1983). Finches show competition in ecology. *Science (Washington, D.C.)* **219**: 1411–1412.
Lewington, I. (1990). Identification of female Pine Bunting. *Birding World* **3(3)**: 89–90.
Lewington, I., Alström, P. & Colston, P. (1991). *A Field Guide to the Rare Birds of Britain and Europe*. HarperCollins, London.
Lewis, A.D. & Pomeroy, D.E. (1989). *A Bird Atlas of Kenya*. A.A. Balkema, Rotterdam.
Lewis, A.R. & Yahner, R.H. (1999). Sex-specific habitat use by Eastern Towhees in a managed forested landscape. *J. Pennsylvania Acad. Sci.* **72(2)**: 77–79.
Lewis, J.B. (1931). Behavior of Rusty Blackbird. *Auk* **48**: 125–126.
Lewis, R.A., King, J.R. & Farner, D.S. (1974). Photoperiodic responses of a subtropical population of the finch *Zonotrichia capensis hypoleuca*. *Condor* **76(3)**: 233–237.
Lewis, R.A., Morton, M.L. & Farner, D.S. (1968). A second large wintering population of White-crowned Sparrows, *Zonotrichia leucophrys gambelii*, in Washington. *Condor* **70**: 280.
Lewthwaite, R.W. (1996). Forest birds in southeast China: observations during 1984–1996. *Hong Kong Bird Rep.* **1995**: 150–203.
Li Dehao, Wang Zuxiang & Jiang Zhihua (1978). Studies on the birds of southeastern Xizang, with notes on their vertical distribution. *Acta Zool. Sinica* **24(3)**: 231–250. In Chinese with English summary.
Li Peixun (1989). A preliminary study on the structure of sound of breeding Yellow-throated Bunting. *Chinese Wildl.* **1989(6)**: 47–50. In Chinese with English summary.
Li Peixun, Yu Xuefeng & Li Fangman (1991). Intraspecific individual recognition by song in Yellow-throated Bunting during breeding season. *Zool. Res.* **12(2)**: 163–168. In Chinese with English summary.
Li Qingwei, Li Shuang, Tian Chunyu, Wang Yongjun & Guo Yumei (2002). Molecular evolution and variability in mitochondrial DNA in 10 species of Passeriformes. *Curr. Zool.* [*Acta Zool. Sinica*] **48(5)**: 625–632. In Chinese with English summary.
Liang Gang, Li Tao, Yin Zuohua & Lei Fumin (2008). Molecular phylogenetic analysis of some Fringillidae species based on mitochondrial CoI gene sequences. *Zool. Res.* **29(5)**: 465–475. In Chinese with English summary.
Lichtenstein, G. (1998). Parasitism by Shiny Cowbirds of Rufous-bellied Thrushes. *Condor* **100**: 680–687.
Lichtenstein, G. (2001). Selfish begging by Screaming Cowbirds, a mimetic brood prasite of the Bay-winged Cowbird. *Anim. Behav.* **61**: 1151–1158.
Lightbody, J.P. & Weatherhead, P.J. (1987). Polygyny in the Yellow-headed Blackbird: female choice versus male competition. *Anim. Behav.* **35**: 1670–1684.
Ligon, J.S. (1961). *New Mexico Birds and Where to Find Them*. University of New Mexico Press, Albuquerque, New Mexico.
Lijtmaer, D.A., Sharpe, N.M., Tubaro, P.L. & Lougheed, S.C. (2004). Molecular phylogenetics and diversification of the genus *Sporophila* (Aves: Passeriformes). *Mol. Phylogen. Evol.* **33**: 562–579.
Lill, A. (1974). Behavior of the Grassland Sparrow and two species of seed-finches. *Auk* **91(1)**: 35–43.
Lille, R. (1996). *Zur Bedeutung von Bracheflächen für die Avifauna der Agrarlandschaft: eine nahrungsökologische Studie an der Goldammer* Emberiza citrinella. Agrarökologie **21**. Verlag Paul Haupt, Bern, Switzerland, 150 pp. In German with English summary.
Lillo, M. (1889). Apuntes sobre la fauna de la provincia de Tucumán. *Bol. Oficiana Quimica Tucumán* **2**: 73–94. In Spanish.
Lima, P.C. (2006). *Euphonia chlorotica chlorotica* (Linnaeus, 1766) – um ninho diferente: adaptação ou evolução? *Atualidades Orn.* **129**: 8–9. In Portuguese.
Lima, P.C. & Buzzetti, D.R.C. (2006). O comportamento reprodutivo da Campainha-azul (*Porphyrospiza caerulescens*) em um encrave de Cerrado no Litoral Norte da Bahia. Um ensaio fotográfico. *Atualidades Orn.* **134** (Suppl.): [1–31]. In Portuguese.
Lima, S.L., Zollner, P.A. & Bednekoff, P.A. (1999). Predation, scramble competition, and the vigilance group size effect in Dark-eyed Juncos (*Junco hyemalis*). *Behav. Ecol. Sociobiol.* **46(2)**: 110–116.
de Lima Fávaro, F. & dos Anjos, L. (2005). Microhabitat de *Habia rubica* (Vieillot) e *Trichothraupis melanops* (Vieillot) (Aves, Emberizidae, Thraupinae), em uma floresta atlântica do sul do Brasil. *Rev. Bras. Zool.* **22(1)**: 213–217. In Portuguese with English summary.
Lindell, C. (1996). Benefits and costs to Plain-fronted Thornbirds (*Phacellodomus rufifrons*) of interactions with avian nest associates. *Auk* **113**: 565–577.
Lindell, C. & Bosque, C. (1999). Notes on the breeding and roosting biology of Troupials (*Icterus icterus*) in Venezuela. *Orn. Neotropical* **10**: 85–90.
Link, R. & Ritter, M. (1973). Zum Wintervorkammen der Zaunammer *Emberiza cirlus* bei Basel. *Orn. Beob.* **70(5/6)**: 267–272. In German.
Linnaeus, C. von (1757). *Calendarium Florae. eller Blomster-Almanach* [...]. Kongl. Tryckeriet, Stockholm. In Swedish.
Linnaeus, C. von (1766). *Systema Naturae per Regna Tria Naturae. Secundum Classes, Ordines, Genera, Species cum Characteribus, Differentiis, Synonymis, Locis*. 12th edition 'reformata'. Vol. 1. Laurentius Salvius, Holmia [Stockholm].
Linnaeus, C. von (1771). *Mantissa Plantarum altera Generum Editionis VI & Specierum Editionis II*. Laurentius Salvius, Holmia [Stockholm].
Linville, S.U. & Breitwisch, R. (1997). Carotenoid availability and plumage coloration in a wild population of Northern Cardinals. *Auk* **114**: 796–800.
Linville, S.U., Breitwisch, R. & Schilling, A.J. (1998). Plumage brightness as an indicator of parental care in male and female Northern Cardinals. *Anim. Behav.* **55**: 119–127.
Lister, S.M. (2007). First record of Ortolan Bunting *Emberiza hortulana* for Ghana. *Bull. Afr. Bird Club* **14(1)**: 75–76.
Littlefield, C.D. & Pakulak, A. (1969). Arrival dates of birds at Churchill, Manitoba, 1968. *Can. Field-Nat.* **83**: 397–399.
Litwinenko, N.M. & Schibajew, J.W. (1966). Zur Brutökologie von *Emberiza jankowskii* Taczanowski. *J. Orn.* **107**: 346–351. In German.
Liu, I.A., Lohr, B., Olsen, B. & Greenberg, R. (2008). Macrogeographic vocal variation in subspecies of Swamp Sparrow. *Condor* **110(1)**: 102–109.
Liu Wanchun & Kroodsma, D.E. (2007). Dawn and daytime singing behavior of Chipping Sparrows (*Spizella passerina*). *Auk* **124(1)**: 44–52.
Llambías, P.E., Ferretti, V. & Reboreda, J.C. (2006). Egg discrimination and sex-specific pecking behaviour in parasitic cowbirds. *Ethology* **112**: 1128–1135.
Llerena de Calgua, M.C. (2006). Der Kleine Kubafink in seiner kubanischen Heimat. *Gefiederte Welt* **130(7)**: 198–200. In German.
Lloyd, H. (2009). Audio recordings of *Tachyphonus rufiventer* from Quita Calzones, Manu Road, Cuzco, Peru. Xeno-Canto, XC23256. Unpubl.
Lloyd, H., Walker, B., Chutas, C.A. & Schmitt, F. (2005). Range extension for Short-tailed Finch *Idiopsar brachyurus* in Peru with notes on its behaviour, plumage and soft-part coloration and nomenclature. *Cotinga* **23**: 48–51.
Lloyd, J., Mannan, R.W., DeStefano, S. & Kirkpatrick, C. (1998). The effects of mesquite invasion on a southeastern Arizona grassland bird community. *Wilson Bull.* **110(3)**: 403–408.
Lloyd, P. (1998). *A Study of the Ecology of Namaqua Sandgrouse and other Arid-zone Birds*. PhD thesis, University of Cape Town, Cape Town.
Lloyd, P. (1999). Rainfall as a breeding stimulus and clutch size determinant in South African arid-zone birds. *Ibis* **141**: 637–643.
Locke, L.N. (1965). Pyrrhuloxia feeding on cactus fruits. *Condor* **67(2)**: 190.
Lockwood, J.L., Fenn, K.H., Curnutt, J.L., Rosenthal, D., Balent, K.L. & Mayer, A.L. (1997). Life history of the endangered Cape Sable Seaside Sparrow. *Wilson Bull.* **109(4)**: 720–731.
Lockwood, M.W. (1995). A closer look: Varied Bunting. *Birding* **27**: 110–113.
Loftin, H. (1974). Recaptures and recoveries of banded native Panamanian birds. *Bird-Banding* **46(1)**: 19–27.
Logan, S. (1951). Cardinal, *Richmondena cardinalis*, assists in feeding of Robins. *Auk* **68**: 516–517.
Loiselle, B.A. & Blake, J.G. (1992). Population variation in a tropical bird community: implications for conservation. *BioScience* **42(11)**: 11–18.
Long, A.J. & Heath, M.F. (1994). Nesting ecology and helping behavior in the Azure-rumped Tanager in Mexico. *Condor* **96**: 1095–1099.
Long, A.M., Jensen, W.E. & With, K.E. (2009). Orientation of Grasshopper Sparrow and Eastern Meadowlark nests in relation to wind direction. *Condor* **111**: 395–399.
Long, C.A. (1963). Production of sterile eggs in the Dickcissel. *Wilson Bull.* **75(4)**: 456.
Long, C.A., Long, C.F., Knops, J. & Matulionis, D.H. (1965). Reproduction in the Dickcissel. *Wilson Bull.* **77**: 251–256.
Long, J.L. (1981). *Introduced Birds of the World: the Worldwide History, Distribution and Influence of Birds Introduced to New Environments*. David and Charles, Newton Abbot, UK.
Lönnberg, E. & Rendahl, H. (1922). A contribution to the ornithology of Ecuador. *Ark. Zool* **14**: 1–87.
de Lope, F., González, G., Pérez, J.J. & Møller, A.P. (1993). Increased detrimental effects of ectoparasites on their bird hosts during adverse environmental conditions. *Oecologia (Berlin)* **95**: 230–240.

Lopes, L.E., Malacco, G.B., Alteff, E.F., de Vasconcelos, M.F., Hoffmann, D. & Silveira, L.F. (2010). Range extensions and conservation of some threatened or little known Brazilian grassland birds. *Bird Conserv. Int.* **20**: 84–94.

López, N.E. (1996). *Evaluación del Hábitat, Densidad Relativa y Situación del Chopí Sayju (*Agelaius flavus*) en San Miguel Potrero, Departamento Itapúa, Paraguay*. Entidad Binacional Yacyretá, Ayolas, Paraguay. In Spanish.

López-Calleja, M.V. & Estades, C.F. (1996). Natural history of the Tamarugo Conebill (*Conirostrum tamarugense*) during the breeding period: diet and habitat preferences. *Rev. Chilena Hist. Nat.* **69(3)**: 351–356.

López-Lanus, B. (2001). Audio recordings of *Conirostrum bicolor* from Salamanca National Park, Colombia. Xeno-Canto, XC56980. Unpubl.

López-Lanús, B. (2005a). Field notes and voices of Colombian icterids. Unpubl.

López-Lanús, B. (2005b). Recordings of songs and calls of *Molothrus armenti*. Unpubl.

López-Lanus, B. (2007). Audio recordings of *Conirostrum rufum* from Bogotá, Colombia. Xeno-Canto, XC57456, XC57458. Unpubl.

López-Lanús, B. ed. (2008). *Bird Sounds from Southern South America. Sonidos de Aves del Cono Sur.* DVD. Audiornis Producciones, Buenos Aires, Argentina. In Spanish and English.

López-Lanús, B., Roesler, I., Blanco, D.E., Petracci, P.F., Serra, M. & Zaccagnini, M.E. (2007). Bobolink (*Dolochonyx oryzivorus*) numbers and non breeding ecology in the ricefields of San Javier, Santa Fe Province, Argentina. *Orn. Neotropical* **18**: 493–502.

López-Ortiz, R., Ventosa-Febles, E.A., Reitsma, L.R., Hengstenberg, D. & Deluca, W. (2002). Increasing nest success in the Yellow-shouldered Blackbird *Agelaius xanthomus* in southwest Puerto Rico. *Biol. Conserv.* **108(2)**: 259–263.

Lorenzana, J.C. & Sealy, S.G. (1996). Are begging calls of generalist parasitic cowbirds adapted for brood parasitism? *UFS (Delta Marsh) Ann. Rep.* **31**: 85–93.

Losada-Prado, S., Gonzalez-Prieto, A.M., Carvajal-Lozano, A.M. & Molina-Martínez, Y.G. (2005). Especies endémicas y amenazadas registradas en la cuenca del rio Coello (Tolima) durante estudios rápidos en 2003. *Orn. Colombiana* **3**: 76–80. In Spanish with English summary.

Losada-Prado, S., Parra-Hernández, R.M. & Carvajal-Lozano, M.A. (2004). Nuevos registros del Turpial Amarillo (*Icterus nigrogularis*) en la parte alta del valle del Magdalena. *Bol. Soc. Antioqueña Orn.* **14(26/27)**: 33–35. In Spanish with English summary.

Loskot, V. (1986). [Geographic variations of Pallas's Reed Bunting *Emberiza pallasi* (Cabanis) and its taxonomic value]. *Trudy Zool. Inst. (Leningr.)* **150**: 147–170. In Russian.

Lougheed, S.C. (1991). Nueva localidad para la Corbatita ala Blanca, *Sporophila leucoptera* (Vieillot). *Nuestras Aves* **24**: 25. In Spanish.

Lougheed, S.C. & Handford, P. (1992). Vocal dialects and the structure of geographic variation in morphological and allozymic characters in the Rufous-collared Sparrow, *Zonotrichia capensis*. *Evolution* **46(5)**: 1443–1456.

Lougheed, S.C. & Handford, P. (1993). Covariation of morphological and allozyme frequency characters in populations of the Rufous-collared Sparrow (*Zonotrichia capensis*). *Auk* **110(2)**: 179–188.

Lougheed, S.C., Freeland, J.R., Handford, P. & Boag, P.T. (2000). A molecular phylogeny of warbling-finches (*Poospiza*): paraphyly in a neotropical Emberizid genus. *Mol. Phylogen. Evol.* **17**: 367–378.

Lovette, I.J. & Bermingham, E. (2002). What is a wood-warbler? Molecular characterization of a monophyletic Parulidae. *Auk* **119(3)**: 695–714.

Lovette, I.J., Rickleffs, R.E. & Bermingham, E. (1999). Mitochondrial DNA phylogeography and the conservation of endangered Lesser Antillean *Icterus* orioles. *Conserv. Biol.* **13(5)**: 1088–1096.

Lovette, I.J., Seutin, G., Ricklefs, R.E. & Bermingham, E. (1999). The assembly of an island fauna by natural invasion: sources and temporal patterns in the avian colonization of Barbados. *Biol. Invasions* **1(1)**: 33–41.

Lowe, P.R. (1923). Notes on some land birds of the Tristan da Cunha group collected by the Quest Expedition. *Ibis* **Ser. 11, no. 5**: 511–529.

Lowen, J.C., Benitez, S. & López-Lanús, B. (2000). Additional breeding data for Tanager-finch *Oreothraupis arremonops*. *Cotinga* **13**: 67.

Lowen, J.C., Clay, R.P., Mazar Barnett, J., Madroño, A., Pearman, M., López Lanús, B., Tobias, J.A., Liley, D.C., Brooks, T.M., Esquivel, E.Z. & Reid, J.M. (1997). New and noteworthy observations on the Paraguayan avifauna. *Bull. Brit. Orn. Club* **117(4)**: 275–293.

Lowery, G.H. (1974). *Louisiana Birds*. Louisiana State Univerity Press, Baton Rouge, Louisiana.

Lowery, G.H. & Dalquest, W. (1951). Birds from the State of Veracruz, Mexico. *Univ. Kansas Publ. Mus. Nat. Hist.* **3**: 531–649.

Lowery, G.H. & O'Neill, J.P. (1964). A new genus and species of tanager from Peru. *Auk* **81**: 125–131.

Lowery, G.H. & O'Neill, J.P. (1965). A new species of *Cacicus* (Aves: Icteridae) from Peru. *Occas. Pap. Mus. Zool. Louisiana State Univ.* **33**: 1–5.

Lowery, G.H. & Tallman, D.A. (1976). A new genus and species of nine-primaried oscine of uncertain affinities from Peru. *Auk* **93**: 415–428.

Lowther, J.K. & Falls, J.B. (1968). White-throated Sparrow. Pp. 1364–1392 in: Bent & Austin (1968).

Lowther, P.E. (1975). Geographic and ecological variation in the family Icteridae. *Wilson Bull.* **87**: 481–495.

Lowther, P.E. (1977). Old cowbird records from the Great Plains region. *Bird-Banding* **48**: 358–369.

Lowther, P.E. (1993). Brown-headed Cowbird (*Molothrus ater*). No. **47** in: Poole, A.F. & Gill, F.B. eds. (1993). *The Birds of North America*. Vol. 2. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.

Lowther, P.E. (1995). Bronzed Cowbird (*Molothrus aeneus*). No. **144** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 4. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.

Lowther, P.E. (1996). Le Conte's Sparrow (*Ammodramus leconteii*). No. **224** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 6. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Lowther, P.E. (2001). New name for the Bolivian Blackbird. *Bull. Brit. Orn. Club* **121**: 280–281.

Lowther, P.E. & James L.I. (2011). Blue Grosbeak (*Passerina caerulea*). No. **79** in: Poole, A. ed. (2010). The birds of North America online. Cornell Lab of Ornithology, Ithaca. URL: http://bna.birds.cornell.edu/bna/species/079 (download 23 April 2011).

Lowther, P.E. & Post, W. (1999). Shiny Cowbird (*Molothrus bonariensis*). No. **399** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.

Lowther, P.E., Fraga, R.M., Schulenberg, T.S. & Lanyon, S.M. (2004). Nomenclatural solution for a polyphyletic *Agelaius*. *Bull. Brit. Orn. Club* **124(3)**: 171–177.

Lowther, P.E., Groschupf, K.D. & Russell, S.M. (1999). Rufous-winged Sparrow (*Aimophila carpalis*). No. **422** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 11. The Birds of North America Inc., Philadelphia, Pennsylvania.

Lowther, P.E., Lanyon, S.M. & Thompson, C.W. (1999). Painted Bunting (*Passerina ciris*). No. **398** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.

Lucero, M.M. (1982). *El Anillado de Aves en la República Argentina*. Miscelánea **74**. Fundación M. Lillo, Tucumán, Argentina. In Spanish.

Lücking, A. & Lücking, R. (1994). *Passerina cyanea* (Passeriformes, Emberizidae), nuevo informe ornitológico para la Isla del Coco, Costa Rica. *Rev. Biol. Trop. (Univ. Costa Rica)* **41(3B)**: 928–929. In Spanish.

Ludwig, C.A. (1998). Type locality and taxonomic status of *Saltator plumbiceps* "Baird, MS." Lawrence, 1867 (Aves: Passeriformes: Cardinalidae). *Proc. Biol. Soc. Washington* **111(2)**: 418–419.

Luscier, J.D., Lehnen, S.E. & Smith, K.G. (2010). Habitat occupancy by Rusty Blackbirds wintering in the lower Mississippi Alluvial Valley. *Condor* **112(4)**: 841–848.

Lusk, J.J., Wells, K.S., Guthery, F.S. & Fuhlendorf, S.D. (2003). Lark Sparrow (*Chondestes grammacus*) nest-site selection and success in a mixed-grass prairie. *Auk* **120(1)**: 120–129.

Lynn, S.E. & Hayward, L.S. (2003). Apparent depredation of Chestnut-collared Longspur nestlings by the Brown-headed Cowbird. *Western Birds* **34(1)**: 45–48.

Lynn, S.E. & Wingfield, J.C. (2008). Dissociation of testosterone and aggressive behavior during the breeding season in male Chestnut-collared Longspurs, *Calcarius ornatus*. *Gen. Comp. Endocrinol.* **156(1)**: 181–189.

Lynn, S.E., Hayward, L.S., Benowitz-Fredericks, Z.M. & Wingfield, J.C. (2002). Behavioural insensitivity to supplementary testosterone during the parental phase in the Chestnut-collared Longspur, *Calcarius ornatus*. *Anim. Behav.* **63(4)**: 795–803.

Lynn, S.E., Hunt, K.E. & Wingfield, J.C. (2003). Ecological factors affecting the adrenocortical response, to stress in Chestnut-collared and McCown's Longspurs (*Calcarius ornatus*, *Calcarius mccownii*). *Physiol. Biochem. Zool.* **76(4)**: 566–576.

Lyon, B.E. (1997). Spatial patterns of Shiny Cowbird brood parasitism on Chestnut-capped Blackbirds. *Anim. Behav.* **54**: 927–939.

Lyon, B.E. & Montgomerie, R.D. (1985). Incubation feeding in Snow Buntings: female manipulation or indirect male parental care? *Behav. Ecol. Sociobiol.* **17**: 279–284.

Lyon, B.E. & Montgomerie, R.D. (1995). Snow Bunting (*Plectrophenax nivalis*) and McKay's Bunting (*Plectrophenax hyperboreus*). No. **198–199** in: Poole, A. & Gill, F. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Lyon, D.L. & Chadek, C. (1971). Exploitation of nectar resources by hummingbirds, bees (*Bombus*) and *Diglossa baritula* and its role in the evolution of *Penstemon kunthii*. *Condor* **73**: 246–248.

de Lyra-Neves, R.M., Dias, M.M., de Azevedo, S.M., Rodrigues Telino, W. & de Larrazábal, M.E.L. (2004). Comunidade de aves da Reserva Estadual de Gurjaú, Pernambuco, Brasil. *Rev. Bras. Zoologia* **21(3)**: 581–592. In Portuguese with English summary.

Lysinger, M., Moore, J.V., Krabbe, N., Coopmans, P., Lane, D.F., Navarrette, L., Nilsson, J. & Ridgely, R.S. (2005). *The Birds of Eastern Ecuador*. Vol. 1. The foothills and lower slopes. John V. Moore Nature Recordings, San José, California.

Macdonald, D. & Wessels, P. (1998). The Chestnut Bunting in Norfolk. *Birding World* **11(6)**: 217–219.

MacDougall-Shackleton, E.A., Stewart, K.A., Potvin, D.A. & Tennenhouse, E. (2009). The rich get richer: song complexity predicts song element sharing and song output in Song Sparrows *Melospiza melodia*. *Anim. Behav.* **78(1)**: 141–146.

MacFarland, C.G. & Reeder, W.G. (1974). Clearing symbiosis involving Galápagos tortoises and two species of Darwin's finches. *Z. Tierpsychol.* **34(5)**: 464–483.

Machado, C.G. (1999). A composição dos bandos mistos de aves na Mata Atlântica da Serra de Paraná piaçaba, no sudeste Brasileiro. *Revista Brasileira de Biologia* **59(1)**: 75–85. In Portuguese with English summary.

Machado, C.G. (2002). As espécies-núcleo dos bandos mistos de aves da mata atlântica da Serra de Paraná piaçaba, no sudeste Brasileiro. *Sitientibus Ser. Cienc. Biol.* **2(1/2)**: 85–90. In Portuguese.

Machado, É. & Silveira, L.F. (2011). Plumage variability and taxonomy of the Capped Seedeater *Sporophila bouvreuil* (Aves: Passeriformes: Emberizidae). *Zootaxa* **2781**: 49–62.

Machado, R.B., Rigueira, S.E. & Lins, L.V. (1998). Expansão geográfica do Cánario-rabudo (*Embernagra longicauda* – Aves, Emberizidae) em Minas Gerais. *Ararajuba* **6(1)**: 42–45. In Portuguese with English summary.

MacKinnon, J.R. & Phillipps, K. (2000). *A Field Guide to the Birds of China*. Oxford University Press, Oxford, UK.

MacLean, R.B. (1886). Spotted eggs of Indigo Buntings. *Oologist* **3**: 55.

MacLeod, C.J., Duncan, R.P., Parish, D.M.B., Wratten, S.D. & Hubbard, S.F. (2005). Can increased niche opportunities and release from enemies explain the success of introduced Yellowhammer populations in New Zealand? *Ibis* **147(3)**: 598–607.

MacLeod, C.J., Parish, D.M.B., Duncan, R.P., Moreby, S. & Hubbard, S.F. (2005). Importance of niche quality for Yellowhammer *Emberiza citrinella* nestling survival, development and body condition in its native and exotic ranges: the role of diet. *Ibis* **147(2)**: 270–282.

MacLeod, C.J., Parish, D.M.B., Duncan, R.P., Wratten, S.D. & Hubbard, S.F. (2005). Do Yellowhammers *Emberiza citrinella* achieve higher breeding productivity in their introduced range than in their native range? *Bird Study* **52(2)**: 217–220.

Maddox, J.D. & Bollinger, E.K. (2000). Male Dickcissels feed nestlings in east-central Illinois. *Wilson Bull.* **112(1)**: 153.

Madroño, A. & Esquivel, E. (1995). Reserva Natural de Bosque Mbaracayú: su importancia en la conservación de aves amenazadas, cuasi-amenazadas y endémicas del Bosque Atlántico. *Cotinga* **4**: 52–57. In Spanish.

Madroño, A., González, C. & Atienza, J.C. eds. (2004). *Libro Rojo de las Aves de España*. Dirección General para la Biodiversidad-SEO & BirdLife, Madrid. In Spanish.

Madsen, J. (1982). Timing of breeding and reproductive success in a Lapland Bunting *Calcarius lapponicus* population in Eqalungmiut Nunaat, West Greenland. *Dansk Orn. Foren. Tidsskr.* **76**: 137–145.

Maeda, T. & Yoshida, H. (2009). Responses of birds in rice fields to winter flooding. *Jap. J. Orn.* **58(1)**: 55–64. In Japanese with English summary.

Maeda, T., Yonemori, Y. & Ikenaga, H. (2008). The first record of Song Sparrow *Melospiza melodia* on Mishima Island, Yamaguchi Prefecture, Japan. *Jap. J. Orn.* **57(2)**: 160–163. In Japanese.

Magyar, G. & Waliczy, Z. (1995). The breeding of Cirl Bunting (*Emberiza cirlus*) in Hungary. *Aquila* **102**: 85–97.

Mah, J. & Neuchterlein, G.L. (1991). Feeding behavior of Red-winged Blackbirds on bird-resistant sunflowers. *Wildl. Soc. Bull.* **19**: 39–46.

Mahony, N.A., Krannitz, P.G. & Martin, K. (2006). Seasonal fecundity of Sagebrush Brewer's Sparrow (*Spizella breweri breweri*) at the northern edge of its breeding range. *Auk* **123(2)**: 512–523.

Mahony, N.A., Vander Haegen, W.M., Walker, B.L. & Krannitz, P.G. (2001). Male incubation and multiple brooding in Sagebrush Brewer's Sparrows. *Wilson Bull.* **113(4)**: 441–444.

Maia, R. & Macedo, R.H. (2011). Achieving luster: prenuptial molt pattern predicts iridescent structural coloration in Blue-black Grassquits. *J. Orn.* **152(2)**: 243–252.

Maillard, O. & Catari, J.C. (2004). El Azulillo Brasileño (*Porphyrospiza caerulescens*) en la región subandina de Bolivia. *Orn. Neotropical* **15(3)**: 399–402. In Spanish.

Maillard, O. & Herrera, M. (2007). El nido y huevos del Tortolito (*Lampropsar tanagrinus*) en el noreste de Bolivia. *Kempffiana* **3**: 25–27. In Spanish.

Maillard, O., Vidoz, J.Q. & Herrera, M. (2008). Registros significativos de aves para el departamento del Beni, Bolivia. Part 2. *Kempffiana* **4**: 8–12. In Spanish.

Mailliard, J.W. (1921). Notes on the nesting of the Yosemite Fox Sparrow, Calliope Hummingbird and Western Wood Pewee at Lake Tahoe, California. *Condor* **23**: 73–77.

Mainardi, D. (1957). L'evoluzione nei fringillidi. Concordanza fra una "mappa sierologica" e i dati dell'analisi electroforetica della emoglobine. *Rendic. Istit. Lombardo Sci. Lett. (B Biol. Med.)* **92**: 180–186. In Italian.

Makatsch, W. (1979). Die Kappenammer. *Vögel der Heimat* **49(8)**: 163–166. In German.

Maki, H. & Onishi, T. (2000). [*A Photographic Guide to the Birds of Japan*]. Heibonsha, Tokyo. In Japanese.

Málaga-Arenas, E. & González, O. (2002). Southern range extension for the Parrot-billed Seedeater *Sporophila peruviana*. *Cotinga* **17**: 79–80.

Maldonado-Coelho, M. & Duraes, R. (2003). The Black-goggled Tanager (*Trichothraupis melanops*): an occasional kleptoparasite in mixed-species bird flocks and ant swarms of southeastern Brazil. *Orn. Neotropical* **14(3)**: 397–403.

Maley, J.M. & Winker, K. (2007). Use of juvenal plumage in diagnosing species limits: an example using buntings in the genus *Plectrophenax*. *Auk* **124(3)**: 907–915.
Maley, J.M. & Winker, K. (2010). Diversification at high latitudes: speciation of buntings in the genus *Plectrophenax* inferred from mitochondrial and nuclear markers. *Mol. Ecol.* **19(4)**: 785–797.
Mallet-Rodrigues, F. & Marinho de Noronha, M.L. (2009). Birds in the Parque Estadual dos Três Picos, Rio de Janeiro state, south-east Brazil. *Cotinga* **31**: 96–107.
Mallet-Rodrigues, F., Marinho de Noronha, M.L. & Parrini, R. (2001). Alimentação do Tiê-de-topete (*Trichothraupis melanops*) em um trecho de Mata Atlântica do Sudeste do Brasil. *Tangara* **1(3)**: 125–129. In Portuguese with English summary.
Maney, D.L., Davis, A.K., Goode, C.T., Reid, A. & Showalter, C. (2008). Carotenoid-based plumage coloration predicts leukocyte parameters during the breeding season in Northern Cardinals (*Cardinalis cardinalis*). *Ethology* **114(4)**: 369–380.
Mann, P., Herlyn, H. & Untheim, H. (1990). Bestandssituation und Habitat der Zippammer *Emberiza cia* im Südschwarzwald. *Vogelwelt* **111(4)**: 142–155. In German.
Manolis, T.D. (1982). *Host Relationships and Breeding Strategies of the Shiny Cowbird in Trinidad and Tobago*. PhD thesis, University of Colorado, Boulder, Colorado.
Marantz, C.A. & Remsen, J.V. (1994). First records of *Tangara cyanicollis melanogaster* from Bolivia. *Bull. Brit. Orn. Club* **114(4)**: 230–231.
Marantz, C.A. & Zimmer, K.J. (2006). *Bird Voices of Alta Floresta and Southeastern Amazonian Brazil*. CD 6. Cornell Laboratory of Ornithology, Ithaca, New York.
Marcgraf, G. & Piso, W. ed. (1648). *Historia Naturalis Brasiliae* [...] *in qua non Tantum Plantæ et Animalia, sed et Indigenarum Morbi, Ingenia et Mores Describuntur et Iconibus Supra Quingentas Illustrantur*. F. Hackium & L. Elzevirium, Lugdunum Batavorum [Leiden] & Amstelodamum [Amsterdam].
March, W.T. (1863). Notes on the birds of Jamaica. *Proc. Acad. Nat. Sci. Philadelphia* **6**: 283–304.
Marchant, S. (1958). The birds of the Santa Elena Peninsula, S.W. Ecuador. *Ibis* **100(3)**: 349–387.
Marchant, S. (1959). The breeding season in S.W. Ecuador. *Ibis* **101**: 137–152.
Marchant, S. (1960). The breeding of some S.W. Ecuadorian birds. Part 2. *Ibis* **102(4)**: 584–599.
Marcondes-Machado, L.O. (1982a). Notas sobre a reprodução de *Sporophila albogularis* (Spix 1825) (Passeriformes, Emberizidae) em cativeiro. *Iheringia (Sér. Zool.)* **61**: 81–89. In Portuguese.
Marcondes-Machado, L.O. (1982b). Poliginia em *Sicalis flaveola brasiliensis* (Gmelin, 1789) (Passeriformes, Emberizidae). *Rev. Bras. Zool.* **1(1)**: 95–99. In Portuguese with English summary.
Marcondes-Machado, L.O. (1988a). Comportamento reprodutivo de *Volatinia jacarina jacarina* (Linnaeus, 1766) em cativeiro (passeres, Emberizidae). *Rev. Bras. Zool.* **4(4)**: 319–330. In Portuguese with English summary.
Marcondes-Machado, L.O. (1988b). Experiência de repovoamento com *Sicalis flaveola brasiliensis* (Gmelin, 1789) (Passeriformes, Emberizidae) em área destinada à pecuária leiteira. *Rev. Bras. Zool.* **5(2)**: 193–200. In Portuguese with English summary.
Marcondes-Machado, L.O. (1988c). Divisão de trabalho em cuidados à prole em *Sicalis flaveola* (Linnaeus, 1766) (Passeriformes, Emberizidae), em cativeiro. *Rev. Bras. Zool.* **5(2)**: 201–208. In Portuguese with English summary.
Marcondes-Machado, L.O. (1988d). Biología y conducta reproductiva de *Ammodramus humeralis*. *Hornero* **13(1)**: 71–74. In Spanish with English summary.
Marcondes-Machado, L.O. (1994). Biologia e comportamento de *Tiaris fuliginosa fuliginosa* (Wied, 1831) em cativeiro (Passeriformes, Emberizidae). *Iheringia (Sér. Zool.)* **77**: 15–23. In Portuguese with English summary.
Marcondes-Machado, L.O. (1997). Comportamento social de *Sicalis flaveola brasiliensis* em cativeiro (Passeriformes, Emberizidae). *Iheringia (Sér. Zool.)* **82**: 151–158. In Portuguese with English summary.
Marcondes-Machado, L.O. (1998). Comportamento reprodutivo de *Sporophila lineola* (Linnaeus) (Passeriformes, Emberizidae). *Rev. Bras. Zool.* **14(3)**: 517–522. In Portuguese with English summary.
Marcus, M.J. (1983). Additions to the avifauna of Honduras. *Auk* **100**: 621–629.
Margoliash, D., Staicer, C.A. & Inoue, S.A. (1991). Stereotyped and plastic song in adult Indigo Buntings, *Passerina cyanea*. *Anim. Behav.* **42**: 367–388.
Margoliash, D., Staicer, C.A. & Inoue, S.A. (1994). The process of syllable acquisition in adult Indigo Buntings, *Passerina cyanea*. *Behaviour* **131**: 39–64.
Marín, M. (2000). The Shiny Cowbird (*Molothrus bonariensis*) in Chile: introduction or dispersion? Its hosts and parasitic trends. *Orn. Neotropical* **11(4)**: 285–296.
Marín, M. & Schmitt, N.J. (1991). Nests and eggs of some Costa Rican birds. *Wilson Bull.* **103(3)**: 506–509.
Marín, M., Carrión, J.M. & Sibley, F.C. (1992). New distributional records for Ecuadorian birds. *Orn. Neotropical* **3(1)**: 27–34.
Marin, M., Kiff, L.F. & Peña, L. (1989). Notes on Chilean birds, with descriptions of two new subspecies. *Bull. Brit. Orn. Club* **109(2)**: 66–82.
Marjakangas, A. (1981). Snow Buntings *Plectrophenax nivalis* burrowing in the snow. *Ornis Fenn.* **58(2)**: 89–90. In Finnish with English summary.
Markert, J.A., Grant, P.R., Grant, B.R., Keller, L.F., Coombs, J.L. & Petren, K. (2004). Neutral locus heterozygosity, inbreeding and survival in Darwin's ground finches (*Geospiza fortis* and *G. scandens*). *Heredity* **92(4)**: 306–315.
Markham, B.J. (1970). Reconocimiento faunístico del área de los fiordos Toro y Cóndor, isla Riesco, Magallanes. *An. Inst. Patagonia* **1**: 41–59. In Spanish.
Markham, B.J. (1971). Descripción de una nueva subespecie de "tordo", *Curaeus curaeus recurvirostris*, subsp. nov. *An. Inst. Patagonia* **2**: 158–159. In Spanish.
Markle, J.M. (1946). A nesting site of the Lark Sparrow. *Condor* **48**: 245–246.
Marks, J.S. & Nordhagen, T. (2005). Type locality of *Ammodramus bairdii* (Audubon). *Auk* **122(1)**: 349–350.
Marler, P. (1969). Tonal quality of bird sounds. Pp. 5–18 in: Hinde, R.A. ed. (1969). *Bird Vocalizations. Essays Presented to W. H. Thorpe*. Cambridge University Press, Cambridge, UK.
Marler, P. & Peters, S. (1982). Structural changes in song ontogeny in the Swamp Sparrow *Melospiza georgiana*. *Auk* **99(3)**: 446–458.
Marler, P. & Peters, S. (1987). A sensitive period for song acquisition in the Song Sparrow, *Melospiza melodia*: a case of age-limited learning. *Ethology* **76(2)**: 89–100.
Marler, P. & Peters, S. (1988a). Sensitive periods for song acquisition from tape recordings and live tutors in the Swamp Sparrow, *Melospiza georgiana*. *Ethology* **77(1)**: 76–84.
Marler, P. & Peters, S. (1988b). The role of song phenology and syntax in vocal learning preferences in the Song Sparrow, *Melospiza melodia*. *Ethology* **77(2)**: 125–149.
Marler, P. & Pickert, R. (1984). Species-universal microstructure in the learned song of the Swamp Sparrow (*Melospiza georgiana*). *Anim. Behav.* **32(3)**: 673–689.
Marler, P. & Slabbekoorn, H. (2004). *Nature's Music: the Science of Birdsong*. Elsevier Academic Press, San Diego, California.
Marone, L. (1992a). Estatus de residencia y categorización trófica de las especies de aves en la reserva de la biosfera de Ñacuñán, Mendoza. *Hornero* **13**: 207–210. In Spanish.
Marone, L. (1992b). Seasonal and year-to-year fluctuations of bird populations and guilds in the Monte Desert, Argentina. *J. Field Orn.* **63**: 294–308.
Marone, L., de Casenave, J.L. & Cueto, V.R. (1997). Patterns of habitat selection by wintering and breeding granivorous birds in the central Monte Desert, Argentina. *Rev. Chilena Hist. Nat.* **70**: 73–81.
Marone, L., de Casenave, J.L., Milesi, F.A. & Cueto, V.R. (2008). Can seed-eating birds exert top-down effects on grasses of the Monte Desert? *Oikos* **117**: 611–619.
Marr, A.B., Keller, L.F. & Arcese, P. (2002). Heterosis and outbreeding depression in descendants of natural immigrants to an inbred population of Song Sparrows (*Melospiza melodia*). *Evolution* **56(1)**: 131–142.
Marra, P.P. (1990). Nest, eggs, and young of the Green-and-gold Tanager, with notes on timing of breeding. *Wilson Bull.* **102(2)**: 346–348.
Marra, P.P., Francis, C.M., Mulvihill, R.S. & Moore, F.R. (2005). The influence of climate on the timing and rate of spring bird migration. *Oecologia (Berlin)* **142**: 307–315.
Marshall, D.B., Hunter, M.G. & Contreras, A.L. eds. (2003). *Birds of Oregon: a General Reference*. Oregon State University Press, Corvallis, Oregon.
Marshall, J.T. (1957). *Birds of Pine-oak Woodland in Southern Arizona and Adjacent Mexico*. Pacific Coast Avifauna **32**. Cooper Ornithological Club, Berkeley, California. 125 pp.
Marshall, J.T. (1960). Interrelations of Abert and Brown Towhees. *Condor* **62**: 49–64.
Marshall, J.T. & Johnson, R.R. (1968). *Pipilo fuscus mesoleucus*, Canyon Brown Towhee. Pp. 622–630 in: Bent & Austin (1968).
Marshall, R.M. & Reinert, S.E. (1990). Breeding ecology of Seaside Sparrows in a Massachusetts salt marsh. *Wilson Bull.* **102(3)**: 501–513.
Martens, J. (1979). Gesang und Verwandtschaft des Steinortolans (*E. buchanani*). *Natur und Museum* **109**: 337–343. In German.
Marthinsen, G., Kleven, O., Brenna, E. & Lifjeld, J.T. (2005). Part-time mate guarding affects paternity in male Reed Buntings (*Emberiza schoeniclus*). *Ethology* **111(4)**: 397–409.
Martí, R. & del Moral, J.C. eds. (2003). *Atlas de las Aves Reproductoras de España*. Dirección General de Conservación de la Naturaleza & Sociedad Española de Ornitología, Madrid. In Spanish.
Martin, J.W. & Carlson, B.A. (1998). Sage Sparrow (*Amphispiza belli*). No. **326** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 9. The Birds of North America Inc., Philadelphia, Pennsylvania.
Martin, J.W. & Parrish, J.R. (2000). Lark Sparrow (*Chondestes grammacus*). No. **488** in: Poole, A. & Gill, F. eds. (2000). *The Birds of North America*. Vol. 13. The Birds of North America Inc., Philadelphia, Pennsylvania.
Martin, K., Hannon, S. & Moses, R. (1981). Nesting of Smith's Longspurs in British Columbia. *Can. Field-Nat.* **95(4)**: 469–470.
Martin, L.C. (1993). *The Folklore of Birds*. The Globe Pequot Press, Old Saybrook, Connecticut.
Martin, M., Camfield, A.F. & Martin, K. (2009). Demography of an alpine population of Savannah Sparrows. *J. Field Orn.* **80(3)**: 253–264.
Martin, P.R., Bonier, F. & Moore, I.T. (2009). First observation of sap well use and maintenance by the Glossy Flowerpiercer (*Diglossa lafresnayii*) (Thraupidae). *Wilson J. Orn.* **121(1)**: 213–215.
Martin, P.S., Robins, C.R. & Heed, W.B. (1954). Birds and biogeography of the Sierra de Tamaulipas, an isolated pine-oak habitat. *Wilson Bull.* **66**: 38–57.
Martin, S.G. (1974). Adaptations for polygynous breeding in the Bobolink, *Dolichonyx oryzivorus*. *Amer. Zool.* **14**: 109–119.
Martin, S.G. (2002). Brewer's Blackbird (*Euphagus cyanocephalus*). No. **616** in: Poole, A.F. & Gill, F.B. eds. (2002). *The Birds of North America*. Vol. 16. The Birds of North America Inc., Philadelphia, Pennsylvania.
Martin, S.G. & Gavin, T.A. (1995). Bobolink (*Dolichonyx oryzivorus*). No. **176** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Martínez-Meyer, E., Peterson, A.T. & Navarro-Sigüenza, A.G. (2004). Evolution of seasonal ecological niches in the *Passerina* buntings (Aves: Cardinalidae). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **271**: 1151–1157.
Martínez-Sánchez, J.C. (1989). Records of new or little known birds for Nicaragua. *Condor* **91(2)**: 468–469.
Martínez-Vilalta, J., Bertolero, A., Bigas, D., Paquet, J.Y. & Martínez-Vilalta, A. (2002). Habitat selection of passerine birds nesting in the Ebro Delta reedbeds (NE Spain): management implications. *Wetlands* **22(2)**: 318–325.
Masatomi, H. & Kobayashi, S. (1982). Mating behaviour of the Yellow-breasted Bunting *Emberiza aureola*. *J. Yamashina Inst. Orn.* **14(2/3)**: 306–324.
Mascher, J.W. & Stolt, B.O. (1961). The activity of the Ortolan Bunting (*Emberiza hortulana* L.) as influenced by air pressure variations in the spring migratory period. *Vår Fågelvärld* **20**: 110–111.
Mason, N.A. & Burns, K.J. (2010). Giant Conebill (*Oreomanes fraseri*). In: Schulenberg, T.S. ed. (2010). Neotropical birds online. Cornell Lab of Ornithology, Ithaca. URL: http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=589196 (download 05 November 2010).
Mason, P. (1980). *Ecological and Evolutionary Aspects of Host Selection in Cowbirds*. PhD thesis, University of Texas, Austin, Texas.
Mason, P. (1985). The nesting biology of some passerines of Buenos Aires, Argentina. Pp. 954–974 in: Buckley *et al.* (1985).
Mason, P. (1986a). Brood parasitism in a host generalist, the Shiny Cowbird: I. The quality of different species as hosts. *Auk* **103**: 52–60.
Mason, P. (1986b). Brood parasitism in a host generalist, the Shiny Cowbird: II. Host selection. *Auk* **103**: 61–69.
Mason, P. (1987). Pair formation in cowbirds: evidence found for Screaming but not Shiny Cowbirds. *Condor* **89**: 349–356.
Mason, P. & Rothstein, S.I. (1986). Coevolution and avian brood parasitism: cowbird eggs show evolutionary response to host discrimination. *Evolution* **40**: 1207–1214.
Mason, P. & Rothstein, S.I. (1987). Crypsis versus mimicry and the color of Shiny Cowbird eggs. *Amer. Naturalist* **130**: 161–167.
Mason, V. (1992). Cassin's Sparrow in Greer County, Oklahoma, in October. *Bull. Okla. Orn. Soc.* **25(1)**: 6–7.
Massa, B. & Fontana, P. (2004). New or little known birds for the Republic of Georgia (eastern Europe). *Riv. Ital. Orn.* **73(2)**: 151–155.
Masson-Delmotte, V., Delmotte, M., Morgan, V., Etheridge, D., van Ommen, T., Tartarin, S. & Hoffmann, G. (2003). Recent southern Indian Ocean climate variability inferred from a Low Dome ice core, new insights for the interpretation of coastal Antarctic isotopic records. *Climate Dynamics* **21(2)**: 153–166.
Massoni, V. & Reboreda, J.C. (1999). Egg puncture allows Shiny Cowbirds to assess host egg development and suitability for parasitism. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **266**: 1871–1874.
Massoni, V. & Reboreda, J.C. (2001). Number of close spatial and temporal neighbors decreases the probability of nest failure and Shiny Cowbird parasitism in colonial nesting blackbirds. *Condor* **103**: 521–529.
Massoni, V. & Reboreda, J.C. (2005). Sexual dimorphism and parental care in the Yellow-winged Blackbird (*Agelaius thilius*). *Orn. Neotropical* **16**: 551–555.
Matessi, G., Dabelsteen, T. & Pilastro, A. (2000). Responses to playback of different subspecies songs in the Reed Bunting *Emberiza schoeniclus*. *J. Avian Biol.* **31(1)**: 96–101.
Matessi, G., Dabelsteen, T. & Pilastro, A. (2001). Subspecies song discrimination in a Mediterranean population of the Reed Bunting *Emberiza schoeniclus intermedia*. *Ital. J. Zool.* **68(4)**: 311–314.
Matessi, G., Griggio, M. & Pilastro, A. (2002). The geographical distribution of populations of the large-billed subspecies of Reed Bunting matches that of its main winter food. *Biol. J. Linn. Soc.* **75(1)**: 21–26.
Matessi, G., Pilastro, A. & Marin, G. (2000). Variation in quantitative properties of song among European populations of Reed Bunting (*Emberiza schoeniclus*) with respect to bill morphology. *Can. J. Zool.* **78(3)**: 428–437.
Matessi, G., Pilastro, A. & Marin, G. (2004). Simultaneous comparison of cultural, genetic and morphological evolution among Reed Bunting *Emberiza schoeniclus* populations. *Curr. Zool.* [*Acta Zool. Sinica*] **50(5)**: 730–737.

Mather, J.R. (1979). Identification of Little and Reed Buntings. *British Birds* **72(8)**: 387–388.
Mather, M.H. & Robertson, R.J. (1992). Honest advertisement in flight displays of Bobolinks (*Dolichonyx oryzivorus*). *Auk* **109**: 869–873.
Matsuoka, S.M. & Johnson, J.A. (2008). Using a multimodel approach to estimate the population size of McKay's Buntings. *Condor* **110(2)**: 371–376.
Matsuoka, S.M., Shaw, D. & Johnson, J.A. (2010). Estimating the abundance of nesting Rusty Blackbirds in relation to wetland habitat in Alaska. *Condor* **112(4)**: 825–833.
Matsuoka, S.M., Shaw, D., Sinclair, P.H., Johnson, J.A., Corcoran, R.M., Dau, N.C., Meyers, P.M. & Rojek, N.A. (2010). Nesting ecology of the Rusty Blackbird in Alaska and Canada. *Condor* **112(4)**: 810–824.
Matthysen, E., Adriaensen, F. & Dhondt, A.A. (2011). Multiple responses to increasing spring temperatures in the breeding cycle of Blue and Great Tits (*Cyanistes caeruleus, Parus major*). *Global Change Biol.* **17**: 1–16.
Mattos, G. & Sick, H. (1985). Sobre a distribuição e a ecologia de duas espécies crípticas: *Embernagra longicauda* Strickland, 1844, e *Embernagra platensis* (Gmelin, 1789), Emberizidae, Aves. *Rev. Bras. Biol.* **45**: 201–206. In Portuguese.
Mattsson, J.P. (2009). Golden-crowned Sparrow in Eagan. *Loon* **81(3)**: 157–158.
Mauck, W.M. & Burns, K.J. (2009). Phylogeny, biogeography, and recurrent evolution of divergent bill types in the nectar-stealing flowerpiercers (Thraupini: *Diglossa* and *Diglossopis*). *Biol. J. Linn. Soc.* **98**: 14–28.
Mauersberger, G. (1956). Brütet *Emberiza cineracea semenowi* Sar. in Syrien? *J. Orn.* **97(4)**: 441–442. In German.
Mauersberger, G. (1960a). *Emberiza cirlus* L. In: Stresemann & Portenko (1960).
Mauersberger, G. (1960b). *Emberiza buchanani* Blyth. In: Stresemann & Portenko (1960).
Mauersberger, G. (1960c). *Emberiza caesia* Cretzschmar. In: Stresemann & Portenko (1960).
Mauersberger, G. (1960d). *Emberiza melanocephala* Scopoli. In: Stresemann & Portenko (1960).
Mauersberger, G. (1960e). *Emberiza icterica* Eversmann. In: Stresemann & Portenko (1960).
Mauersberger, G. (1966). Die Rassenzugehörigkeit mandschurischer *Emberiza elegans* Temminck. *J. Orn.* **107**: 229–230. In German.
Mauersberger, G. (1971). Ist *Emberiza leucocephalos* eine Subspecies von *E. citrinella*? *J. Orn.* **112**: 232–233. In German.
Mauersberger, G. (1972). Über den taxonomischen Rang von *Emberiza godlewskii* Taczanowski. *J. Orn.* **113(1)**: 53–59. In German.
Mauersberger, G. (1982). Zur Gefiederfolge von *Emberiza buchanani* (Blyth). *Mitt. Zool. Mus. Berlin* **58** (Suppl. *Ann. Orn.* **6**): 101–113. In German.
Mauersberger, G. & Portenko, L.A. (1971). *Emberiza cia* L. und *Emberiza godlewskii* Taczanowski. In: Stresemann *et al.* (1971).
Maués, M.M. & Venturieri, G.C. (1997). Pollination ecology of *Platonia insignis* Mart. (Clusiaceae), a fruit tree from eastern Amazon region. *Acta Horticulturae* **437**: 255–260.
Maugeri, F.G. (2006). Ampliación del rango de distribución y descripción de aspectos reproductivos de cuatro especies de aves en el sudoeste de la provincia de Buenos Aires, Argentina. *Cotinga* **25**: 43–46. In Spanish with English summary.
Maugeri, F.G. & Drozd, H.O. (2006). Primer registro de nidificación del Matico (*Icterus croconotus strictifrons*) para Argentina. *Orn. Neotropical* **17**: 301–305. In Spanish.
Maumary, L., Curchod, J. & Duperrex, H. (1990). Première observation du Bruant à calotte blanche (*Emberiza leucocephalos*) en Suisse. *Nos Oiseaux* **40(8)**: 490–491. In French.
Maurrasse, F. & Rigaud, J.G. (1982). Cenozoic facies distribution in the Southern Peninsula of Haiti and the Barahona Peninsula, Dominican Republic. Pp. 161–174 in: Llinas, C.R., Gil, N., Seaward, M., Tavares, I. & Snow, W. eds. (1982). *Transactions of the 9th Caribbean Geological Conference*. Vol. 1. [Publisher not given], Santo Domingo, Dominican Republic.
Maxwell, G.R. (1970). Pair formation, nest building and egg laying of the Common Grackle in northern Ohio. *Ohio J. Sci.* **70**: 284–291.
Maxwell, G.R., Nocilly, J.M. & Shearer, R.I. (1976). Observations at a cavity nest of the Common Grackle and an analysis of grackle nest sites. *Wilson Bull.* **88**: 505–507.
Maxwell, T.C., Madden, D.E. & Dawkins, R.C. (1988). Status of Le Conte's Sparrow, *Ammodramus leconteii* (Emberizidae), wintering in western Texas. *Southwest. Nat.* **33(3)**: 373–375.
Maybank, B. (1985). Prince Albert National Park. *Birdfinding Canada* **5(2)**: 1–3.
Maybank, B. & McKenna, K. (1997). A Lazuli Bunting on Seal Island: first provincial sight record. *Nova Scotia Birds* **39(3)**: 44–45.
Mayer, C., Schiegg, K. & Pasinelli, G. (2009). Patchy population structure in a short-distance migrant: evidence from genetic and demographic data. *Mol. Ecol.* **18(11)**: 2353–2364.
Mayer, S. (2000). *Birds of Bolivia 2.0. Sounds and Photographs*. CD-ROM. Bird Songs International B.V., Westernieland, The Netherlands.
Mayer, S. (2010). *Bird Sounds of Bolivia 2. Sonidos de Aves de Bolivia 2*. CD-ROM. Bird Songs International, Enschede, Netherlands. In Spanish and English.
Mayfield, H.F. (1965). The Brown-headed Cowbird, with old and new hosts. *Living Bird* **4**: 13–28.
Mayr, E. & Johnson, N.K. (2001). Is *Spizella taverneri* a species or a subspecies? *Condor* **103(2)**: 418–419.
Mayr, E. & Vuilleumier, F. (1983). New species of birds described from 1966 to 1975. *J. Orn.* **124(3)**: 217–232.
Mazar Barnett, J. & Herrera, J. (1996). First record of *Tiaris fuliginosa* for Argentina. *Hornero* **14(3)**: 73–74.
Mazar Barnett, J., Clark, R., Bodrati, A., Bodrati, G., Pugnali, G. & della Seta, M. (1998). Natural history notes on some little-known birds in north-west Argentina. *Cotinga* **9**: 64–75.
Mazar Barnett, J., Kirwan, G.M. & Minns, J. (2006). Neotropical notebook. *Cotinga* **25**: 92–93.
Mazar Barnett, J., Pugnali, G. & della Seta, M. (1998). Primer registro del Sai Grande *Oreomanes fraseri* (Passeriformes: Coerebidae? Thraupidae?) en la Argentina. *Hornero* **15(1)**: 44–46. In Spanish.
Mazar Barnett, J., Pugnali, G. & della Seta, M. (2001). Bolivian Warbling-finch *Poospiza boliviana* in Argentina. *Cotinga* **15**: 68.
Mazerolle, D.F. & Hobson, K.A. (2007). Patterns of differential migration in White-throated Sparrows evaluated with isotopic measurements of feathers. *Can. J. Zool.* **85(3)**: 413–420.
McAtee, W.L. (1908). *Food Habits of the Grosbeaks*. Bulletin United States Bureau of Biological Survey **32**. United States Department of Agriculture, Bureau of Biological Survey, Washington, D.C. 92 pp.
McCarthy, E.M. (2006). *Handbook of Avian Hybrids of the World*. Oxford University Press, Oxford.
McCaskie, G. (1971). Rusty Blackbirds in California and western North America. *Calif. Birds* **2**: 55–68.
McCrary, J.K. & Gates, J.E. (2007). Evidences of brood parasitism of Giant Cowbirds (*Molothrus oryzivorus*) on Spot-breasted (*Icterus pectoralis*) and Streak-backed (*I. pustulatus*) Orioles. *Orn. Neotropical* **18**: 11–115.
McDiarmid, R.W., Ricklefs, R.E. & Foster, M.S. (1977). Dispersal of *Stemmadenia donnell-smithii* (Apocynaceae) by birds. *Biotropica* **9**: 9–25.
McDonald, M.A. (1988). *The Significance of Heterochrony to the Evolution of Hispaniolan Palm-tanagers. Genus* Phaenicophilus*: Behavioral, Morphological and Genetic Correlates*. PhD thesis, University of Florida, Gainsville, Florida.
McDonald, M.A. & Smith, M.H. (1990). Speciation, heterochrony, and genetic variation in Hispaniolan Palm-tanagers. *Auk* **107**: 707–717.
McDonald, M.A. & Smith, M.H. (1994). Behavioral and morphological correlates of heterochrony in Hipaniolan Palm-tanagers. *Condor* **96(2)**: 433–446.
McDonald, M.V. (1989). Function of song in Scott's Seaside Sparrow, *Ammodramus maritimus peninsulae*. *Anim. Behav.* **38(3)**: 468–485.
McDonald, M.V. & Post, W. (1982). Territorial behaviour and spacing of Scott's Seaside Sparrow *Ammospiza maritima peninsulae*. *Bird Behaviour* **4(1)**: 52.
McElroy, D.B. & Ritchison, G. (1996). Effect of mate removal on singing behavior and movement patterns of female Northern Cardinals. *Wilson Bull.* **108**: 550–555.
McEwen, A. (1979). Breeding attempt with the Golden-collared Honeycreeper (*Tangara pulcherrima*) in 1977. *Avicult. Mag.* **85**: 141–145.
McGraw, K.J., Hill, G.E. & Parker, R.S. (2003). Carotenoid pigments in a mutant Cardinal: implications for the genetic and enzymatic control mechanisms of carotenoid metabolism in birds. *Condor* **105**: 587–592.
McGraw, K.J., Hill, G.E., Stradi, R. & Parker, R.S. (2001). The influence of carotenoid acquisition and utilization on the maintenance of species-typical plumage pigmentation in male American Goldfinches (*Carduelis tristis*) and Northern Cardinals (*Cardinalis cardinalis*). *Physiol. Biochem. Zool.* **74(6)**: 843–852.
McGregor, R. (2004). New records of Ortolan Bunting *Emberiza hortulana* in Nigeria. *Bull. Afr. Bird Club* **11(1)**: 30–31.
McGregor, R.M., Ottosson, U. & Cresswell, W.R.L. (2007). Moult of Guinea savanna passerines in West Africa. *Ostrich* **78**: 287–290.
McGuire, A.D. (1986). Some aspects of the breeding biology of Red-winged Blackbirds in Alaska. *Wilson Bull.* **98**: 257–266.
McIlhenny, E.A. (1937). Life history of the Boat-tailed Grackle in Louisiana. *Auk* **54**: 274–295.
McKay, J.E., Murphy, M.T., Smith, S.B. & Richardson, J.K. (2009). Fecal-sac ingestion by Spotted Towhees. *Condor* **111(3)**: 503–510.
McKechnie, A.E. & Wolf, B.O. (2009). Climate change increases the likelihood of catastrophic avian mortality events during extreme heat waves. *Biol. Letters (London)* **6**: 253–256.
McKenzie, P.M. & Noble, R.E. (1989). Notes on a large foraging concentration of the endangered Yellow-shouldered Blackbird (*Agelaius xanthomus*) in southwestern Puerto Rico. *Caribb. J. Sci.* **25(1/2)**: 90–91.
McKitrick, M.C. (1979). Territory, size and density of Bachman's Sparrow in south central Florida. *Florida Field Nat.* **7(2)**: 33–34.
McLaren, I. (2002). First for Canada, Saltmarsh Sharp-tailed Sparrow in Nova Scotia. *Birders J.* **11(3)**: 110–113.
McLaughlin, R.L. & Montgomerie, R.D. (1985). Brood division by Lapland Longspurs. *Auk* **102**: 687–695.
McMaster, D.G. & Sealy, S.G. (1997). Host-egg removal by Brown-headed Cowbirds: a test of the host incubation limit hypothesis. *Auk* **114**: 212–220.
McNair, D.B. (1984). Reuse of other species nests by Lark Sparrows. *Southwest. Nat.* **29(4)**: 506–509.
McNair, D.B. (1985). A comparison of oology and nest record card data in evaluating the reproductive biology of Lark Sparrows, *Chondestes grammacus*. *Southwest. Nat.* **30(2)**: 213–224.
McNair, D.B. (1986). Clutch information for the Florida Grasshopper Sparrow from oological collections. *Florida Field Nat.* **14(2)**: 48–49.
McNair, D.B. (1990). Review of proven, probable, and possible breeding records of the Dickcissel in Georgia and the Carolinas. *Oriole* **55**: 1–8.
McNair, D.B. (1998a). Henslow's Sparrow and Sedge Wren response to a dormant-season prescribed burn in a pine savanna. *Florida Field Nat.* **26(2)**: 46–47.
McNair, D.B. (1998b). Indirect evidence on parasitism of the Lesser Antillean Bullfinch by the Shiny Cowbird. *Pitirre* **11(1)**: 4–5.
McNair, D.B. & Forster, R.A. (1983). Heterospecific vocal mimicry by six oscines. *Can. Field-Nat.* **97**: 321–322.
McNair, D.B. & Nicholson, C.P. (1991). Historical breeding evidence of the Bachman's Sparrow in the North Carolina mountains. *Migrant* **62(1)**: 4–5.
McNair, D.B. & Post, W. (2000). Historical winter status of three upland *Ammodramus* sparrows in South Carolina. *Studies Avian Biol.* **21**: 32–38.
McNair, D.B., Runolfsson, O. & Hjartarson, G. (2008). Fyrsta stathfesta varp Sportittlings a Islandi. *Bliki* **29**: 49–52. In Icelandic.
McPeek, G.A. ed. (1994). *The Birds of Michigan*. Indiana University Press, Bloomington, Indiana.
McWilliams, G.M. & Brauning, D.W. (2000). *The Birds of Pennsylvania*. Cornell University Press, Ithaca, New York.
Mead, P.S. & Morton, M.L. (1985). Hatching asynchrony in the Mountain White-crowned Sparrow (*Zonotrichia leucophrys oriantha*): a selected or incidental trait? *Auk* **102(4)**: 781–792.
Meanley, B. (1959). Notes on Bachman's Sparrow in central Louisiana. *Auk* **76**: 232–234.
Meanley, B. (1963). Nesting ecology and habits of the Dickcissel on the Arkansas Grand Prairie. *Wilson Bull.* **75**: 280–281.
Meanley, B. (1971). *Blackbirds and the Southern Rice Crop*. United States Fish & Wildlife Service Publication **100**. United States Government Printing Office, Washington, D.C.
Meanley, B. (1989). Unique shape of a Bachman's Sparrow nest. *Chat* **53(1)**: 12–13.
Meanley, B. (1990). Some observations of the singing behavior of Bachman's Sparrow. *Chat* **54(3)**: 63.
Meanley, B. (1995). Some foods of the Rusty Blackbird in the Great Dismal Swamp region. *Raven* **66(1)**: 9–10.
Medland, R.D. (1996). Does the Cape Bunting move or migrate? A review of its status in Malawi. *Nyala* **19**: 7–11.
Mee, A., Ohlson, J., Stewart, I., Wilson, M., Örn, P. & Ferregra, D.F. (2002). The Cerros del Sira revisited: birds of submontane and montane forest. *Cotinga* **18**: 46–57.
Meents, J.K., Anderson, B.W. & Ohmart, R.D. (1981). Vegetation characteristics associated with Abert's Towhee numbers in riparian habitats. *Auk* **98(4)**: 818–827.
Meents, J.K., Anderson, B.W. & Ohmart, R.D. (1982). Vegetation relationships and food of Sage Sparrows wintering in honey mesquite habitat. *Wilson Bull.* **94(2)**: 129–138.
Mees, G.F. (1968). Enige voor de avifauna van Suriname nieuwe vogelsoorten. *Gerfaut* **58**: 101–107. In Dutch.
Mees, G.F. (1970). On some birds from southern Mexico. *Zool. Meded. Leiden* **44**: 237–245.
Mees, G.F. (1974). Additions to the avifauna of Suriname. *Zool. Meded. Leiden* **48**: 55–67.
Meier, M. (1974). Another Black-throated Sparrow in Nebraska. *Nebraska Bird Rev.* **42(1)**: 18–19.
Meiklejohn, R.F. (1936). Nesting notes on Rüppell's Warbler and Black-headed Bunting. *Ibis* **Ser. 13, no. 6**: 377–378.
Meise, W. (1938a). Über die Rassen des Kernbeißers *Pheucticus chrysopeplus* Less. *Bull. Mus. Hist. Nat. Belg.* **14(52)**: 1–4. In German.
Meise, W. (1938b). Ueber Rassen und Kleider der Maskenammer *Emberiza spodocephala* Pall. *Orn. Monatsber.* **46**: 142–146. In German.
Meitzen, T.C. (1967). Nesting of the Varied Bunting in South Texas. *Bull. Texas Orn. Soc.* **1**: 12.
Melman, D.S. & Searcy, W.A. (1999). Microgeographic song discrimination in a nonterritorial passerine: the Boat-tailed Grackle. *Condor* **101(4)**: 845–848.
de Melo Valente, R. (2000). Muda e reprodução em *Ramphocelus carbo* (Passeriformes, Emberizidae) na Amazônia brasileira. *Ararajuba* **8(2)**: 135–139. In Portuguese with English summary.
Meltofte, H. (1983). Arrival and pre-nesting period of the Snow Bunting *Plectrophenax nivalis* in east Greenland. *Polar Res.* **1(2)**: 185–198.
Mengel, R.M. (1951). A flight-song of Bachman's Sparrow. *Wilson Bull.* **63**: 208.
Menk, G.E. & Stevenson, H.M. (1978). A Florida specimen of the Black-throated Sparrow. *Florida Field Nat.* **6(1)**: 21.
Menz, M.H.M., Brotons, L. & Arlettaz, R. (2009). Habitat selection by Ortolan Buntings *Emberiza hortulana* in post-fire succession in Catalonia: implications for the conservation of farmland populations. *Ibis* **151(4)**: 752–761.

Menz, M.H.M., Mosimann-Kampe, P. & Arlettaz, R. (2009). Foraging habitat selection in the last Ortolan Bunting *Emberiza hortulana* population in Switzerland: final lessons before extinction. *Ardea* **97(3)**: 323–333.

Merino, S. & Møller, A.P. (2010). Host-parasite interactions and climate change. Pp. 213–226 in: Møller *et al.* (2010).

Merino, S. & Potti, J. (1996). Weather dependent effects of ectoparasites on their bird host. *Ecography* **19**: 107–113.

Mermoz, M.E. & Fernández, G.J. (1999). Low frequency of Shiny Cowbird parasitism on Scarlet-headed Blackbirds: anti-parasite adaptations or nonspecific host life-history traits? *J. Avian Biol.* **30(1)**: 15–22.

Mermoz, M.E. & Fernández, G.J. (2003). Breeding success of a specialist brood parasite, the Screaming Cowbird, parasitizing an alternative host. *Condor* **105(1)**: 63–72.

Mermoz, M.E. & Ornelas, J.F. (2004). Phylogenetic analysis of life-history adaptations in parasitic cowbirds. *Behav. Ecol.* **15(1)**: 109–119.

Mermoz, M.E. & Reboreda, J.C. (1994). Brood parasitism of the Shiny Cowbird, *Molothrus bonariensis*, on the Brown-and-yellow Marshbird, *Pseudoleistes virescens*. *Condor* **96**: 716–721.

Mermoz, M.E. & Reboreda, J.C. (1996). New host for a specialized brood parasite, the Screaming Cowbird. *Condor* **98**: 630–632.

Mermoz, M.E. & Reboreda, J.C. (1998). Nesting success of Brown-and-yellow Marshbirds: effects of timing, nest site, and brood parasitism. *Auk* **115**: 871–878.

Mermoz, M.E. & Reboreda, J.C. (1999). Egg-laying behaviour by Shiny Cowbirds parasitizing Brown-and-yellow Marshbirds. *Anim. Behav.* **58(4)**: 873–882.

Mermoz, M.E. & Reboreda, J.C. (2003). Reproductive success of Shiny Cowbird (*Molothrus bonariensis*) parasitizing the larger Brown-and-yellow Marshbird (*Pseudoleistes virescens*) in Argentina. *Auk* **120(4)**: 1128–1139.

Messlinger, U. (2004). Brutbestand, Lebensraum und Gefährdung der Zippammer *Emberiza cia* in Unterfranken 2002. *Orn. Anz.* **43(3)**: 243–249. In German with English summary.

Mettke-Hofmann, C., Sinclair, P.H., Hamel, P.B. & Greenberg, R. (2010). Implications of prebasic and a previously undescribed prealternate molt for aging Rusty Blackbirds. *Condor* **112(4)**: 854–861.

Mettler, R.D. & Spellman, G.M. (2009). A hybrid zone revisited: molecular and morphological analysis of the maintenance, movement, and evolution of a Great Plains avian (Cardinalidae: *Pheucticus*) hybrid zone. *Mol. Ecol.* **18(15)**: 3256–3267.

Meunier, M. & Bedard, J. (1984). Nestling foods of the Savannah Sparrow. *Can. J. Zool.* **62(1)**: 23–27.

Mewaldt, L.R. & Farner, D.S. (1957). Translocated Golden-crowned Sparrows return to winter range. *Condor* **59**: 268–269.

Mewaldt, L.R. & King, J.R. (1977). The annual cycle of White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*) in coastal California. *Condor* **79(4)**: 445–455.

Mey, E. (1988). Herbstdaten zur mongolischen Avifauna. *Mitt. Zool. Mus. Berlin* **64** (Suppl. *Ann. Orn.* **12**): 79–128. In German with English summary.

Meyer de Schauensee, R. (1951). The birds of the Republic of Colombia: their distribution and keys for their identification. *Caldasia* **5(25)**: 873–1112.

Meyer de Schauensee, R. (1952a). A review of the genus *Sporophila*. *Proc. Acad. Nat. Sci. Philadelphia* **104**: 153–196.

Meyer de Schauensee, R. (1952b). The birds of the Republic of Colombia: their distribution and keys for their identification. *Caldasia* **5(26)**: 1115–1214.

Meyer de Schauensee, R. (1964). *The Birds of Colombia*. Livingston Publishing Company, Narberth, Pennsylvania.

Meyer de Schauensee, R. (1966). *The Species of Birds of South America and their Distribution*. Livingston Publishing Company, Narberth, Pennsylvania.

Meyer de Schauensee, R. (1970a). *A Guide to the Birds of South America*. Livingston Publishing Company, Wynnewood, Pennsylvania.

Meyer de Schauensee, R. (1970b). A review of the South American finch *Oryzoborus crassirostris*. *Notul. Nat. (Philadelphia)* **428**: 1–6.

Meyer de Schauensee, R. (1984). *The Birds of China*. Oxford University Press & Smithsonian Institution Press, Oxford & Washington, D.C.

Meyer de Schauensee, R. & Phelps, W.H. (1978). *A Guide to the Birds of Venezuela*. Princeton University Press, Princeton, New Jersey.

Meyrom, K., Yosef, R. & Tryjanowski, P. (2001). Phenology and biometrics of the migratory Reed Bunting (*Emberiza schoeniclus*) in Israel. *Israel J. Zool.* **47(2)**: 161–165.

Mezquida, E.T. (2003). La reproducción de cinco especies de Emberizidae y Fringillidae en la Reserva de Ñacuñán, Argentina. *Hornero* **18(1)**: 13–20. In Spanish with English summary.

Mezquida, E.T. (2004). Nest site selection and nesting success of five species of passerines in a South American open *Prosopis* woodland. *J. Orn.* **145(1)**: 16–22.

Mezquida, E.T. & Marone, L. (2003). Comparison of the reproductive biology of two *Poospiza* warbling-finches of Argentina in wet and dry years. *Ardea* **91(2)**: 251–262.

Mezquida, E.T. & Villarán, A. (2006). Abundance variations, survival and site fidelity of Reed Buntings *Emberiza schoeniclus* wintering in central Spain. *Ornis Fenn.* **83(1)**: 11–19.

Michaelis, H.J. (1978). Der Schwarzgimpelfink als Käfigvogel. *Falke* **25(8)**: 278–279. In German.

Michaelsen, J. (1985). Rapport fra Norsk Sjeldenhetskomité for Fugl. *Vår Fuglefauna* **8**: 49–52. In Norwegian.

Michener, J.R. & Michener, H. (1951). Notes on banding records and plumages of the Black-headed Grosbeak. *Condor* **53**: 93–96.

Michopoulos, V., Maney, D.L., Morehouse, C.B. & Thomas, J.W. (2007). A genotyping assay to determine plumage morph in the White-throated Sparrow (*Zonotrichia albicollis*). *Auk* **124(4)**: 1330–1335.

Mickey, F.W. (1943). Breeding habits of McCown's Longspurs. *Auk* **60**: 181–209.

Middleton, A.L.A. (1998). Chipping Sparrow (*Spizella passerina*). No. **334** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 9. The Birds of North America Inc., Philadelphia, Pennsylvania.

Middleton, A.L.A. & Prescott, D.R.C. (1989). Polygyny, extra-pair copulations, and nest helpers in the Chipping Sparrow, *Spizella passerina*. *Can. Field-Nat.* **103(1)**: 61–64.

Mihara, M. (2006). A tagged Pallas's Bunting, *Emberiza pallasi polaris*, in Fukui Prefecture, 2002. *Ciconia* **11**: 17–18.

Mikkola, K. & Koivunen, F. (1966). Über die Brutbiologie und das Vorkommen der Zwergammer (*Emberiza pusilla* Pall.) in Finnland. *Ornis Fenn.* **43**: 1–12. In German.

Mikkola, K. & Rautatiek, P. (1969). *Zonotrichia albicollis* in continental Europe. *Bull. Brit. Orn. Club* **89**: 68–69.

Mikulaschek, G. (1987). Der Grüne Kardinal *Gubernatrix cristata* – Eine Verhaltensstudie. *Gefiederte Welt* **111(6)**: 152–154. In German.

Milá, B., McCormack, J.E., Castañeda, G., Wayne, R.K. & Smith, T.B. (2007). Recent postglacial range expansion drives the rapid diversification of a songbird lineage in the genus *Junco*. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **274**: 2653–2660.

Miles, D.B. (1986). A record of Brown-headed Cowbird (*Molothrus ater*) nest parasitism of Rufous-crowned Sparrows (*Aimophila ruficeps*). *Southwest. Nat.* **31(2)**: 253–254.

Milesi, F.A., de Casenave, J.L. & Cueto, V.R. (2008). Selection of foraging sites by desert granivorous birds: vegetation structure, seed availability, species-specific foraging tactics, and spatial scale. *Auk* **125(2)**: 473–484.

Militello, E. & Chebez, J.C. (2009). Notas sobre aves del Parque Nacional Iguazú y zona de influencia, Misiones, Argentina. *Not. Faun.* **32**: 1–5. In Spanish with English summary.

Miller, A.H. (1931). Notes on the song and territorial habits of Bullock's Oriole. *Wilson Bull.* **43**: 102–108.

Miller, A.H. (1941). Speciation in the avian genus *Junco*. *Univ. Calif. Publ. Zool.* **44**: 173–434.

Miller, A.H. (1947). The tropical avifauna of the Upper Magdalena Valley, Colombia. *Auk* **64**: 351–381.

Miller, A.H. (1963). Seasonal activity and ecology of the avifauna of an American equatorial cloud forest. *Univ. Calif. Publ. Zool.* **66**: 1–78.

Miller, A.H. & Moore, R.T. (1954). A further record of the Slaty Finch in Mexico. *Condor* **56**: 310–311.

Miller, A.H. & Stebbins, R.C. (1964). *The Lives of Desert Animals in Joshua Tree National Monument*. University of California Press, Berkeley, California.

Miller, A.H., Friedmann, H., Griscom, L. & Moore, R.T. eds. (1957). *Distributional Check-List of the Birds of Mexico*. Part 2. Pacific Coast Avifauna **33**. Cooper Ornithological Society, Berkeley, California.

Miller, C. (1973). Breeding the Masked Tanager (*Tangara nigrocincta*). *Avicult. Mag.* **79(5)**: 165–167.

Miller, L.J. & Weise, C.M. (1978). Effects of altered photoperiod on migratory orientation in White-throated Sparrows (*Zonotrichia albicollis*). *Condor* **80(1)**: 94–96.

Miller, M. (1982). Über den Schwarzen Reisknacker und Schwarzkopfreisknacker. *Gefiederte Welt* **106(11)**: 350–352. In German.

Miller, P. (2005). Long distance dispersal of a Florida Grasshopper Sparrow. *Florida Field Nat.* **33(4)**: 123–124.

Miller-Rushing, A.J., Lloyd-Evans, T.L., Primack, R.B. & Satzinger, P. (2008). Bird migration times, climate change, and changing population sizes. *Global Change Biol.* **14**: 1959–1972.

Millikan, G.C. & Bowman, R.I. (1967). Observations on Galápagos tool-using finches in captivity. *Living Bird* **6**: 23–41.

Millington, R. (1995). Black-headed Buntings in spring 1995. *Birding World* **8(6)**: 215.

Millington, S.J. & Grant, P.R. (1983). Feeding ecology and territoriality of the Cactus Finch *Geospiza scandens* on Isla Daphne Major, Galápagos. *Oecologia (Berlin)* **58(1)**: 76–83.

Millington, S.J. & Grant, P.R. (1984). The breeding ecology of the Cactus Finch *Geospiza scandens* on Isla Daphne Major, Galápagos. *Ardea* **72(2)**: 177–188.

Millington, S.J. & Price, T.D. (1985). Song inheritance and mating patterns in Darwin's finches. *Auk* **102(2)**: 342–346.

Millon, A., Nielsen, J., Bretagnolle, V. & Møller, A.P. (2009). Predator-prey relationships in a changing environment: the case of the Sparrowhawk and its avian prey community in a rural area. *J. Anim. Ecol.* **78**: 1086–1095.

Mills, D.G.H. (1982). Leg coloration of Little and Reed Buntings. *British Birds* **75(6)**: 290–291.

Mills, G.S. (1977). New locations for the Five-striped Sparrow in the United States. *Western Birds* **8(4)**: 121–130.

Mills, G.S., Silliman, J.R., Groschupf, K.D. & Speich, S.M. (1980). Life history of the Five-striped Sparrow. *Living Bird* **18**: 95–110.

Minshull, B.C. (1996). The first Pine Bunting *Emberiza leucocephalos* in Jordan. *Sandgrouse* **18(2)**: 69.

Misenhelter, M.D. & Rotenberry, J.T. (2000). Choices and consequences of habitat occupancy and nest site selection in Sage Sparrows. *Ecology* **81(10)**: 2892–2901.

Mishchenko, Y.V. (1983). [New data on the bird fauna of Kopet-Dagh]. *Vestnik Zoologii* **1983(5)**: 87–88. In Russian.

Mishra, M.K. & Tewary, P.D. (1998). Photoperiodic regulation of reproduction in migratory bunting, *Emberiza melanocephala*: an evidence for external coincidence model. *Curr. Sci.* **74(3)**: 246–248.

Mishra, M.K. & Tewary, P.D. (1999a). Annual pattern of moulting in Blackheaded Bunting, *Emberiza melanocephala*. *Proc. Natl. Inst. Sci. India (Part B, Biol. Sci.)* **69(3/4)**: 269–273.

Mishra, M.K. & Tewary, P.D. (1999b). Changes in body weight, ovarian growth, and circulating plasma estradiol level in response to programmed photoperiods in Blackheaded Bunting, *Emberiza melanocephala*. *J. Exper. Biol.* **283(2)**: 215–220.

Mishra, M.K. & Tewary, P.D. (2000). Photoperiodic induction of ovarian growth and plasma estradiol secretion in a migratory finch, *Emberiza melanocephala*: involvement of circadian rhythm. *Acta Biol. Hungarica* **51(1)**: 31–36.

Misra, R.K. & Short, L.G. (1974). A biometric analysis of oriole hybridization. *Condor* **76(2)**: 137–146.

Mitchell, M.H. (1954). Habitat of the Screaming Seedeater (*Sporophila caerulescens*) in Brazil. *Auk* **71(4)**: 473.

Mitchell, M.H. (1957). *Observations on Birds of Southeastern Brazil*. University of Toronto Press, Toronto, Ontario.

Mitsch, H. (1978). Die Papageientangare (*Chlorornis riefferii*), ein wenig bekannter Andenbewohner. *Orn. Mitt.* **30(3)**: 60–63. In German.

Mjøs, A.T. (2002). Review of older records and changes to the Norwegian bird list. *Ornis Nor.* **25(2)**: 64–92.

Mlikovsky, J. (2009). First record of the Thick-billed Reed Bunting (*Emberiza schoeniclus reiseri*) from the Czech Republic. *Sylvia* **45**: 242–247.

Moermond, T.C. (1981). Cooperative feeding, defense of young, and flocking in the Black-faced Grosbeak. *Condor* **83(1)**: 82–83.

Moermond, T.C. (1983). Suction-drinking in tanagers Thraupidae and its relation to frugivory. *Ibis* **125(4)**: 545–549.

Moermond, T.C. & Denslow, J.S. (1985). Neotropical avian frugivores: patterns of behavior, morphology, and nutrition, with consequences for fruit selection. Pp. 865–897 in: Buckley *et al.* (1985).

Moldenhauer, R.R. (1970a). The effects of temperature on the metabolic rate and evaporative water loss of the Sage Sparrow *Amphispiza belli nevadensis*. *Comp. Biochem. Physiol.* **36**: 579–587.

Moldenhauer, R.R. (1970b). The water economy of the Sage Sparrow *Amphispiza belli nevadensis*. *Condor* **72**: 265–275.

Moldenhauer, R.R. & Taylor, P.G. (1973). Energy intake by hydropenic Chipping Sparrows (*Spizella passerina* passerina) maintained on different diets. *Condor* **75(4)**: 439–445.

Møller, A.P. (1984). Geographical variation in breeding parameters of two hirundines. *Ornis Scand.* **15**: 43–54.

Møller, A.P. (1988). Spatial and temporal distribution of song in the Yellowhammer *Emberiza citrinella*. *Ethology* **78(4)**: 321–331.

Møller, A.P. (1994a). *Sexual Selection and the Barn Swallow*. Oxford University Press, Oxford, UK.

Møller, A.P. (1994b). Phenotype-dependent arrival time and its consequences in a migratory bird. *Behav. Ecol. Sociobiol.* **35**: 115–122.

Møller, A.P. (2002). North Atlantic Oscillation (NAO) effects of climate on the relative importance of first and second clutches in a migratory passerine bird. *J. Anim. Ecol.* **71**: 201–210.

Møller, A.P. (2004a). Protandry, sexual selection and climate change. *Global Change Biol.* **10**: 2028–2035.

Møller, A.P. (2004b). Rapid temporal change in frequency of infanticide in a passerine bird associated with change in population density and body condition. *Behav. Ecol.* **15**: 462–468.

Møller, A.P. (2006). Rapid change in nest size of a bird related to change in a secondary sexual character. *Behav. Ecol.* **17**: 108–116.

Møller, A.P. (2007a). Interval between clutches, fitness, and climate change. *Behav. Ecol.* **18**: 62–70.

Møller, A.P. (2007b). Tardy females, impatient males: protandry and divergent selection on arrival date in the two sexes of the Barn Swallow. *Behav. Ecol. Sociobiol.* **61**: 1311–1319.

Møller, A.P. (2008a). Distribution of arrival dates in a migratory bird in relation to environmental conditions, natural selection and sexual selection. *Ethology. Ecology & Evolution* **20**: 193–210.

Møller, A.P. (2008b). Climate change and micro-geographic variation in laying date. *Oecologia (Berlin)* **155**: 845–857.

Møller, A.P. (2010). Host-parasite interactions and vectors in the Barn Swallow in relation to climate change. *Global Change Biol.* **16**: 1158–1170.

Møller, A.P. (2011a). When climate change affects where birds sing. *Behav. Ecol.* **22(1)**: 212–217.

Møller, A.P. (2011b). Behavioral and life history responses to extreme climatic conditions. *Curr. Zool. [Acta Zool. Sinica]* **57(3)**: 351–362.

Møller, A.P. & Erritzøe, J. (2003). Climate, body condition and spleen size in birds. *Oecologia (Berlin)* **137**: 621–626.

Møller, A.P. & Szép, T. (2005). Rapid evolutionary change in a secondary sexual character linked to climatic change. *J. Evol. Biol.* **18**: 481–495.
Møller, A.P., Arriero, E., Lobato, E. & Merino, S. (2010). A meta-analysis of parasite virulence in nestling birds. *Biol. Rev.* **84**: 567–588.
Møller, A.P., Balbontín, J., Cuervo, J.J., Hermosell, I.G. & de Lope, F. (2009). Individual differences in protandry, sexual selection, and fitness. *Behav. Ecol.* **20(2)**: 433–440.
Møller, A.P., Fiedler, W. & Berthold, P. eds. (2004). *Birds and Climate Change*. Elsevier, Amsterdam, The Netherlands.
Møller, A.P., Fiedler, W. & Berthold, P. eds. (2010). *Effects of Climate Change on Birds*. Oxford University Press, Oxford, UK.
Møller, A.P., Flensted-Jensen, E., Klarborg, K., Mardal, W. & Nielsen, J.T. (2010). Climate change affects the duration of the reproductive season in birds. *J. Anim. Ecol.* **79**: 777–784.
Møller, A.P., Flensted-Jensen, E. & Mardal, W. (2006a). Rapidly advancing laying date in a seabird and the changing advantage of early reproduction. *J. Anim. Ecol.* **75**: 657–665.
Møller, A.P., Flensted-Jensen, E. & Mardal, W. (2006b). Dispersal and climate change: a case study of the Arctic Tern *Sterna paradisaea*. *Global Change Biol.* **12**: 2005–2013.
Møller, A.P., Flensted-Jensen, E. & Mardal, W. (2007). Agriculture, fertilisers and life history of a coastal seabird. *J. Anim. Ecol.* **76**: 515–525.
Møller, A.P., Flensted-Jensen, E. & Mardal, W. (2009). Adjustment of the annual cycle to climatic change in a long-lived migratory bird species. *Curr. Zool.* [*Acta Zool. Sinica*] **55**: 92–101.
Møller, A.P., Nuttall, R., Piper, S.E., Szép, T. & Vickers, E.J. (2011). Migration, moult and climate change in Barn Swallows *Hirundo rustica* in South Africa. *Climate Res.* **DOI**: 10.3354/cr01005.
Møller, A.P., Rubolini, D. & Lehikoinen, E. (2008). Populations of migratory bird species that did not show a phenological response to climate change are declining. *Proc. Natl. Acad. Sci. USA* **105**: 16195–16200.
Møller, A.P., Saino, N., Adamík, P., and 14 other authors (2011). Rapid change in host use of the Common Cuckoo *Cuculus canorus* linked to climate change. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **278**: 733–738.
Möller, E. & Richardson, C. (1994). First record of Cinereous Bunting *Emberiza cineracea* in Oman. *Sandgrouse* **16(1)**: 63–64.
Monadjem, A. (2001). Population fluctuations of birds (Aves) in Acacia savanna in Swaziland. *Durban Mus. Novit.* **26**: 6–9.
Monadjem, A. (2002). Population densities and community structure of birds in broadleaved woodland in the lowveld of Swaziland. *Ostrich* **73**: 100–105.
Monahan, W.B. & Hijmans, R.J. (2008). Ecophysiological constraints shape autumn migratory response to climate change in the North American Field Sparrow. *Biol. Letters (London)* **4(5)**: 595–598.
Monroe, B.L. (1963). Notes on the avian genus *Arremonops* with description of a new subspecies from Honduras. *Occas. Pap. Mus. Zool. Louisiana State Univ.* **28**: 1–12.
Monroe, B.L. (1968). *A Distributional Survey of the Birds of Honduras*. Ornithological Monographs **7**. American Ornithologists' Union & Allen Press, Lawrence, Kansas. 458 pp.
Monroe, B.L., Banks, R.C., Fitzpatrick, J.W., Howell, T.R., Johnson, N.K., Oulette, H., Remsen, J.V. & Storer, R.W. (1993). Thirty-ninth supplement to the American Ornithologists' Union Check-list of North American Birds. *Auk* **110**: 675–682.
Monroe, M.S. & Ritchison, G. (2005). Breeding biology of Henslow's Sparrows on reclaimed coal mine grasslands in Kentucky. *J. Field Orn.* **76(2)**: 143–149.
Monson, G. (1997). A concentration of Dickcissels in Sinaloa, México. Pp. 83–85 in: Dickerman, R.W. ed. (1997). *The Era of Allan R. Phillips: A Festschrift*. Horizon Communications, Albuquerque, New Mexico.
Montalti, D., Ferman, L.M., Camperi, A.R., Soave, G.E., Arambarri, A.M. & Darrieu, C.A. (2005). Winter diet of Great Pampa-finches *Embernagra platensis* in Guamini Lagoon, Argentina. *Acta Orn. (Warszawa)* **40(1)**: 79–82.
Montalvo, L.D. (2009). New distributional bird records from south-western province of Esmeraldas, Ecuador. *Check List: J. Spec. Lists & Distrib.* **5(3)**: 629–631.
Moojen, J., de Carvalho, J.C. & Lopes, H.S. (1941). Observações sobre o conteúdo gástrico das aves brasileiras. *Mem. Inst. Oswaldo Cruz* **36**: 405–444. In Portuguese.
Moore, C.C. & Armelin, M. (1999). Pallas' Reed Bunting *Emberiza pallasi*: the first Portuguese and Iberian record. *Airo* **10(1)**: 34–36.
Moore, I.T., Wada, H., Perfito, N., Shallin Busch, D., Hahn, T.P. & Wingfield, J.C. (2004). Territoriality and testosterone in an equatorial population of Rufous-collared Sparrows, *Zonotrichia capensis*. *Anim. Behav.* **67(3)**: 411–420.
Moore, J.V., Coopmans, P., Ridgely, R.S. & Lysinger, M. (1999). *The Birds of Northwestern Ecuador*. CD 3. The upper foothills and subtropics. John V. Moore Nature Recordings, San José, California.
Moore, J.V., Krabbe, N., Lysinger, M., Lane, D.F., Coopmans, P., Rivadeneyra, J. & Ridgely, R.S. (2009). *The Birds of Eastern Ecuador*. DVD. John V. Moore Nature Recordings, San José, California.
Moore, L.C., Stutchbury, B.J.M., Burke, D.M. & Elliott, K.A. (2010). Effects of forest management on postfledging survival of Rose-breasted Grosbeaks (*Pheucticus ludovicianus*). *Auk* **127(1)**: 185–194.
Moore, M. (1962). Nesting of the Hooded Oriole in Sacramento, California. *Condor* **64**: 79.
Moore, R.T. (1934a). A review of the races of *Buthraupis eximia* (Boissoneau). *Amer. Mus. Novit.* **715**: 1–8.
Moore, R.T. (1934b). The Mt. Sangay labyrinth and its fauna. *Auk* **51**: 141–156.
Moore, R.T. (1946). The Rufous-winged Sparrow, its legends and taxonomic status. *Condor* **48**: 117–123.
Moraes, V.S. & Krul, R. (1997). Notes on the Black-backed Tanager *Tangara peruviana* (Desmarest, 1806). *Bull. Brit. Orn. Club* **117(4)**: 316–318.
Morand-Ferron, J., Lefebvre, L., Reader, S.M., Sol, D. & Elvin, S. (2004). Dunking behaviour in Carib Grackles. *Anim. Behav.* **68(6)**: 1267–1274.
Morand-Ferron, J., Veillette, M. & Lefebvre, L. (2006). Stealing of dunked food in Carib Grackles (*Quiscalus lugubris*). *Behav. Processes* **73(3)**: 342–347.
Morbey, Y.E. & Ydenberg, R.C. (2001). Protandrous arrival timing to breeding areas: a review. *Ecol. Letters* **4**: 663–673.
Moreau, R.E. & Moreau, W.M. (1939). Observations on some East African birds. *Ibis* **Ser. 14, no. 3**: 296–323.
Moreira Lima, L. (2004). Primeiro registro documentado da Triste-pia (*Dolichonyx oryzivorus*) no estado do Rio de Janeiro. *Atualidades Orn.* **122**: 3–4. In Portuguese.
Moreno, J. & Møller, A.P. (2011). Extreme climatic events in relation to global change and their impact on life histories. *Curr. Zool.* [*Acta Zool. Sinica*] **57(3)**: 375–389.
Moriarty, D.J. (1977). Flocking and foraging in the Scarlet-rumped Tanager. *Wilson Bull.* **89**: 151–153.
Morimoto, D.C. & Wasserman, F.E. (1991). Dispersion patterns and habitat associations of Rufous-sided Towhees, Common Yellowthroats, and Prairie Warblers in the southeastern Massachusetts pine barrens. *Auk* **108(2)**: 264–276.
Morony, J. (1985). Systematic relations of *Sericossypha albocristata* (Thraupinae). Pp. 383–389 in: Buckley *et al.* (1985).
Morozov, V.V. (1986). [Nesting of Pallas's Reed Bunting in the European part of the USSR]. *Vestnik Zoologii* **1986(1)**: 87. In Russian.
Morozov, V.V. (1987). [New data on fauna and distribution of birds for the eastern part of Bolshezemelskaya tundra]. *Ornitologiya* **22**: 134–147. In Russian.
Morris, A.J. & Bradbury, R.B. (2002). Determinants of patch selection by Yellowhammers *Emberiza citrinella* foraging in cereal crops. *Aspects Appl. Biol.* **67**: 43–50.
Morris, A.J., Whittingham, M.J., Bradbury, R.B., Wilson, J.D., Kyrkos, A., Buckingham, D.L. & Evans, A.D. (2001). Foraging habitat selection by Yellowhammers (*Emberiza citrinella*) nesting in agriculturally contrasting regions in lowland England. *Biol. Conserv.* **101(2)**: 197–210.
Morris, A.J., Wilson, J.D., Whittingham, M.J. & Bradbury, R.B. (2005). Indirect effects of pesticides on breeding Yellowhammer (*Emberiza citrinella*). *Agric. Ecosyst. & Environm.* **106(1)**: 1–16.
Morris, D.L. (2005). *Effects of Forest Fragmentation on Reproductive Effort and Productivity of Indigo Buntings (*Passerina cyanea*)*. PhD thesis, University of Missouri, Columbia.
Morrison, A. (1948). A list of the birds observed at the hacienda Huarapa, Department of Huáunco, Peru. *Ibis* **90**: 126–128.
Morrison, D.W. & Caccamise, D.F. (1990). Comparison of roost use by three species of communal roostmates. *Condor* **92**: 405–412.
Morrison, M.L., Hall, L.S., Robinson, S.K., Rothstein, S.I., Hahn, D.C. & Rich, T.D. eds. (1999). *Research and Management of the Brown-headed Cowbird in Western Landscapes*. Studies in Avian Biology **18**. Cooper Ornithological Society, Sacramento, California.
Morrison, S.A. & Bolger, D.T. (2002a). Lack of an urban edge effect on reproduction in a fragmentation-sensitive sparrow. *Ecol. Appl.* **12(2)**: 398–411.
Morrison, S.A. & Bolger, D.T. (2002b). Variation in a sparrow's reproductive success with rainfall: food and predator-mediated processes. *Oecologia (Berlin)* **133(3)**: 315–324.
Morrison, S.A., Bolger, D.T. & Sillett, T.S. (2004). Annual survivorship of the sedentary Rufous-crowned Sparrow (*Aimophila ruficeps*): no detectable effects of edge or rainfall in southern California. *Auk* **121(3)**: 904–916.
Morse, R.J. & Monson, G. (1985). Flame-colored Tanager in Arizona. *Amer. Birds* **39(5)**: 843–844.
Morton, E.S. (1975). Ecological sources of selection on avian sounds. *Amer. Naturalist* **109**: 17–34.
Morton, E.S. (1976). Vocal mimicry in the Thick-billed Euphonia. *Wilson Bull.* **88**: 485–487.
Morton, E.S. (1979a). A comparative survey of avian social systems in northern Venezuela habitats. Pp. 233–259 in: Eisenberg, J.F. ed. (1979). *Vertebrate Ecology in the Northern Neotropics*. Smithsonian Institution Press, Washington, D.C.
Morton, E.S. (1979b). Effective pollination of *Erythrina fusca* by the Orchard Oriole (*Icterus spurius*): coevolved behavioral manipulation? *Ann. Missouri Bot. Garden* **66(3)**: 482–489.
Morton, E.S. & González Alonso, H.J. (1982). The biology of *Torreornis inexpectata* I. A comparison of vocalizations in *T. i. inexpectata* and *T. i. sigmani*. *Wilson Bull.* **94(4)**: 433–446.
Morton, K.M. (1996). The Socotra Bunting *Emberiza socotrana*. *Sandgrouse* **17**: 155–157.
Morton, M.L. (1967a). Diurnal feeding patterns in White-crowned Sparrows, *Zonotrichia leucophrys gambelii*. *Condor* **69**: 491–512.
Morton, M.L. (1967b). The effects of isolation on the diurnal feeding pattern of White-crowned Sparrows (*Zonotrichia leucophrys gambelii*). *Ecology* **48**: 690–694.
Morton, M.L. (1991). Postfledging dispersal of Green-tailed Towhees to a subalpine meadow. *Condor* **93**: 466–468.
Morton, M.L. (1992). Effects of sex and birth date on premigration biology, migration schedules, return rates and natal dispersal in the Mountain White-crowned Sparrow. *Condor* **94**: 117–133.
Morton, M.L. (1997). Natal and breeding dispersal in the Mountain White-crowned Sparrow *Zonotrichia leucophrys oriantha*. *Ardea* **85(1)**: 145–154.
Morton, M.L. & Pereyra, M.E. (1987). Autumn migration of Gambel's White-crowned Sparrows through Tioga Pass, California. *J. Field Orn.* **58**: 6–21.
Morton, M.L. & Welton, D.E. (1973). Postnuptial molt and its relation to reproductive cycle body weight in Mountain White-crowned Sparrows (*Zonotrichia leucophrys oriantha*). *Condor* **75(2)**: 184–189.
Morton, M.L., Horstmann, J.L. & Osborn, J.M. (1972). Reproductive cycle and nesting success of the Mountain White-crowned Sparrow (*Zonotrichia leucophrys oriantha*) in the central Sierra Nevada. *Condor* **74(2)**: 152–163.
Morton, M.L., Orejuela, J.E. & Budd, S.M. (1972). The biology of immature Mountain White-crowned Sparrows (*Zonotrichia leucophrys oriantha*) on the breeding ground. *Condor* **74(4)**: 423–430.
Moskwik, M.P. & O'Connell, M.A. (2006). Male and female reproductive strategies in the polygynous Bobolink. *Northwest Science* **80(2)**: 108–115.
Mowbray, T.B. (1997). Swamp Sparrow (*Melospiza georgiana*). No. **279** in: Poole, A. & Gill, F. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Mowbray, T.B. (1999). Scarlet Tanager (*Piranga olivacea*). No. **479** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 12. The Birds of North America Inc., Philadelphia, Pennsylvania.
Moynihan, M. (1962a). Display patterns of tropical American "nine-primaried" songbirds. I. *Chlorospingus*. *Auk* **79(3)**: 310–344.
Moynihan, M. (1962b). Display patterns of tropical American "nine-primaried" songbirds. II. Some species of *Ramphocelus*. *Auk* **79(4)**: 655–686.
Moynihan, M. (1962c). The organization and probable evolution of some mixed species flocks of Neotropical birds. *Smithsonian Misc. Coll.* **143**: 1–140.
Moynihan, M. (1963a). Display patterns of tropical American "nine-primaried" songbirds. III. The Green-backed Sparrow. *Auk* **80**: 116–144.
Moynihan, M. (1963b). Inter-specific relations between some Andean birds. *Ibis* **105**: 327–339.
Moynihan, M. (1966). Display patterns of tropical American 'nine-primaried' songbirds. 4. The Yellow-rumped Tanager. *Smithsonian Misc. Coll.* **149**: 1–34.
Moynihan, M. (1979). Geographic variation in social behavior and in adaptations to competition among Andean birds. *Publ. Nuttall Orn. Club* **18**: 1–162.
Muehter, V.R., Greene, E. & Ratcliffe, L. (1997). Delayed plumage maturation in Lazuli Buntings: tests of the female mimicry and status signalling hypotheses. *Behav. Ecol. Sociobiol.* **41(4)**: 281–290.
Muheim, R., Phillips, J.B. & Deutschlander, M.E. (2009). White-throated Sparrows calibrate their magnetic compass by polarized light cues during both autumn and spring migration. *J. Exper. Biol.* **212(21)**: 3466–3472.
Muller, K.A. (1967). The South American Crimson Finch *Rhodospingus cruentus*. *Avicult. Mag.* **73(1)**: 1–2.
Mulligan, J.A. (1966). Singing behaviour and its development in the Song Sparrow *Melospiza melodia*. *Univ. Calif. Publ. Zool.* **81**: 1–76.
Mulvihill, R.S. (1988). The occurrence of Dickcissels in western Pennsylvania during the 1988 nesting season – its possible bearing on the species' unusual history in eastern North America. *Pennsylvania Birds* **2**: 83–87.
Mulvihill, R.S. & Chandler, C.R. (1991). A comparison of wing shape between migrating and sedentary Dark-eyed Juncos (*Junco hyemalis*). *Condor* **93(1)**: 172–175.
Mundle, M. (2000). Nesting of the Orangequit (*Euneornis campestris*) in Jamaica. *Pitirre* **13(3)**: 91.
Munn, C.A. (1984). Birds of different feathers also flock together. *Nat. Hist. (New York)* **93**: 34–42.
Munn, C.A. (1985). Permanent canopy and understorey flocks in Amazonia: species composition and population density. Pp. 683–712 in: Buckley *et al.* (1985).
Munn, C.A. (1986). Birds that 'cry wolf'. *Nature (London)* **319**: 143–145.
Munn, C.A. & Terborgh, J.W. (1979). Multi-species territoriality in Neotropical foraging flocks. *Condor* **81**: 338–347.
Munson, E.S. & Robinson, W.D. (1992). Extensive folivory by Thick-billed Saltators (*Saltator maxillosus*) in Southern Brazil. *Auk* **109(4)**: 917–919.
Munves, J. (1975). Birds of a highland clearing in Cundinamarca, Colombia. *Auk* **92**: 307–321.
Murakami, M. & Nakano, S. (2001). Species-specific foraging behavior of birds in a riparian forest. *Ecol. Res.* **16(5)**: 913–923.
Murose, A. & Fujimaki, Y. (1999). Birds of Tokachi District, Hokkaido 7. Birds along the upper reaches of the Satsunai River. *Res. Bull. Obihiro Univ. Nat. Sci.* **21(2)**: 33–39. In Japanese with English summary.
Murray, B.G. (1968). The relationships of sparrows in the genera *Ammodramus*, *Passerherbulus*, and *Ammospiza* with a description of a hybrid Le Conte's × Sharp-tailed Sparrow. *Auk* **85**: 586–593.

Murray, B.G. (1969). A comparative study of the Le Conte's and Sharp-tailed Sparrows. *Auk* **86**: 199–231.
Murray, B.G. (1982). Territorial behavior of the Blue-black Grassquit. *Condor* **84(1)**: 119.
Murray, B.G. & Hardy, J.W. (1981). Behavior and ecology of four syntopic species of finches in Mexico. *Z. Tierpsychol.* **57(1)**: 5–72.
Murray, H. (1970). Breeding the Fawn-naped Tanager. *Avicult. Mag.* **76**: 243.
Murray, K.A., Wilcox, A. & Stoate, A. (2002). A simultaneous assessment of farmland habitat use by breeding Skylarks and Yellowhammers. *Aspects Appl. Biol.* **67**: 121–127.
Murray, R.L., Stanton, T.P. & Emrick, V.R. (2004). Bachman's Sparrows mimic the vocalizations of the Common Yellowthroat and the Indigo Bunting. *J. Field Orn.* **75(1)**: 51–52.
Musilek, J. (1928). Beitrag zur Verbreitung von *Emberiza jankowskii* Tacz. *Orn. Monatsber.* **36**: 74–76. In German.
Mutchler, T. & Mutchler, M. (1987). Rose-breasted Grosbeaks. *North Amer. Bird Bander* **12(2)**: 65–66.
Myers, H.W. (1909). Nesting habits of the Rufous-crowned Sparrow. *Condor* **11**: 131–134.
Myers, J.G. (1935). Nesting association of birds with social insects. *Trans. Roy. Entom. Soc. London* **83**: 11–22.
Mylecraine, K.A., Bulgin, N.L., Gibbs, H.L., Vickery, P.D. & Perkins, D.W. (2008). Limited genetic structure and evidence for dispersal among populations of the endangered Florida Grasshopper Sparrow, *Ammodramus savannarum floridanus*. *Conserv. Genetics* **9(6)**: 1633–1638.
Myres, M.T. (1959). The first record of Harris' Sparrow, *Zonotrichia querula* (Nuttall), from Alaska. *Auk* **76**: 364.
Nagata, H. & Ishimoto, A. (2000). First detailed description of captured Savannah Sparrow *Passerculus sandwichensis* in Ibaraki Prefecture. *Jap. J. Orn.* **49(1)**: 55–58.
Naggatz, H. (1996a). Meine Erfahrungen mit dem Grünen Kardinal. Teil 1: Haltung des Grünen Kardinals (*Gubernatrix cristata*). *Voliere* **19(8)**: 238–246. In German.
Naggatz, H. (1996b). Meine Erfahrungen mit dem Grünen Kardinal. Teil 2: Zucht des Grünen Kardinals (*Gubernatrix cristata*). *Voliere* **19(11)**: 335–342. In German.
Naggatz, H. (1997). Haltung und Zucht des Grünen Kardinals. Teil 2: Zucht. *Gefiederte Welt* **121(11)**: 374–377. In German.
Nair, N.G., Pant, K. & Chandola-Saklani, A. (1994). Environmental and hormonal control of vernal migration in Redheaded Bunting (*Emberiza bruniceps*). *J. Biosci.* **19(4)**: 453–466.
Naka, L.N., Cohn-Haft, M., Mallet-Rodrigues, F., Dantas Santos, M.P. & Torres, M.F. (2006). The avifauna of the Brazilian state of Roraima: bird distribution and biogeography in the Rio Branco bassin. *Rev. Bras. Orn.* **14**: 197–238.
Nakamura, H. (1986). Ecological studies of the beech forest bird community on Kayanodoura Heights. *Bull. Inst. Nat. Educ. Shiga Heights* **23**: 9–20. In Japanese with English summary.
Nakamura, T. (1969). [Physiological and ecological studies on bird migration with special reference to body lipids]. *Tori* **19**: 87–92. In Japanese.
Nakamura, T. (1973). Comparative ecology of emberizids wintering in central Honshu; especially of *Emberiza rustica* and *E. cioides*. *Misc. Rep. Yamashina Inst. Orn.* **7(2)**: 139–159. In Japanese with English summary.
Nakamura, T. (1978). [Habitat & territoriality of Grey Buntings (*Emberiza variabilis*) in Shiga Heights]. *Bull. Inst. Nat. Educ. Shiga Heights* **17**: 33–54. In Japanese.
Nakamura, T. (1981a). Annual change and disappearance of a local population of Japanese Reed Bunting *Emberiza yessoensis* in Kirigamine grassland. *Tori* **30(2/3)**: 57–74. In Japanese with English summary.
Nakamura, T. (1981b). The breeding behaviour and territorial dispersion of Japanese Reed Bunting *Emberiza yessoensis*. *Misc. Rep. Yamashina Inst. Orn.* **13(2)**: 1–41.
Nakamura, T. (1983). Ecological gradient of avian community on lower limit in subalpine coniferous forests. *J. Yamashina Inst. Orn.* **15(1)**: 1–18. In Japanese with English summary.
Nakamura, T. & Iijima, K. (1977). [Buntings wintering in southern Kyushu, especially the mode of dispersion in *Emberiza fucata* and *Emberiza rustica*]. *Misc. Rep. Yamashima Inst. Orn.* **9(1)**: 1–19. In Japanese.
Nakamura, T. & Kitahara, M. (1983). Migratory activities in caged *Emberiza rustica* exposed to different artificial lights and temperatures. *J. Yamashina Inst. Orn.* **15(2)**: 141–155.
Nakamura, T., Iijima, K. & Kagawa, T. (1968). A comparative study on the habitat preference and home range of four species of the genus *Emberiza* on peat grasslands. *Misc. Rep. Yamashina Inst. Orn.* **5**: 313–336. In Japanese with English summary.
Nakamura, T., Iijima, K. & Ushiyama, H. (1970). Territoriality of *Emberiza yessoensis* in a high population density. *Misc. Rep. Yamashina Inst. Orn.* **6**: 82–102. In Japanese with English summary.
Nam Hyun-Young, Choi Chang-Yong, Park Jong-Gil, Hong Gil-Pyo, Won Il-Jae, Kim Sung-Jin, Bing Gi-Chang & Chae Hee-Young (2011). Protandrous migration and variation in morphological characters in *Emberiza* buntings at an East Asian stopover site. *Ibis* **153(3)**: 494–501.
Naoki, K. (1998). Seasonal change of flower use by the Slaty Flowerpiercer (*Diglossa plumbea*). *Wilson Bull.* **110(3)**: 393–397.
Naoki, K. (2003a). The relative importance of arthropods and fruits in foraging behavior of omnivorous tanagers (Thraupidae): the comparison of three methods. *Condor* **105**: 135–144.
Naoki, K. (2003b). Notes on foraging ecology of the little known Green-capped Tanager (*Tangara meyerdeschauensee*). *Orn. Neotropical* **14**: 411–414.
Naoki, K. (2003c). *Evolution of Ecological Diversity in the Neotropical Tanagers of the Genus* Tangara *(Aves: Thraupidae)*. PhD thesis, Louisiana State University, Baton Rouge, Louisiana.
Naoki, K. (2007). Arthropod resource partitioning among omnivorous tanagers (*Tangara* spp.) in western Ecuador. *Auk* **124(1)**: 197–209.
Naranjo, L.G. (1995). Patrones de reproducción en dos poblaciones aisladas de *Agelaius icterocephalus*. *Caldasia* **18**: 89–100. In Spanish.
Narosky, S. (1973). The mystery of the Boyero's stocking. *Animals (London)* **15(6)**: 280–282.
Narosky, S. (1975). Una nueva especie de *Sporophila* para la avifauna argentina. *Hornero* **11(3)**: 169–171. In Spanish.
Narosky, S., Salvador, S.A. & Saibene, C.A. (1984). Especies nuevas o poco citadas para la provincia de Buenos Aires, Argentina: *Asthenes modesta*, *Agriornis montana*, *Catamenia analis* y *Sicalis lebruni*. *Hornero* **12(3)**: 209–211. In Spanish.
Narosky, T. & Di Giacomo, A.G. (1993). *Las Aves de la Provincia de Buenos Aires: Distribución y Estatus*. Asociación Ornitológica del Plata & Vázquez Mazzini Editores, Buenos Aires. In Spanish with English summary.
Narosky, T. & Yzurieta, D. (1987). *Guía para la Identificatión de las Aves de Argentina y Uruguay*. Vázquez Mazzini Editores, Buenos Aires. In Spanish.
Narosky, T. & Yzurieta, D. (2003). *Birds of Argentina and Uruguay: a Field Guide*. Vázquez Mazzini, Buenos Aires.
Natorp, O. (1931). Beitrag zur Kenntnis der Kleider von *Plectrophenax nivalis nivalis* (L.). *J. Orn.* **79**: 338–346. In German.
Naugler, C.T. (1993). American Tree Sparrow (*Spizella arborea*). No. **37** in: Poole, A., Stettenheim, P. & Gill, F. eds. (1993). *The Birds of North America*. Vol. 1. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Naumburg, E.M.B. (1924). *Thraupis sayaca* and its allies. *Auk* **41**: 105–116.
Naumburg, E.M.B. (1930). The birds of Matto Grosso, Brazil: a report on the birds secured by the Roosevelt-Rondon Expedition. *Bull. Amer. Mus. Nat. Hist.* **60**: i–vii, 1–432.
Nava Solorio, J. (1994). Hábitos reproductivos de la Zacua Mayor (*Psarocolius montezumae*) en Bacalar, Quintana Roo, México. *An. Inst. Biol. Univ. Nac. Aut. Mex. (Ser. Zool.)* **65**: 265–274. In Spanish.
Navarro, R., Marín, G. & Muñoz, J. (2010). Notas sobre el nido del Gonzalito Real (*Icterus auricapillus*) en Venezuela. *Cotinga* **32**: 119. In Spanish.
Navarro-Sigüenza, A.G. & Peterson, A.T. (2004). An alternative species taxonomy of the birds of Mexico. *Biota Neotropica* **4(2)**: 1–32.
Navarro-Sigüenza, A.G., Peterson, A.T., Nyari, A., García-Deras, G.M. & García-Moreno, J. (2008). Phylogeography of the *Buarremon* brush-finch complex (Aves, Emberizidae) in Mesoamerica. *Mol. Phylogen. Evol.* **47**: 21–35.
Navas, J.R. & Bó, N.A. (1988a). *Sporophila falcirostris* (Temminck, 1820), nueva especie para la Argentina (Aves, Emberizinae). *Neotrópica* **33**: 96. In Spanish.
Navas, J.R. & Bó, N.A. (1988b). Nuevos aportes a la distribución geográfica de *Diuca diuca* (Aves, Emberizinae) en la Argentina. *Neotrópica* **33**: 97–104. In Spanish with English summary.
Nazarov, Y.N. (1974). [On the ecology of *Emberiza yessoensis continentalis* (With.)]. *Trudy Biol. Pochv. Inst. SSSR* **17(120)**: 136–144. In Russian.
Nealen, P.M. & Breitwisch, R. (1997). Northern Cardinal sexes defend nests equally. *Wilson Bull.* **109**: 269–278.
Nechaev, V.A. (1978). [Grey Bunting *Emberiza variabilis* on Sakhalin Island (biology, age plumages, systematics)]. Pp. 57–71 in: Bromlei, G.F. & Yudin, V.G. eds. (1978). *Ecologiya i zoogeografiya nekotorykh pozvonochnikh sushi Dal'nego Vostoka*. [*Ecology and Zoogeography of Certain Land Vertebrates from the Soviet Far East*]. [Far-East Scientific Center], Akademiya nauk SSSR, Vladivostok, Russia. In Russian.
Neff, B.D. & Pitcher, T.E. (2009). Mate choice for nonadditive genetic benefits and the maintenance of genetic diversity in Song Sparrows. *J. Evol. Biol.* **22(2)**: 424–429.
Neff, J.A. (1937). Nesting distribution of the Tricolored Redwing. *Condor* **39**: 61–81.
Neff, J.A. (1942). Migration of the Tricolored Red-wing in central California. *Condor* **44**: 45–53.
Negret, A.J. & Negret, R.A. (1981). *As Aves Migratórias do Distrito Federal*. Boletim Técnico **6**. Ministério da Agricultura, Instituto Brasileiro de Desenvolvimento Florestal, Brasília. In Portuguese.
Nehrkorn, A. (1899). *Katalog der Eiersammlung*. 1st edition. Harald Bruhn, Braunschweig, Germany. In German.
Nelson, B.S. (2002). Duplex auditory distance assessment in a small passerine bird (*Pipilo erythrophthalmus*). *Behav. Ecol. Sociobiol.* **53(1)**: 42–50.
Nelson, B.S. (2004). Dynamics of frequency and amplitude modulations in vocalizations produced by Eastern Towhees, *Pipilo erythrophthalmus*. *J. Acoust. Soc. Amer.* **115(3)**: 1333–1344.
Nelson, D.A. (1987). Song syllable discrimination by Song Sparrows (*Melospiza melodia*). *J. Comp. Psychol.* **101(1)**: 25–32.
Nelson, D.A. (1988). Feature weighting in species song recognition by the Field Sparrow (*Spizella pusilla*). *Behaviour* **106(1/2)**: 158–182.
Nelson, D.A. (1989). Song frequency as a cue for recognition of species and individuals in the Field Sparrow (*Spizella pusilla*). *J. Comp. Psychol.* **103(2)**: 171–176.
Nelson, D.A. (1992). Song overproduction and selective attrition lead to song sharing in the Field Sparrow (*Spizella pusilla*). *Behav. Ecol. Sociobiol.* **30(6)**: 415–424.
Nelson, D.A. & Croner, L.J. (1991). Song categories and their functions in the Field Sparrow (*Spizella pusilla*). *Auk* **108(1)**: 42–52.
Nelson, D.A. & Poesel, A. (2009). Does learning produce song conformity or novelty in White-crowned Sparrows, *Zonotrichia leucophrys*? *Anim. Behav.* **78(2)**: 433–440.
Nelson, D.A. & Soha, J.A. (2004). Perception of geographical variation in song by male Puget Sound White-crowned Sparrows, *Zonotrichia leucophrys pugetensis*. *Anim. Behav.* **68(2)**: 395–405.
Nelson, E.W. (1912). Descriptions of new genera, species and subspecies of birds from Panama, Columbia and Ecuador. *Smithsonian Misc. Coll.* **60(3)**: 1–25.
Nelson, K.J. & Martin, K. (1999). Thermal aspects of nest-site location for Vesper Sparrows and Horned Larks in British Columbia. *Studies Avian Biol.* **19**: 137–143.
Nelson, W. (1989). A Black-headed Grosbeak in Aitkin. *Loon* **61(1)**: 47–48.
Nelson, W.S., Dean, T. & Avise, J.C. (2000). Matrilineal history of the endangered Cape Sable Seaside Sparrow inferred from mitochondrial DNA polymorphism. *Mol. Ecol.* **9(6)**: 809–813.
Nemeth, E. (1996). Different singing styles in mated and unmated Reed Bunting *Emberiza schoeniclus*. *Ibis* **138(2)**: 172–176.
Nero, R.W. (1963). Comparative behavior of the Yellow-headed Blackbird, Red-winged Blackbird, and other icterids. *Wilson Bull.* **75**: 376–413.
Nero, R.W. (1983). Post-copulatory display in the Lark Bunting and other species. *Wilson Bull.* **94(4)**: 585–590.
Nero, R.W. (1984). *Redwings*. Smithsonian Institution Press, Washington, D.C.
Nethersole-Thompson, D. (1966). *The Snow Bunting*. Oliver and Boyd, Edinburgh & London.
Neudorf, D.L. & Blanchfield, P.J. (1994). The Slatecolored Seedeater (*Sporophila schistacea*): a bamboo specialist? *Orn. Neotropical* **5**: 129–132.
Neudorf, D.L. & Sealy, S.G. (1992). Reactions of four passerine species to threats of predation and cowbird parasitism: enemy recognition or generalized responses? *Behaviour* **123**: 84–105.
Neufeldt, I.A. & Wunderlich, K. (1981). *Emberiza jankowskii* Taczanowski. In: Dathe, H. & Neufeldt, I.A. eds. (1981). *Atlas der Verbreitung palaearktischer Vögel*. 9th instalment. Akademie-Verlag, Berlin. In German.
Newman, G.A. (1970). Cowbird parasitism and nesting success of Lark Sparrows in southern Oklahoma. *Wilson Bull.* **82**: 304–309.
Newman, J. (1985). Minnesota's first wintering Clay-colored Sparrow. *Loon* **57(2)**: 104–105.
Newman, J. (2000). White-naped Seedeater *Dolospingus fringilloides*. *Cotinga* **14**: 111–112.
Newman, M.M., Yeh, P.J. & Price, T.D. (2008). Song variation in a recently founded population of the Dark-eyed Junco (*Junco hyemalis*). *Ethology* **114(2)**: 164–173.
Newman, R.J. (1954). *Toxostoma ocellatum* and *Diglossa baritula* in Hidalgo. *Condor* **56**: 361.
Newton, I. (2007). Weather-related mass-mortality events in migrants. *Ibis* **149**: 453–467.
Newton, I. (2008). *The Migration Ecology of Birds*. Academic Press, London.
Ney-Nifle, M., Bernstein, C., Reboreda, J.C. & Kacelnik, A. (2005). Population dynamics and avian brood parasitism: persistence and invasions in a three-species system. *J. Anim. Ecol.* **74(2)**: 274–284.
Nice, M.M. (1927). Experiences with Cardinals at a feeding station in Oklahoma. *Condor* **29**: 101–103.
Nice, M.M. (1937). Studies in the life history of the Song Sparrow. 1. A population study of the Song Sparrow. *Trans. Linn. Soc. New York* **4**: 1–247.
Nice, M.M. (1943). Studies in the life history of the Song Sparrow. 2. The behavior of the Song Sparrow and other passerine birds. *Trans. Linn. Soc. New York* **6**: 1–328.
Nicholson, C.P. (1976). The Bachman's Sparrow in Tennessee. *Migrant* **47(3)**: 53–60.
Nicholson, C.P. (1981). Likely nest reuse by a Field Sparrow. *J. Field Orn.* **52(3)**: 235.
Nicholson, W.H. (1936). Notes on the habits of the Florida Grasshopper Sparrow. *Auk* **53**: 318–319.
Nielsen, J.T. & Møller, A.P. (2006). Effects of food abundance, density and climate change on reproduction in the Sparrowhawk *Accipiter nisus*. *Oecologia (Berlin)* **149**: 505–518.
Niethammer, G. (1956). Zur Vogelwelt Boliviens (Teil II: Passeres). *Bonn. Zool. Beitr.* **7**: 84–150. In German.
Nikolov, B.P., Nankinov, D.N., Dalakchieva, S.Y., Popov, K.S. & Ivanov, S.K. (2008). Sex ratio, biometrics and fat score of migratory and wintering Reed Buntings *Emberiza schoeniclus* (Aves: Passeriformes) in Bulgaria. *Acta Zool. Bulg.* **60** (Suppl. 2): 111–118.
Nikolov, S.C. & Spasov, S.D. (2005). Frequency, density and numbers of some breeding birds in the south part of Kresna Gorge (SW Bulgaria). *Acrocephalus (Ljubljana)* **26(124)**: 23–31.
Nishi, H. (2004). Changes of the bird distribution and individual number in the Basin of Shinano River, Nagaoka City, Niigata Prefecture. *Bull. Nagaoka Municipal Sci. Mus.* **39**: 41–54. In Japanese with English summary.
Nishi, N. (2009). The first record of a Little Bunting in Mie Prefecture. *J. Yamashina Inst. Orn.* **40(2)**: 154–155. In Japanese with English summary.

Nishide, T. (1987). *Emberiza* species on Hachirogata reclaimed land. 1. Invasion and changes in distribution. *Strix* **6**: 86–95.
Nitzsche, H. (1994). Erfolgreiche Nachzucht des Braunbauchorganisten *Euphonia pectoralis*. *Gefiederte Welt* **118(2)**: 55–56. In German.
Nocera, J.J., Fitzgerald, T.M., Hanson, A.R. & Milton, G.R. (2007). General status ranks of wild species in Nova Scotia. *J. Field Orn.* **78(1)**: 50–55.
Nolan, V. (1965). A male Cardinal helper at a nest of Yellow-breasted Chats. *Wilson Bull.* **77**: 196.
Nolan, V., Ketterson, E.D., Cristol, D.A., Rogers, C.M., Clotfelter, E.D., Titus, R.C., Schoech, S.J. & Snajdr, E. (2002). Dark-eyed Junco (*Junco hyemalis*). No. **716** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.
Nomura, H. (1996). *Avifauna no Folclore*. Coll. Mossoroense, Rio Grande do Norte, Brazil. In Portuguese.
van Noorden, B. (1999). De Ortolaan *Emberiza hortulana*, een plattelandsdrama. *Limosa* **72(2)**: 55–63. In Dutch with English summary.
Nordhagen, T.J., Nordhagen, M.P. & Hendricks, P. (2005). Nelson's Sharp-tailed Sparrow nest parasitized by Brown-headed Cowbird. *Wilson Bull.* **117(4)**: 403–404.
Nordin, K.E., McGillivray, W.B. & Biermann, G.C. (1988). Courtship feeding in Brewer's Sparrows (*Spizella breweri*). *J. Field Orn.* **59(1)**: 33–36.
Nordlund, C.A. & Barber, C.A. (2005). Parental provisioning in *Melospiza melodia* (Song Sparrows). *Northeastern Naturalist* **12(4)**: 425–432.
Nores, M. & Cerana, M.M. (1990). Biogeography of forest relics in the mountains of northwestern Argentina. *Rev. Chilena Hist. Nat.* **63**: 37–46.
Nores, M. & Yzurieta, D. (1979). Una nueva especie y dos nuevas subespecies de aves (Passeriformes). *Misc. Acad. Nac. Cienc. Córdoba* **61**: 4–8. In Spanish with English summary.
Nores, M. & Yzurieta, D. (1980). *Aves de Ambientes Acuáticos de Córdoba y Centro de Argentina*. Secretaría de Estado de Agricultura y Ganadería, Dirección de Caza, Pesca y Actividades Acuáticas & Academia Nacional de Ciencias de Córdoba, Córdoba, Argentina. In Spanish.
Nores, M. & Yzurieta, D. (1983). Especiación en las sierras pampeanas de Córdoba y San Luis (Argentina), con descripción de siete nuevas subespecies de aves. *Hornero* **12** (Suppl.): 88–102. In Spanish.
Nores, M. & Yzurieta, D. (1986). Nuevas localidades para aves argentinas. Part 7. *Hist. Nat., Corrientes* **6**: 49–52. In Spanish.
Nores, M., Yzurieta, D. & Salvador, S. (1991). Lista y distribución de las aves de Santiago del Estero, Argentina. *Bol. Acad. Nac. Cienc. (Córdoba)* **59**: 157–196. In Spanish.
Norgaard-Olesen, E. (1973). *Tanagers*. Vol. 1. Skibby-Books, Skibby, Denmark.
Norgaard-Olesen, E. (1974). *Tanagers*. Vol. 2. Skibby-Books, Skibby, Denmark.
Norment, C.J. (1992). Comparative breeding biology of Harris' Sparrows and Gambel's White-crowned Sparrows in the Northwest Territories, Canada. *Condor* **94**: 955–975.
Norment, C.J. (1994). Breeding site fidelity in Harris' Sparrows, *Zonotrichia querula*, in the Northwest Territories. *Can. Field-Nat.* **108(2)**: 234–236.
Norment, C.J. (1995). Prebasic (postnuptial) molt in free-ranging Harris' Sparrows, *Zonotrichia querula*, in the northwest Territories, Canada. *Can. Field-Nat.* **109(4)**: 470–472.
Norment, C.J. (2003). Patterns of nestling feeding in Harris's Sparrows, *Zonotrichia querula* and White-crowned Sparrows, *Z. leucophrys*, in the Northwest Territories, Canada. *Can. Field-Nat.* **117(2)**: 203–208.
Norment, C.J. & Fuller, M.E. (1997). Breeding-season frugivory by Harris' Sparrows (*Zonotrichia querula*) and White-crowned Sparrows (*Zonotrichia leucophrys*) in a low-arctic ecosystem. *Can. J. Zool.* **75(5)**: 670–679.
Norment, C.J. & Shackleton, S.A. (1993). Harris' Sparrow (*Zonotrichia querula*). No. **64** in: Poole, A. & Gill, F. eds. (1993). *The Birds of North America*. Vol. 2. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Norment, C.J., Hendricks, P. & Santonocito, R. (1998). Golden-crowned Sparrow (*Zonotrichia atricapilla*). No. **352** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 9. The Birds of North America Inc., Philadelphia, Pennsylvania.
Norton, W.J.E. (1975). Notes on the birds of the Sierra Nevada de Santa Marta of Colombia. *J. Roy. Air Force Orn. Soc.* **9**: 8–16.
Nottebohm, F. (1969). The song of the Chingolo, *Zonotrichia capensis*, in Argentina: description and evaluation of a system of dialects. *Condor* **71**: 299–315.
Nottebohm, F. (1975a). Continental patterns of song variability in *Zonotrichia capensis*: some possible ecological correlates. *Amer. Nat.* **109(970)**: 605–624.
Nottebohm, F. (1975b). Vocal behavior in birds. Pp. 289–332 in: Farner, D.S., King, J.R. & Parkes, K.C. eds. (1975). *Avian Biology*. Vol. 5. Academic Press, London.
Nottebohm, F. & Selander, R.K. (1972). Vocal dialects and gene frequencies in the Chingolo Sparrow (*Zonotrichia capensis*). *Condor* **74(2)**: 137–143.
Novaes, F.C. (1950). Sobre as aves de Sernambetiba, Distrito Federal, Brasil. *Rev. Bras. Biol.* **10**: 199–208. In Portuguese.
Novaes, F.C. (1952). Algumas adendas a ornitologia de Goiás, Brasil. *Bol. Mus. Nac. Rio J. Zool.* **117**: 1–7. In Portuguese.
Novaes, F.C. (1957). Contribuição a ornitologia do noroeste do Acre. *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **8**: 1–30. In Portuguese.
Novaes, F.C. (1958). As aves e as comunidades bióticas no alto Rio Juruá, território do Acre. *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **14**: 1–13. In Portuguese.
Novaes, F.C. (1960). Sobre uma coleção de aves do sudeste do Estado do Pará. *Arq. Zool. Est. São Paulo* **11**: 133–146. In Portuguese.
Novaes, F.C. (1969). Análise ecológica e abundancia das aves em um trecho da mata do baixo rio Guamá (Estado do Pará). *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **69**: 1–52. In Portuguese.
Novaes, F.C. (1970). Distribuição ecológica e abundancia das aves em um trecho da mata do baixo rio Guamá (Estado do Pará). *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **71**: 1–54. In Portuguese.
Novaes, F.C. (1973). Aves de uma vegetação secundária na foz do Amazonas. *Publ. Avuls. Mus. Paraense Emilio Goeldi (Zool.)* **21**: 1–88. In Portuguese.
Novaes, F.C. (1978). Ornitologia do território do Amapá 2. *Publ. Avuls. Mus. Paraense Emilio Goeldi (Zool.)* **29**: 1–75. In Portuguese.
Novaes, F.C. (1980). Observações sobre a avifauna do alto curso do rio Paru de Leste, Estado do Pará. *Bol. Mus. Paraense Emilio Goeldi (Nova Sér. Zool.)* **100**: 1–58. In Portuguese.
Novaes, F.C. (1992). Bird observations in the State of Piauí, Brazil. *Goeldiana Zool.* **17**: 1–5.
Novaes, F.C. & Lima, M.F.C. (1998). *Aves da Grande Belém: Municipios de Belém e Ananindeua, Pará*. Museu Paraense Emilio Goeldi, Belém, Brasil. In Portuguese.
Novaes, F.C. & Pimentel, T. (1973). Observações sobre avifauna dos campos de Bragança, estado do Pará. *Publ. Avuls. Mus. Paraense Emilio Goeldi (Zool.)* **20**: 229–246. In Portuguese.
Novoa, F.F., Bozinovic, F. & Rosenmann, M. (1994). Seasonal changes of thermal conductance in *Zonotrichia capensis* (Emberizidae), from central Chile: the role of plumage. *Comp. Biochem. Physiol Part A Physiol.* **107(2)**: 297–300.
Novoa, F.F., Veloso, C., Lopez-Calleja, M.V. & Bozinovic, F. (1996). Seasonal changes in diet, digestive morphology and digestive efficiency in the Rufous-collared Sparrow (*Zonotrichia capensis*) in central Chile. *Condor* **98(4)**: 873–876.
Novy, F.O. & McGrew, A.D. (1974). Orange-breasted Bunting in southern Texas. *Auk* **91**: 178–179.
Nowicki, S., Searcy, W.A., Hughes, M. & Podos, J. (2001). Evolution of bird song: male and female response to song innovation in Swamp Sparrows. *Anim. Behav.* **62(6)**: 1189–1195.
Nulty, B., Burt, J.M., Akcay, C., Templeton, C.N., Campbell, S.E. & Beecher, M.D. (2010). Song learning in Song Sparrows: relative importance of autumn vs. spring tutoring. *Ethology* **116(7)**: 653–661.
Núñez-Santamaría, W.N. & Rodríguez-Berrocal, D. (2002). Descripción de las características comportamentales e identificación del uso que hace el Jolofo Basto *Molothrus armenti* Cabanis (1851) de dos zonas de humedales en el delta del río Magdalena. *Orn. Colombiana* **3**: 123. In Spanish.
Oates, J. (1996). Hybrid Pine Buntings. *Birding World* **9(2)**: 63–64.
Oatley, T.B. (1996). SASOL report on selected recoveries received at SAFRING: January 1996–June 1996. *Safring News* **25**: 60–67.
Oatley, T.B. (2005). Buntings. *Africa Birds & Birding* **9(6)**: 22–23.
Oberholser, H.C. (1974). *The Bird Life of Texas*. Vol. 2. University of Texas Press, Austin, Texas.
Oberle, M.W. (2008). *Caribbean Bird Song: Puerto Rico South to Grenada with the Bahamas, Caymans & San Andrés*. CD 3. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York.
O'Brien, C.E. (1968). Rediscovery of *Embernagra longicauda* Strickland. *Auk* **85**: 323.
Occhiato, D. (2003a). Identification of Pine Bunting. *Dutch Birding* **25(1)**: 1–16.
Occhiato, D. (2003b). Pine Bunting in Italy. Status and distribution. *Dutch Birding* **25(1)**: 32–39.
Ochoa, J.M. & Cuervo Maya, A. (1998). Apuntes sobre la nidificación del Cacique Candela (*Hypopyrrhus pyrohypogaster*) en el municipio de Barbosa. *Bol. Soc. Antioqueña Orn.* **9**: 61–68. In Spanish.
O'Connor, B. (2003). Black-headed Grosbeak in Moorhead, Clay County. *Loon* **74(4)**: 240–241.
O'Connor, J.A., Sulloway, F.J., Robertson, J. & Kleindorfer, S. (2010). *Philornis downsi* parasitism is the primary cause of nestling mortality in the critically endangered Darwin's Medium Tree Finch (*Camarhynchus pauper*). *Biodiversity & Conservation* **19**: 853–866.
O'Connor, K.D., Marr, A.B., Arcese, P., Keller, L.F, Jeffery, K.J. & Bruford, M.W. (2006). Extra-pair fertilization and effective population size in the Song Sparrow *Melospiza melodia*. *J. Avian Biol.* **37(6)**: 572–578.
O'Daniel, D.L. (1989). Observations of seed dispersal and seed predation in two species of *Calathea* in a Costa Rica rain forest with decriptions of foraging behaviour of avian visitors. *Brenesia* **27**: 55–68.
Oddie, W.E. (1981). Cretzschmar's Bunting in Shetland. *British Birds* **74(12)**: 532–533.
Ogilvie-Grant, W.R. (1912). *Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History)*. Vol. 5. Trustees of the British Museum (Natural History), London.
Ogilvie-Grant, W.R. & Forbes, H.O. (1903). Birds of Sokotra and Abd-el-Kuri. Pp. 21–63 in: Forbes, H.O. ed. (1903). *The Natural History of Sokotra and Abd-el-Kuri: Being the Report upon the Results of the Conjoint Expedition to these Islands in 1898–9*. Henry Young and Sons & H.R. Porter, Liverpool & London.
O'Grady, D.R., Hill, D.P. & Barclay, R.M.R. (1996). Nest visitation by humans does not increase predation on Chestnut-collared Longspur eggs and young. *J. Field Orn.* **67(2)**: 275–280.
Ohmart, R.D. (1968). Breeding of Botteri's Sparrow (*Aimophila botteru*) in Arizona. *Condor* **70**: 277.
Ohmart, R.D. & Smith, E.L. (1971). Water deprivation and use of sodium chloride solutions by Vesper Sparrows (*Pooecetes gramineus*). *Condor* **73**: 364–366.
Øien, I.J. & Oyan, H.S. (1987). Little Buntings breeding in Porsanger. *Vår Fuglefauna* **10(3)**: 162. In Norwegian with English summary.
Ojeda, V. & Trejo, A. (2002). Primeros registros de nidificación en cavidades para tres especies de aves del bosque andino patagónico. *Hornero* **17(2)**: 85–89. In Spanish with English summary.
Okanoya, K. & Dooling, R.J. (1988). Hearing in the Swamp Sparrow, *Melospiza georgiana*, and the Song Sparrow, *Melospiza melodia*. *Anim. Behav.* **36(3)**: 726–732.
Okulewicz, J. (1989). Breeding biology and ecology of the Reed Bunting (*Emberiza schoeniclus*) in the region of the Milicz fish-pond area. *Ptaki Slaskа* **7**: 1–39.
Olafson, E. (1993). Rare and vagrant birds in Iceland: buntings, vireos and icterids. *Natturufraedingurinn* **63(1/2)**: 87–108.
Olioso, G. (1988). Migration et hivernage du Bruant des roseaux *Emberiza schoeniclus* (L.) en région Rhône-Alpes. Analyse des reprises de bagues. *Bièvre* **9(1)**: 1–8. In French with English summary.
Olivares, A. (1959). Cinco aves que aparentemente no habían sido registradas en Colombia. *Lozania* **12**: 51–56. In Spanish.
Olivares, A. (1962). Aves de la región de la Sierra de la Macarena, Meta, Colombia. *Rev. Acad. Colombiana Cienc. Exact. Fis. Nat.* **11**: 305–345. In Spanish.
Olivares, A. (1963). Notas sobre aves de los Andes Orientales en Boyacá. *Bol. Soc. Venez. Cienc. Nat.* **25**: 91–125. In Spanish.
Olivares, A. (1969). *Aves de Cundinamarca*. Instituto de Cieñcias Naturales & Dirección de Divulgación Cultural, Bogotá. In Spanish.
Olivares, A. (1970). Effects of the environmental changes on the avifauna of the Republic of Colombia. Pp. 77–87 in: Buechner, H.K. &. Buechner, J.H. eds. (1970). *The Avifauna of Northern Latin America: a Symposius Held at the Smithsonian Institution 13–15 April 1966*. Smithsonian Contributions to Zoology **26**. Smithsonian Institution, Washington, D.C.
Olivares, A. & Hernández, J. (1962). Aves de la comisaría del Vaupés (Colombia). *Rev. Biol. Trop. (Univ. Costa Rica)* **10**: 61–90. In Spanish.
de Oliveira, L.S., Sousa, L.M.S., Davanço, P.V. & Francisco, M.R. (2010). Breeding behaviour of the Lined Seedeater (*Sporophila lineola*) in southeastern Brazil. *Orn. Neotropical* **21**: 251–261.
de Oliveira, R.G. (1981). A Patativa-chorona (*Sporophila leucoptera*). *Sulornis* **2**: 16–21.
de Oliveira, R.G. & Rech, F.G. (1981). Ocorrência da 'Saira-sete-cores' (*Tangara seledon*) no Município de Porto Alegre (RS). *An. Soc. Sul-Rio Grand. Orn.* **2**: 25. In Portuguese.
Oliver, P. (2001). Lack of territorial defence by male Yellowhammers. *British Birds* **94(8)**: 387–389.
Oliveras de Ita, A. & Gómez de Silva Garza, H. (2002). Nueva localidad para el Gorrión Serrano (*Xenospiza baileyi*). *Orn. Neotropical* **13(2)**: 203–204. In Spanish with English summary.
Oliveras de Ita, A. & Gómez de Silva Garza, H. (2007). Territoriality and survivorship of the Sierra Madre Sparrow in La Cima, México. *Biodiversity & Conservation* **16(4)**: 1055–1061.
Oliveras de Ita, A. & Rojas-Soto, O.R. (2006). A survey for the Sierra Madre Sparrow (*Xenospiza baileyi*), with its rediscovery in the state of Durango, Mexico. *Bird Conserv. Int.* **16(1)**: 25–32.
Oliveras de Ita, A., Gómez de Silva, H. & Grosselet, M. (2001). Population dynamics and natural history of the Sierra Madre Sparrow (*Xenospiza baileyi*) at La Cima, Mexico. *Cotinga* **15**: 43–47.
Olmos, F. (1996). Satiation or deception?: mast-seeding *Chusquea* bamboos, birds and rats in the Atlantic Forest. *Rev. Bras. Biol.* **56(2)**: 391–401.
Olmstead, S.T., Solano-Ugalde, A. & Cisneros-Heredia, D.F. (2011). Range expansion of Red-breasted Blackbird *Sturnella militaris* in western Ecuador and notes on its contact zone with Peruvian Meadowlark *S. bellicosa*. MS.
O'Loghlen, A.L. (1995). Delayed access to local songs prolongs vocal development in dialect populations of Brown-headed Cowbirds. *Condor* **97**: 402–414.
O'Loghlen, A.L. & Rothstein, S.I. (2002). Ecological effects on song learning: delayed development is widespread in wild populations of Brown-headed Cowbirds. *Anim. Behav.* **63**: 475–486.
Olrog, C.C. (1963). *Lista y Distribución de las Aves Argentinas*. Opera Lilloana **9**. Universidad Nacional de Tucumán, Tucumán, Argentina. 377 pp. In Spanish.
Olrog, C.C. & Navas, J.R. (1961). *Sicalis lutea* en la fauna argentina (Aves, Fringillidae). *Neotropica* **7(23)**: 55–57. In Spanish.
Olsen, B.J., Greenberg, R., Fleischer, R.C. & Walters, J.R. (2008). Extrapair paternity in the Swamp Sparrow, *Melospiza georgiana*: male access or female preference? *Behav. Ecol. Sociobiol.* **63(2)**: 285–294.
Olsen, K.M. (1989). [Identification of the Reed Bunting, Little Bunting and Rustic Bunting with notes on Pallas' Reed Bunting and the Lapland Bunting]. *Dansk Orn. Foren. Tidsskr.* **83(3/4)**: 97–101. In Danish.
Olsen, K.M. (1991). [Field identification of Reed Bunting, Little Bunting and Rustic Bunting]. *Calidris* **20(1)**: 16–21. In Swedish.
Olson, J.B. & Kendeigh, S.C. (1980). Effect of season on the energetics, body composition, and cage activity of the Field Sparrow. *Auk* **97(4)**: 704–720.

Olson, S.L. (1980). The subspecies of Grasshopper Sparrow (*Ammodramus savannarum*) in Panama (Aves: Emberizinae). *Proc. Biol. Soc. Washington* **93**: 757–759.
Olson, S.L. (1981a). A revision of the subspecies of *Sporophila* ("*Oryzoborus*") *angolensis* (Aves: Emberizinae). *Proc. Biol. Soc. Washington* **94(1)**: 43–51.
Olson, S.L. (1981b). A revision of the northern forms of *Euphonia xanthogaster* (Aves: Thraupidae). *Proc. Biol. Soc. Washington* **94(1)**: 101–106.
Olson, S.L. (1981c). Systematic notes on certain oscines from Panama and adjacent areas (Aves: Passeriformes). *Proc. Biol. Soc. Washington* **94(2)**: 363–373.
Olson, S.L. (1981d). The nature of the variability in the Variable Seedeater of Panama (*Sporophila americana*: Emberizinae). *Proc. Biol. Soc. Washington* **94(2)**: 380–390.
Olson, S.L. (1981e). Interaction between the two subspecies groups of the Seed-finch *Sporophila angolensis* in the Magdalena Valley, Colombia. *Auk* **98(2)**: 379–381.
Olson, S.L. (1983a). A hybrid between the orioles *Icterus chrysater* and *I. mesomelas*. *Auk* **100(3)**: 733–735.
Olson, S.L. (1983b). Geographic variation in *Chlorospingus ophthalmicus* in Colombia and Venezuela (Aves: Thraupidae). *Proc. Biol. Soc. Washington* **96**: 103–107.
Olson, S.L. (1983c). The distribution of the races of *Arremon aurantiirostris* (Emberizinae) in Panama. *Bull. Brit. Orn. Club* **103(3)**: 84–86.
Olson, S.L. (1984). The last St. Kitts Bullfinch *Loxigilla portoricensis grandis* (Emberizinae) and the extinction of its race. *Bull. Brit. Orn. Club* **104(4)**: 121–123.
Olson, S.L. & Alvarenga, H.M.F. (2006). An extraordinary feeding assemblage of birds at a termite swarm in the Serra da Mantiqueira, São Paulo, Brazil. *Rev. Bras. Orn.* **14(3)**: 297–299.
Olson, S.L. & Angle, J.P. (1977). Weights of some Puerto Rican birds. *Bull. Brit. Orn. Club* **97**: 105–107.
Olsson, U. (1995). Little-known Oriental bird Kozlov's Bunting *Emberiza koslowi*. *Bull. Oriental Bird Club* **21**: 39–43.
Omel'ko, M.A. (1974). [A new discovery of *Passerculus sandwichensis* in the USSR]. *Ornitologiya* **11**: 397. In Russian.
Omland, K.E. & Kondo, B.K. (2006). Phylogenetic studies of plumage evolution and speciation in New World orioles (*Icterus*). *Curr. Zool.* [*Acta Zool. Sinica*] **52** (Suppl.): 320–326.
Omland, K.E. & Lanyon, S.M. (2000). Reconstructing plumage evolution in orioles (*Icterus*): repeated convergence and reversal in patterns. *Evolution* **54(6)**: 2119–2133.
Omland, K.E., Lanyon, S.M. & Fritz, S.J. (1999). A molecular phylogeny of the New World orioles (*Icterus*): the importance of dense taxon sampling. *Mol. Phylogen. Evol.* **12**: 224–239.
O'Neal, D.M., Reichard, D.G., Pavilis, K. & Ketterson, E.D. (2008). Experimentally-elevated testosterone, female parental care, and reproductive success in a songbird, the Dark-eyed Junco (*Junco hyemalis*). *Horm. Behav.* **54(4)**: 571–578.
O'Neill, J.P. (1966). Notes on the distribution of *Conothraupis speculigera* (Gould). *Condor* **68**: 598–600.
O'Neill, J.P. (1969). Distributional notes on the birds of Peru, including twelve species previously unreported from the Republic. *Occas. Pap. Mus. Zool. Louisiana State Univ.* **37**: 1–11.
O'Neill, J.P. (1974). *The Birds of Balta, a Peruvian Dry Tropical Forest Locality with an Analysis of their Origins and Ecological Relationships*. PhD thesis, Louisiana State University, Baton Rouge, Louisiana.
O'Neill, J.P. & Parker, T.A. (1978). Responses of birds to a snowstorm in the Andes of southern Peru. *Wilson Bull.* **90(3)**: 446–449.
O'Neill, J.P. & Parker, T.A. (1981). New subspecies of *Pipreola rieffereii* and *Chlorospingus ophthalmicus* from Peru. *Bull. Brit. Orn. Club* **101**: 294–299.
O'Neill, J.P. & Parker, T.A. (1997). New subspecies of *Myrmoborus leucophrys* (Formicaridae) and *Phrygilus alaudinus* (Emberizidae) from the Upper Huallaga Valley, Peru. *Orn. Monogr.* **48**: 485–491.
O'Neill, J.P. & Pearson, D.L. (1974). Estudio preliminar de las aves de Yarinacocha, Departamento de Loreto, Perú. *Publ. Mus. Hist. Nat. Javier Prado (Ser. A. Zool.)* **25**: 1–13. In Spanish.
O'Neill, J.P. & Schulenberg, T.S. (1979). Notes on the Masked Saltator, *Saltator cinctus*, in Peru. *Auk* **96(3)**: 610–613.
Oniki, Y. (1972). Some temperatures of Panamian birds. *Condor* **74**: 209–215.
Oniki, Y. (1975). Temperatures of some Puerto Rican birds, with note of low temperatures in todies. *Condor* **77**: 344.
Oniki, Y. (1984). A study of breeding birds of the Belem area, Brazil. [Part] 7: Thraupidae to Fringillidae. *Ciênc. Cult.* **36(1)**: 69–76.
Oniki, Y. & Willis, E.O. (1972). Studies of ant-following birds north of the eastern Amazon. *Acta Amazonica* **2**: 127–151.
Oniki, Y. & Willis, E.O. (1983). Breeding records of birds from Manaus, Brazil. Part 5. Icteridae to Fringillidae. *Rev. Bras. Biol.* **43**: 55–64.
Oniki, Y. & Willis, E.O. (2002). Roosting behavior of the Sayaca Tanager (*Thraupis sayaca*) in southeast Brazil. *Orn. Neotropical* **14**: 279–283.
Onmus, O., Durusoy, R. & Eken, G. (2009). Distribution of breeding birds in the Gediz Delta, western Turkey (Aves). *Zool. Middle East* **47**: 39–48.
van Oosten, H. (2008). Audio recordings of *Diglossa sittoides* from Antioquia, Colombia. Xeno-Canto, XC18237, XC18238. Unpubl.
van Oosten, H., Beunen, R., van de Meulengraaf, B. & van Noort, T. (2007). White-masked Antbird *Pithys castaneus* and Orange-throated Tanager *Wetmorethraupis sterrhopteron* at a new location in Amazonas, Peru. *Cotinga* **28**: 79–81.
Oppel, S., Schaefer, H.M. & Schmidt, V. (2003). Description of the nest, eggs, and breeding behavior of the endangered Pale-headed Brush-finch (*Atlapetes pallidiceps*) in Ecuador. *Wilson Bull.* **115(4)**: 360–366.
Oppel, S., Schaefer, H.M., Schmidt, V. & Schroeder, B. (2004a). Cowbird parasitism of Pale-headed Brush-finch *Atlapetes pallidiceps*: implications for conservation and management. *Bird Conserv. Int.* **14(2)**: 63–75.
Oppel, S., Schaefer, H.M., Schmidt, V. & Schroeder, B. (2004b). How much suitable habitat is left for the last known population of the Pale-headed Brush-finch? *Condor* **106(2)**: 429–434.
Oppel, S., Schaefer, H.M., Schmidt, V. & Schroeder, B. (2004c). Habitat selection by the Pale-headed Brush-finch (*Atlapetes pallidiceps*) in southern Ecuador: implications for conservation. *Biol. Conserv.* **118(1)**: 33–40.
Orcés, V.G. (1944). Notas sobre la distribución geográfica de algunas aves neotrópicas. *Flora* **4**: 103–123. In Spanish.
Orejuela, J.E. & Cantillo, G. (1990). *Aves de la Reserva Natural La Planada*. Fundación para la Educación Superior, Cali, Colombia. In Spanish.
Orejuela, J.E. & Morton, M.L. (1975). Song dialects in several populations of Mountain White-crowned Sparrows (*Zonotrichia leucophrys oriantha*) in the Sierra Nevada. *Condor* **77(2)**: 145–153.
Oren, D.C. (1982). A avifauna do arquipélago de Fernando de Noronha. *Bol. Mus. Paraense Emilio Goeldi (Zool.)* **118**: 1–22. In Portuguese with English summary.
Oren, D.C. (1991). Aves do estado do Maranhão, Brasil. *Goeldiana Zool.* **9**: 1–55. In Portuguese.
Oren, D.C. & Parker, T.A. (1997). Avifauna of the Tapajós National Park and vicinity, Amazonian Brazil. Pp. 493–525 in: Remsen (1997a).
Orians, G.H. (1960). Autumnal breeding in the Tricolored Blackbird. *Auk* **77**: 379–398.
Orians, G.H. (1961). The ecology of blackbird (*Agelaius*) social systems. *Ecol. Monogr.* **31**: 285–312.
Orians, G.H. (1966). Food of nestling Yellow-headed Blackbirds, Cariboo Parklands, British Columbia. *Condor* **68**: 321–337.
Orians, G.H. (1973). The Red-winged Blackbird in tropical marshes. *Condor* **75**: 28–42.
Orians, G.H. (1980). *Some Adaptations of Marsh-nesting Blackbirds*. Princeton University Press, Princeton, New Jersey.
Orians, G.H. (1983). Notes on the behavior of the Melodious Blackbird *Dives dives*. *Condor* **85**: 453–460.
Orians, G.H. (1985a). *Blackbirds of the Americas*. University of Washington Press, Seattle, Washington.
Orians, G.H. (1985b). Allocation of reproductive effort by breeding blackbirds, family Icteridae. *Rev. Chilena Hist. Nat.* **58**: 19–29.
Orians, G.H. & Beletsky, L.D. (1989). Lifetime reproductive patterns among Red-winged Blackbirds. Pp. 183–197 in: Newton, I. ed. (1989). *Lifetime Reproduction in Birds*. Academic Press, New York.
Orians, G.H. & Christman, G.M. (1968). A comparative study of the behavior of Red-winged, Tricolored, and Yellow-headed Blackbirds. *Univ. Calif. Publ. Zool.* **84**: 1–85.
Orians, G.H. & Collier, G. (1963). Competition and blackbird social systems. *Evolution* **17**: 449–459.
Orians, G.H. & Horn, H.S. (1969). Overlap in foods and foraging of four species of blackbirds in the potholes of central Washington. *Ecology* **50**: 930–938.
Orians, G.H. & Orians, E.N. (2000). Observations on the Pale-eyed Blackbird in SE Peru. *Condor* **102**: 956–958.
Orians, G.H. & Paulson, D.R. (1969). Notes on Costa Rican birds. *Condor* **71**: 426–431.
Orians, G.H. & Willson, M.F. (1964). Interspecific territories of birds. *Ecology* **45**: 736–745.
Orians, G.H., Eckermann, M.L. & Schultz, J.C. (1977). Nesting and other habits of the Bolivian Blackbird (*Oreopsar bolivianus*). *Condor* **79**: 250–255.
Orians, G.H., Orians, C.E. & Orians, K.J. (1977). Helpers at the nest in some Argentine blackbirds. Pp. 137–151 in: Stonehouse, B. & Perrins, C. eds. (1977). *Evolutionary Ecology*. Macmillan Press, London, UK.
Orlowski, G. (2005). Habitat use by breeding and wintering Reed Bunting *Emberiza schoeniclus* L. in farmland of Lower Silesia (SW Poland). *Polish J. Ecol.* **53(2)**: 243–254.
Orlowski, G. & Czarnecka, J. (2007). Winter diet of Reed Bunting *Emberiza schoeniclus* in fallow and stubble fields. *Agric. Ecosyst. & Environm.* **118(1–4)**: 244–248.
Orlowski, G. & Gebski, P. (2007). Effect of weather change on flock size of the Snow Bunting (*Plectrophenax nivalis* L.) wintering in south-western Poland. *Polish J. Ecol.* **55(1)**: 181–185.
Ormston, C.G. (2000). Winter habitat of the Smith's Longspur in Oklahoma. *Bull. Okla. Orn. Soc.* **33(1)**: 6–12.
Ortega, C.P. & Cruz, A. (1991). A comparative study of cowbird parasitism in Yellow-headed Blackbirds and Red-winged Blackbirds. *Auk* **108**: 16–24.
Ortega, C.P. & Hill, G.E. (2010). Black-headed Grosbeak (*Pheucticus melanocephalus*). No. **143** in: Poole, A. ed. (2010). The birds of North America online. Cornell Lab of Ornithology, Ithaca. URL: http://bna.birds.cornell.edu/bna/species/143 (download 07 November 2010).
Ortega, C.P. & Ortega, J.C. (2003). Comparison of Black-headed Grosbeaks nesting in riparian and Gambel oak pastures in Southwestern Colorado. *Southwest. Nat.* **48(3)**: 383–388.
Ortega, C.P., Chace, J.F. & Peer, B.D. eds. (2005). *Management of Cowbirds and their Hosts: Balancing Science, Ethics and Mandates*. Ornithological Monographs **57**. American Ornithologists' Union, Washington, D.C.
Ortega, J.C. & Ortega, C.P. (2009). Sex ratios and survival probabilities of Brown-headed Cowbirds (*Molothrus ater*) in southwest Colorado. *Auk* **126(2)**: 268–277.
Ortiz, D. (2008). Distribución histórica y actual del Cardenal Amarillo (*Gubernatrix cristata*) en el litoral fluvial argentino. *Inst. Sup. Correl. Geol. Misc.* **17(1)**: 121–126. In Spanish.
Ortiz, D., Aráoz, R. & Alderete, C. (2011). Lista sistemática de las aves de la reserva experimental Horco Molle, provincia de Tucumán, Argentina. *Not. Faun.* **62**: 1–5. In Spanish.
Ortiz-von Halle, B. (1990). Adiciones a la avifauna de Colombia de especies arribadas a la Isla Gorgona. *Caldasia* **16(77)**: 209–214. In Spanish with English summary.
Osborn, K. & Harvey, P. (1994). The Chestnut Bunting in Shetland. *Birding World* **7(9)**: 371–373.
Osborne, J. (1992). *The Cardinal*. Texas University Press, Austin, Texas.
Osiejuk, T.S. (2011). The song of the Cinnamon-breasted Bunting, *Emberiza tahapisi*, in the Bamenda Highlands (NW Cameroon). *J. Orn.* **152(3)**: 651–659.
Osiejuk, T.S., Ratynska, K., Cygan, J.P. & Dale, S. (2003a). Ortolan Bunting *Emberiza hortulana* singing like Yellowhammer *E. citrinella*. *Ornis Fenn.* **80(1)**: 38–42.
Osiejuk, T.S., Ratynska, K., Cygan, J.P. & Dale, S. (2003b). Song structure and repertoire variation in Ortolan Bunting (*Emberiza hortulana* L.) from isolated Norwegian population. *Ann. Zool. Fennici* **40(1)**: 3–16.
Osiejuk, T.S., Ratynska, K., Cygan, J.P. & Dale, S. (2005). Frequency shift in homologue syllables of the Ortolan Bunting *Emberiza hortulana*. *Behav. Processes* **68(1)**: 69–83.
Osiejuk, T.S., Ratynska, K., Dale, S., Steifetten, O. & Cygan, J.P. (2004). Ortolan Buntings *Emberiza hortulana* mimicking other species and other dialects of own species. *Ornis Nor.* **27(2)**: 73–79.
Ostapenko, V.A. (1981). [On the avifauna of Kunashir Island (south Kuril Islands)]. *Ornitologiya* **16**: 156–157. In Russian.
Ottavio, J., Giovanni, B., Pavia, M. & Gertosio, G. (2008). Notes on the breeding of birds in Yanachaga-Chemillén National Park, Peru. *Cotinga* **30**: 42–46.
Ottema, O. (2002). The occurrence of the Short-billed Honeycreeper *Cyanerpes nitidus* in Surinam. *Cotinga* **17**: 78–79.
Ottvall, R., Green, M., Lindström, Å., Svensson, S., Esseen, P.A. & Marklund, L. (2008). Ortolansparvens *Emberiza hortulana* förekomst och habitatval i Sverige. *Ornis Svecica* **18(1)**: 3–16. In Swedish with English summary.
Ouellet, H. (1992). Speciation, zoogeography, and taxonomic problems in the Neotropical genus *Sporophila* (Aves: Emberizinae). *Bull. Brit. Orn. Club* **112A**: 225–236.
Ouwerkerk, A. (1994). Bill colour of female Pallas's Reed Bunting. *Dutch Birding* **16(4)**: 154.
Overmire, T.G. (1962). Nesting of the Dickcissel in Oklahoma. *Auk* **79**: 115–116.
Owen, A. (2001). *Montserrat Oriole* Icterus oberi. *Species Management Guidelines*. Durrell Wildlife Conservation Trust, Jersey, UK.
Owen, A. (2003). The capture of eight Montserrat Orioles and their subsequent establishment and breeding at Jersey Zoo. *Avicult. Mag.* **109(3)**: 116–124.
Owen, R.P. (1977). New bird records for Micronesia and major island groups in Micronesia. *Micronesica* **13(1)**: 57–63.
Owre, O.T. (1973). A consideration of the exotic avifauna of southeastern Florida. *Wilson Bull.* **85(4)**: 491–500.
Pacheco, J.F. (1998). Cherry-throated Tanager *Nemosia rourei* rediscovered. *Cotinga* **9**: 41.
Pacheco, J.F. (1999). É de Minas Gerais o exemplar único e original de *Nemosia rourei*? *Atualidades Orn.* **89**: 7. In Portuguese.
Pacheco, J.F. (2000). A ornitologia descobre o sertão: um balanço do conhecimento da avifauna da Caatinga dos primórdios aos anos 1950. Pp. 11–70 in: Straube, F.C., Argel-de-Oliveira, M.M. & Candido, J.F. eds. (2000). *Ornitologia Brasileira no Século XX*. Universidade do Sul de Santa Catarina & Sociedade Brasileira de Ornitologia, Curitiba, Brazil. In Portuguese.
Pacheco, J.F. & Olmos, F. (2006). As aves do Tocantins. Part 1: Região Sudeste. *Rev. Bras. Orn.* **14**: 85–100. In Portuguese with English summary.
Pacheco, J.F., Kirwan, G.M., Aleixo, A., Whitney, B.M., Whittaker, A., Minns, J., Zimmer, K.J., da Fonseca, P.S.M., Fátima, C., de Lima, M. & David, C. (2007). An avifaunal inventory of the CVRD Serra dos Carajás project, Pará, Brazil. *Cotinga* **27**: 15–30.
Pacheco, J.F., Parrini, R., Whitney, B.M., Bauer, C. & da Fonseca, P.S.M. (1997). Novos registros de aves para o estado do Rio de Janeiro: região sul do vale do Rio Paraíba do Sul. *Atualidades Orn.* **79(1)**: 4–5. In Portuguese.
Pagliani, A.C., Lee, P.L.M. & Bradbury, R.B. (1999). Molecular determination of sex-ratio in Yellowhammer *Emberiza citrinella* offspring. *J. Avian Biol.* **30(3)**: 239–244.
Paine, R.T. (1968). Brewer's Sparrow. Pp. 1208–1217 in: Bent & Austin (1968).

Palacios, E.C. (2005). First nesting record of White-naped Brush-finch (*Atlapetes albinucha*). *Huitzil* **6(1)**: 6–7.

Palacios-Silva, R., Castillo Meza, A.L. & García-Chávez, J. (2005). Descripción del nido y huevos del Gorrión Embridado (*Aimophila mystacalis*). *Orn. Neotropical* **16(1)**: 101–104. In Spanish.

Palanqué, R. (2005). Audio recording of *Orchesticus abeillei* from Parque Estadual Intervales, São Paulo, Brazil. Xeno-Canto, XC11823. Unpubl.

Palmer-Ball, B. & Cassell, R. (1990). "Spotted" Towhee in Kentucky. *Kentucky Warbler* **66(4)**: 98–99.

Palmerio, A.G. & Massoni, V. (2009). Reproductive biology of female Saffron Finches does not differ by the plumage of the mate. *Condor* **111(4)**: 715–721.

Palomera-García, C., Santana, E. & Amparán-Salido, R. (1994). Patrones de distribución de la avifauna en tres estados del occidente de México. *Acta Zool. Mexicana* **65(1)**: 137–175. In Spanish.

Paludan, K. (1959). On the birds of Afghanistan. *Vidensk. Medd. Dansk Naturhist. Foren.* **122**: 1–332.

Panagis, K. & Stutterheim, I.M. (1985). Mortalities of birds caught for the bird export trade in South West Africa/Namibia. *Madoqua* **14**: 173–175.

Pande, S., Pawashe, A. & Joshi, V. (2006). Notes on the breeding of Striolated Bunting *Emberiza striolata* near Pune, Maharashtra. *Indian Birds* **2**: 153–156.

Panov, E.N. (1973). [Interrelationships of two closely related species of buntings (*Emberiza*) in their sympatric zone]. Pp. 261–294 in: Vorontsov, N.N. ed. (1973). [*Problems of Evolution*]. Vol. 3. Nauka, Moscow. In Russian.

Panov, E.N., Nepomnyashchikh, V.A. & Zykova, L.Y. (2006). [Organization of song in the Yellowhammer (*Emberiza citrinella*, Aves, Emberizidae)]. *Zoologicheskii Zhurnal* **85(11)**: 1341–1353. In Russian.

Panov, E.N., Rubtsov, A.S. & Monzikov, D.G. (2003a). [Interrelationships between two bunting species (Yellowhammer *Emberiza citrinella* and Pine Bunting *E. leucocephalos*) interbreeding in zones of their ranges' overlap]. *Zoologicheskii Zhurnal* **82(4)**: 470–484. In Russian.

Panov, E.N., Rubtsov, A.S. & Monzikov, D.G. (2003b). Hybridization between Yellowhammer and Pine Bunting in Russia. *Dutch Birding* **25(1)**: 17–31.

Panov, E.N., Rubtsov, A.S. & Mordkovich, M.V. (2007). [New data on interrelationships between two bunting species (*Emberiza citrinella*, *Emberiza leucocephalos*) interbreeding in the zone of their overlapping ranges]. *Zoologicheskii Zhurnal* **86(11)**: 1362–1378. In Russian.

Park, P.J. (1936). Banding Harris's Sparrow in its winter range; a preliminary report. *Proc. Okla. Acad. Sci.* **16**: 29–32.

Parker, T.A. (1982). Observations of some unusual rainforest and marsh birds in southeastern Peru. *Wilson Bull.* **94(4)**: 477–493.

Parker, T.A. & Bailey, B. (1991). A biological assessment of the Alto Madidi region and adjacent areas of northwest Bolivia, May 18–June 15, 1990. Conservation International, Washington, D.C.

Parker, T.A. & Goerck, J.M. (1997). The importance of national parks and biological reserves to bird conservation in the Atlantic forest region of Brazil. Pp. 527–541 in: Remsen (1997a).

Parker, T.A. & O'Neill, J.P. (1980). Notes on little known birds of the upper Urubamba Valley, southern Peru. *Auk* **97**: 167–176.

Parker, T.A. & Parker, S.A. (1982). Behavioral and distributional notes on some unusual birds of a lower montane cloud forest in Peru. *Bull. Brit. Orn. Club* **102**: 63–70.

Parker, T.A. & Rocha, O. (1991). La avifauna del Cerro San Simón, una localidad de campo rupestre aislado en el depto. Beni, noreste boliviano. *Ecol. Bolivia* **17**: 15–29. In Spanish with English and German summary.

Parker, T.A., Castillo, A., Gell-Mann, M. & Rocha, O. (1991). Records of new and unusual birds from Bolivia. *Bull. Brit. Orn. Club* **111**: 120–138.

Parker, T.A., Parker, S.A. & Plenge, M.A. (1982). *An Annotated Checklist of Peruvian Birds*. Buteo Books, Vermillion, South Dakota.

Parker, T.A., Remsen, J.V. & Heindel, J.A. (1980). Seven bird species new to Bolivia. *Bull. Brit. Orn. Club* **100**: 160–162.

Parker, T.A., Schulenberg, T.S., Graves, G.R. & Braun, M.J. (1985). The avifauna of the Huancabamba region, northern Peru. Pp. 169–197 in: Buckley *et al.* (1985).

Parker, T.A., Schulenberg, T.S., Kessler, M. & Wust, W.H. (1995). Natural history and conservation of the endemic avifauna in north-west Peru. *Bird Conserv. Int.* **5(2/3)**: 201–231.

Parkes, K.C. (1957). The juvenal plumages of the finch genera *Atlapetes* and *Pipilo*. *Auk* **74**: 499–502.

Parkes, K.C. (1959a). Subspecific status of *Atlapetes brunnei-nucha* in South America. *Condor* **61**: 156–157.

Parkes, K.C. (1959b). A new race of *Saltator albicollis* from Venezuela and adjacent Colombia. *Noved. Colombianas* **1(4)**: 200–201.

Parkes, K.C. (1966). Geographic variation in Azara's Marsh Blackbird, *Agelaius cyanopus*. *Proc. Biol. Soc. Washington* **79**: 1–12.

Parkes, K.C. (1969a). The Blue-backed Tanager (*Cyanicterus cyanicterus*), a genus new to Venezuela, with notes on its plumages. *Auk* **86**: 568–569.

Parkes, K.C. (1969b). Some undescribed subspecies of tanagers from South America. *Bull. Brit. Orn. Club* **89**: 17–20.

Parkes, K.C. (1970). A revision of the Red-rumped Cacique, *Cacicus haemorrhous* (Aves: Icteridae). *Proc. Biol. Soc. Washington* **83**: 203–214.

Parkes, K.C. (1974a). Variation in the Olive Sparrow in the Yucatan Peninsula. *Wilson Bull.* **86(3)**: 293–295.

Parkes, K.C. (1974b). Systematics of the White-throated Towhees (*Pipilo albicollis*). *Condor* **76**: 457–459.

Parkes, K.C. (1977). An undescribed subspecies of the Red-legged Honeycreeper *Cyanerpes cyaneus*. *Bull. Brit. Orn. Club* **97**: 65–68.

Parkes, K.C. (1985). Audubon's mystery birds. *Nat. Hist. (New York)* **94(4)**: 88–93.

Parkes, K.C. (1992). The subspecies of the Sharp-tailed Sparrow and the re-identification of a western Pennsylvania specimen. *Pennsylvania Birds* **6**: 13–14.

Parkes, K.C. (1994). *Thraupis episcopus ehrenreichi* (Reichenow) is a valid subspecies. *Bol. Mus. Paraense Emílio Goeldi (Nova Sér. Zool.)* **9(2)**: 313–316.

Parkes, K.C. & Blake, E.R. (1965). Taxonomy and nomenclature of the Bronzed Cowbird. *Fieldiana Zool.* **44**: 207–216.

Parkes, K.C. & Humphrey, P.S. (1963). Geographic variations and plumage sequence of the tanager *Hemithraupis flavicollis* in the Guianas and adjacent Brazil. *Proc. Biol. Soc. Washington* **76**: 81–84.

Parmelee, D.F. (1959). The breeding behavior of the Painted Bunting in southern Oklahoma. *Bird-Banding* **30**: 1–18.

Parmelee, D.F. (1964). Survival in the Painted Bunting. *Living Bird* **3**: 5–7.

Parmelee, D.F. (1968). *Plectrophenax nivalis nivalis* (Linnaeus): Snow Bunting. Pp. 1652–1675 in: Bent & Austin (1968).

Parmesan, C. (2006). Ecological and evolutionary responses to recent climate change. *Ann. Rev. Ecol. Evol. Syst.* **37**: 637–669.

Parmesan, C. & Yohe, G. (2003). A globally coherent fingerprint of climate change impacts across natural systems. *Nature (London)* **421**: 37–42.

Parrini, R. & Raposo, M.A. (2008). Associação entre aves e flores de duas espécies de árvores do gênero *Erythrina* (Fabaceae) na Mata Atlântica do sudeste do Brasil. *Iheringia (Ser. Zool.)* **98(1)**: 123–128. In Portuguese.

Parrini, R., Pacheco, J.F. & Mallet-Rodrigues, F. (2009). Comportamento de forrageamento de *Poospiza thoracica* (Passeriformes: Emberizidae) na Floresta Atlântica Alto-Montana do Parque Nacional da Serra dos Órgãos e do Parque Nacional do Itatiaia, sudeste do Brasil. *Atualidades Orn.* **147**: 4–7. In Portuguese.

Parrish, J.D. (1997). Patterns of frugivory and energetic condition in Nearctic landbirds during autumn migration. *Condor* **99(3)**: 681–697.

Partridge, W.R. (1964). Breeding the Cayenne Seed-eater (*Sporophila frontalis*). *Avicult. Mag.* **70**: 111–113.

Pasinelli, G. & Schiegg, G. (2006). Fragmentation within and between wetland reserves: the importance of spatial scales for nest predation in Reed Buntings. *Ecography* **29(5)**: 721–732.

Patient, R. (2001). The Black-faced Bunting on Lundy. *Birding World* **14(10)**: 435–436.

Patrikeev, M. (2006a). New nesting records of the Le Conte's Sparrow, *Ammospiza leconteii*, from north-eastern Ontario, with some notes on nesting behaviour. *Can. Field-Nat.* **120(1)**: 22–26.

Patrikeev, M. (2006b). On the feeding and nesting behaviour of the Pyrrhuloxia (*Cardinalis sinuatus*) in the Lower Rio Grande Valley. *Bull. Texas Orn. Soc.* **39(2)**: 60–63.

Patten, M.A. (2006). Dispersal and vagrancy in the Pyrrhuloxia. *Western Birds* **37(1)**: 37–44.

Patten, M.A. & Fugate, M. (1998). Systematic relationships among the emberizid sparrows. *Auk* **115**: 412–424.

Patten, M.A. & Pruett, C.L. (2009). The Song Sparrow, *Melospiza melodia*, as a ring species: patterns of geographic variation, a revision of subspecies, and implications for speciation. *Systematics & Biodiversity* **7(1)**: 33–62.

Patten, M.A. & Unitt, P. (2002). Diagnosability versus mean differences of Sage Sparrow subspecies. *Auk* **119(1)**: 26–35.

Patterson, B. & Allen, R. (1968). A Maine nest of the Scarlet Tanager. *Wilson Bull.* **80**: 495.

Patterson, C.B. (1991). Relative parental investment in the Red-winged Blackbird. *J. Field Orn.* **62**: 1–18.

Patterson, T.L. & Petrinovich, L. (1978). Territory size in the White-crowned Sparrow (*Zonotrichia leucophrys*): measurements and stability. *Condor* **80(1)**: 97–98.

Patti, S. (1992). Pyrrhuloxia (*Cardinalis sinuatus*), a new bird for Kansas. *Kansas Orn. Soc. Bull.* **43(3)**: 30–31.

Pätzold, R. (1975). Zur Biologie der Kappenammer. *Falke* **22(9)**: 300–304. In German.

Paulson, D.R. (1988). Unusual agonistic behavior in a Green Honeycreeper. *Wilson Bull.* **100(3)**: 503–504.

Pauly, J.R. & Ferrell, B.R. (1984). Sunset as an orientational cue for a nocturnal migrant, the White-throated Sparrow (*Zonotrichia albicollis*). *Trans. Kentucky Acad. Sci.* **45(3/4)**: 122–124.

Payne, R.B. (1969). Breeding seasons and reproductive physiology of Tricolored Blackbirds and Redwinged Blackbirds. *Univ. Calif. Publ. Zool.* **90**: 1–115.

Payne, R.B. (1973). The breeding season of a parasitic bird, the Brown-headed Cowbird, in central California. *Condor* **75**: 80–99.

Payne, R.B. (1981). Song learning and social interaction in Indigo Buntings. *Anim. Behav.* **29**: 688–697.

Payne, R.B. (1982). Ecological consequences of song matching: breeding success and intraspecific song mimicry in Indigo Buntings. *Ecology* **63**: 401–411.

Payne, R.B. (1983). The social context of song mimicry: song-matching dialects in Indigo Buntings (*Passerina cyanea*). *Anim Behav.* **31**: 788–805.

Payne, R.B. (1991). Natal dispersal and population structure in a migratory songbird, the Indigo Bunting. *Evolution* **45**: 49–62.

Payne, R.B. (1992). Indigo Bunting (*Passerina cyanea*). No. **4** in: Poole, A.F., Stettenheim, P.R. & Gill, F.B. eds. (1992). *The Birds of North America*. Vol. 1. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington, D.C. & Philadelphia.

Payne, R.B. (1996). Song traditions in Indigo Buntings: origin, improvisation, dispersal, and extinction in cultural evolution. Pp. 198–220 in: Kroodsma, D.E. & Miller, E.H. eds. (1996). *Ecology and Evolution of Acoustic Communication in Birds*. Comstock University Press, Ithaca & London.

Payne, R.B. (2006). Indigo Bunting (*Passerina cyanea*). No. **4** in: Poole, A. ed. (2006). The birds of North America online. Cornell Lab of Ornithology, Ithaca. URL: http://bna.birds.cornell.edu/bna/species/004 (download 07 November 2010).

Payne, R.B. & Landolt, M. (1970). Thyroid histology of Tricolored Blackbirds (*Agelaius tricolor*) in the annual cycle, breeding, and molt. *Condor* **72**: 445–451.

Payne, R.B. & Payne, L.L. (1989). Heritability estimates and behaviour observations: extra-pair matings in Indigo Buntings. *Anim. Behav.* **38**: 457–467.

Payne, R.B. & Payne, L.L. (1990). Survival estimates of Indigo Buntings: comparison of banding recoveries and local observations. *Condor* **92**: 938–946.

Payne, R.B. & Payne, L.L. (1993a). Breeding dispersal in Indigo Buntings: circumstances and consequences for breeding success and population structure. *Condor* **95**: 1–24.

Payne, R.B. & Payne, L.L. (1993b). Song copying and cultural transmission in Indigo Buntings. *Anim. Behav.* **46**: 1045–1065.

Payne, R.B. & Payne, L.L. (1996). Dispersal, demography, and the persistence of partnerships in Indigo Buntings. Pp. 305–320 in: Black, J.M. ed. (1996). *Partnerships in Birds: the Study of Monogamy*. Oxford University Press, New York.

Payne, R.B. & Payne, L.L. (1998). Brood parasitism by Brown-headed Cowbirds: risks and costs on reproductive success and survival in Indigo Buntings. *Behav. Ecol.* **9**: 64–73.

Payne, R.B. & Westneat, D.F. (1988). A genetic and behavioral analysis of mate choice and song neighborhoods in Indigo Buntings. *Evolution* **42**: 935–947.

Payne, R.B., Payne, L.L. & Doehlert, S.M. (1987). Song, mate choice and the question of kin recognition in a migratory songbird. *Anim. Behav.* **35**: 35–47.

Payne, R.B., Payne, L.L. & Doehlert, S.M. (1988). Biological and cultural success of song memes in Indigo Buntings. *Ecology* **69**: 104–117.

Payne, R.B., Thompson, W.L., Fiala, K.L. & Sweany, L.L. (1981). Local song traditions in Indigo Buntings: cultural transmission of behavior patterns across generations. *Behaviour* **77**: 199–221.

Paynter, R.A. (1955). The ornithogeography of the Yucatán Peninsula. *Peabody Mus. Nat. Hist. Yale Univ. Bull.* **9**: 1–347.

Paynter, R.A. (1964a). Genetic limits of *Zonotrichia*. *Condor* **66**: 277–281.

Paynter, R.A. (1964b). The type locality of *Atlapetes albinucha*. *Auk* **81**: 223–224.

Paynter, R.A. (1967). Notes on the emberizine sparrow *Rhynchospiza stolzmanni*. *Breviora* **278**: 1–6.

Paynter, R.A. (1970a). Subfamily Emberizinae, buntings and American sparrows. Pp. 3–214 in: Paynter, R.A. & Storer, R.W. eds. (1970). *Check-list of Birds of the World. A Continuation of the Work of James L. Peters*. Vol. 13. Museum of Comparative Zoology, Cambridge, Massachusetts.

Paynter, R.A. (1970b). Subfamily Cardinalinae, cardinal-grosbeaks. Pp. 216–245 in: Paynter, R.A. & Storer, R.W. eds. (1970). *Check-list of Birds of the World. A Continuation of the Work of James L. Peters*. Vol. 13. Museum of Comparative Zoology, Cambridge, Massachusetts.

Paynter, R.A. (1971). Notes on the habits and taxonomy of *Rhodospingus cruentus*. *Bull. Brit. Orn. Club* **91**: 79–81.

Paynter, R.A. (1972). Biology and evolution of the *Atlapetes schistaceus* species-group (Aves: Emberizinae). *Bull. Mus. Comp. Zool. Harvard* **143(4)**: 297–320.

Paynter, R.A. (1978). Biology and evolution of the avian genus *Atlapetes*. *Bull. Mus. Comp. Zool. Harvard* **148**: 323–369.

Peach, W.J., Lovett, L.J., Wotton, S.R. & Jeffs, C. (2001). Countryside stewardship delivers Cirl Buntings (*Emberiza cirlus*) in Devon, UK. *Biol. Conserv.* **101(3)**: 361–373.

Peach, W.J., Siriwardena, G.M. & Gregory, R.D. (1999). Long-term changes in over-winter survival rates explain the decline of Reed Buntings *Emberiza schoeniclus* in Britain. *J. Appl. Ecol.* **36(5)**: 798–811.

Pearce-Higgins, J., Dennis, P., Whittingham, M. & Yalden, D. (2010). Impacts of climate on prey abundance account for fluctuations in a population of a northern wader at the southern edge of its range. *Global Change Biol.* **16**: 12–23.

Pearman, M. (1989). Observaciones de *Sicalis luteocephala*. Una nueva especie para la Argentina. *Nuestras Aves* **20**: 5. In Spanish.

Pearman, M. (1993). Some range extensions and five species new to Colombia, with notes on some scarce or little known species. *Bull. Brit. Orn. Club* **113(2)**: 66–75.

Pearman, M. (1997). Photospot: Rufous-bellied Saltator *Saltator rufiventris*. *Cotinga* **7**: 72–74.
Pearman, M. (2001). Notes and range extensions of some poorly known birds of northern Argentina. *Cotinga* **16**: 76–80.
Pearson, D.L. (1971). Vertical stratification of birds in a tropical dry forest. *Condor* **73**: 46–55.
Pearson, D.L. (1972). Un estudio de las aves de Limoncocha, Provincia de Napo, Ecuador. *Bol. Inf. Cient. Nac. Quito* **13**: 1–14. In Spanish.
Pearson, D.L. (1974). Use of abandoned cacique nests by nesting Troupials (*Icterus icterus*): precursor to parasitism? *Wilson Bull.* **86**: 290–291.
Pearson, D.L. (1975a). The relation of foliage complexity to ecological diversity of three Amazonian bird communities. *Condor* **77**: 453–466.
Pearson, D.L. (1975b). Range extensions and new records for bird species in Ecuador, Peru, and Bolivia. *Condor* **77**: 96–99.
Pearson, D.L. (1975c). Un estudio de las aves de Tumi Chucua, departamento de Beni, Bolivia. *Pumapunku* **8**: 50–56. In Spanish.
Pearson, D.L. (1977). A pantropical comparison of bird community structure on six lowland forest sites. *Condor* **79**: 232–244.
Pearson, O.P. (1979). Spacing and orientation among feeding Golden-crowned Sparrows. *Condor* **81(3)**: 278–285.
Peck, G.K. & James, R.D. (1987). *Breeding Birds of Ontario: Nidiology and Distribution*. Vol. 2. Passerines. Life Sciences Miscellaneous Publication. Royal Ontario Museum, Toronto, Canada.
Peck, M.E. (1910). The effect of natural enemies on the nesting habits of some British Honduras birds. *Condor* **12**: 53–60.
Peek, F.W., Franks, E. & Case, D. (1972). Recognition of nest, eggs, nest site, and young in female Red-winged Blackbirds. *Wilson Bull.* **84**: 243–249.
Peele, A.M., Burtt, E.H., Schroeder, M.R. & Greenberg, R.S. (2009). Dark color of the Coastal Plain Swamp Sparrow (*Melospiza georgiana nigrescens*) may be an evolutionary response to occurrence and abundance of salt-tolerant feather-degrading bacilli in its plumage. *Auk* **126(3)**: 531–535.
Peer, B.D. (2010). Conspecific brood parasitism by the Dickcissel. *Wilson J. Orn.* **122(1)**: 186–187.
Peer, B.D. & Bollinger, E.K. (1997a). Common Grackle (*Quiscalus quiscula*). No. **271** in: Poole, A.F. & Gill, F.B. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Peer, B.D. & Bollinger, E.K. (1997b). Explanations for the infrequent cowbird parasitism on Common Grackles. *Condor* **99**: 151–161.
Peer, B.D. & Rothstein, S.I. (2010). Phenotypic plasticity in Common Grackles (*Quiscalus quiscula*) in response to repeated brood parasitism. *Auk* **127(2)**: 293-299.
Peer, B.D. & Sealy, S.G. (1999a). Laying time of the Bronzed Cowbird. *Wilson Bull.* **111**: 137–139.
Peer, B.D. & Sealy, S.G. (1999b). Parasitism and egg puncture behavior by Bronzed and Brown-headed Cowbirds in sympatry. *Studies Avian Biol.* **18**: 235–240.
Peer, B.D. & Sealy, S.G. (2000). Conspecific brood parasitism and egg rejection in Great-tailed Grackles. *J. Avian Biol.* **31(3)**: 271–277.
Peer, B.D. & Sealy, S.G. (2001). Mechanism of egg recognition in the Great-tailed Grackle (*Quiscalus mexicanus*). *Bird Behavior* **14(2)**: 71–73.
Peer, B.D. & Sealy, S.G. (2004). Fate of grackle (*Quiscalus* sp.) host defenses in the absence of brood parasitism: implications for long-term parasite-host coevolution. *Auk* **121**: 1172–1186.
Peer, B.D., Rothstein, S.I. & Rivers, J.W. (2005). First record of Bronzed Cowbird parasitism on the Great-tailed Grackle. *Wilson Bull.* **117(2)**: 194–196.
Peixoto Velho, P.P. (1932). Descrição de alguns ovos de aves do Brasil existentes nas coleções do museu. *Bol. Mus. Nac. Rio J.* **8**: 49–60. In Portuguese.
Pelikan, M.L. (2004). Sightings [Sonoran Desert Museum, Arizona, USA: Yellow Grosbeak]. *Winging It* **17(7)**: 10.
Peltomaki, J. (1996). Finland next? – Pallas's Reed Bunting. *Alula* **2(2)**: 76–80.
Peltomaki, J. & Jantunen, J. (2000). Identification and ageing of Yellow-breasted Bunting and separation from Chestnut Bunting. *Dutch Birding* **22(4)**: 187–203.
Pelzeln, A. von (1869). *Zur Ornithologie Brasiliens*. A. Pichler's Witwe & Sohn, Vienna. In German.
Pemberton, J.R. (1910). Notes on the Rufous-crowned Sparrow. *Condor* **12**: 123–125.
de la Peña, M.R. (1975). Nidificaciones de aves en la provincia de Santa Fe. *Hornero* **11(4)**: 318. In Spanish.
de la Peña, M.R. (1980). Nidos de aves de Santa Fe. 4. *Hornero* **12(1)**: 72–74. In Spanish.
de la Peña, M.R. (1983). Nota sobre observaciones de nidificación de aves en la provincia de Santa Fe. *Hornero* **12(2)**: 129–131. In Spanish.
de la Peña, M.R. (1987). *Nidos y Huevos de Aves Argentinas*. Talleres Gráficos de la Imprenta Lux, Santa Fe, Argentina. In Spanish.
de la Peña, M.R. (1989). *Guía de Aves Argentinas*. Vol. 6. Literature of Latin America, Buenos Aires. In Spanish.
de la Peña, M.R. (1996a). *Ciclo Reproductivo de las Aves Argentinas*. Part 2. Santa Fe, Argentina. In Spanish.
de la Peña, M.R. (1996b). Descripción de nidos nuevos o poco conocidos de la avifauna argentina. *Hornero* **14(3)**: 85–86. In Spanish with English summary.
de la Peña, M.R. (2005). *Reproducción de las Aves Argentinas (con Descripción de Pinchones)*. Monografía **20**. Literature of Latin America, Buenos Aires. In Spanish.
de la Peña, M.R. & Pensiero, J.F. (2003). Contribución de la flora en los hábitos alimentarios de las aves en un bosque del centro de la provincia de Santa Fe, Argentina. *Orn. Neotrpical* **14**: 499–513. In Spanish.
de la Peña, M.R. & Rumboll, M. (1998). *Collins Illustrated Checklist: Birds of Southern South America and Antarctica*. Harper Collins, London.
Penard, F.P. & Penard, A.P. (1910). *De Vogels van Guyana (Suriname, Cayenne en Demerara)*. Vol. 2. Penard, Paramaribo, Suriname. In Dutch.
Peralta, D.F.S. (2007). Anotaciones sobre la historia natural de aves frugívoras y nectarívoras en la región de Boquete, Panamá. *Zeledonia* **11(1)**: 14–19. In Spanish.
Peraza, C.A. (2009). First record of nest and eggs of the Pale-naped Brush-finch (*Atlapetes pallidinucha*). *Wilson J. Orn.* **121(1)**: 159–163.
Perdue, C.T. (1979). Out-of-season breeding behavior of Cardinals. *Jack-Pine Warbler* **57**: 108.
Pereyra, J.A. (1933). Nuestros tordos de bañado del género *Agelaius*. *Hornero* **5**: 189–192. In Spanish.
Pereyra, J.A. (1934). El nido del Federal *Amblyrhamphus holosericeus*. *Hornero* **5**: 384–386. In Spanish.
Pereyra, J.A. (1938). Aves de la zona ribereña nordeste de la provincia de Buenos Aires. *Mem. Jard. Zool. La Plata* **9**: 1–304. In Spanish.
Pereyra, J.A. (1951). Avifauna argentina. *Hornero* **9**: 291–347. In Spanish.
Pereyra, J.A. (1956). Notas biológicas sobre el Corbatita Común. *Hornero* **10**: 140–142. In Spanish.
Pérez-Rivera, R.A. (1986). Parasitism by the Shiny Cowbird in the interior parts of Puerto Rico. *J. Field Orn.* **57(2)**: 99–104.
Pérez-Rivera, R.A. (1992a). Sobre el nido, los huevos y la camada del Jilguero de Puerto Rico (*Euphonia musica sclateri*). *Caribb. J. Sci.* **28(3/4)**: 235–238. In Spanish.
Pérez-Rivera, R.A. (1992b). Changes in diet and foraging behavior of the Antillean Euphonia in Puerto Rico after Hurricane Hugo. *J. Field Orn.* **62(4)**: 474–478.
Pérez-Rivera, R.A. (1993). Notes on breeding of the Puerto Rican Tanager (*Nesospingus speculiferus*). *Caribb. J. Sci.* **29(3/4)**: 262–264.
Pérez-Rivera, R.A. (1994). Feeding ecology of the Puerto Rican Bullfinch (*Loxigilla portoricensis*) in the Carite and Guánica Forests. *Caribb. J. Sci.* **30(3/4)**: 242–249.
Pérez-Rivera, R.A. (1998). Desplazamiento de Llorosas de Puerto Rico (*Nesospingus speculiferus*) por el huracán Georges. *Pitirre* **11(3)**: 93–94. In Spanish.
Pérez-Rivera, R.A. (2000). Alimentos y conducta alimentaria no informadas en el Mozambique (*Quiscalus niger brachipterus*) de Puerto Rico. *Pitirre* **13(2)**: 40–41. In Spanish with English summary.
Peris, S. (1997). Notes on the breeding biology and population density of the Tucumán Mountain-finch (*Poospiza baeri*; Aves: Emberizidae) in Argentina, with description of nest and eggs. *Rev. Chilena Hist. Nat.* **70**: 221–224.
Perkins, A.J., Anderson, G. & Wilson, J.D. (2007). Seed food preferences of granivorous farmland passerines. *Bird Study* **54(1)**: 46–53.
Perkins, A.J., Maggs, H.E., Wilson, J.D., Watson, A. & Smout, C. (2008). Targeted management intervention reduces rate of population decline of Corn Buntings *Emberiza calandra* in eastern Scotland. *Bird Study* **55(1)**: 52–58.
Perkins, A.J., Whittingham, M.J., Morris, A.J. & Bradbury, R.B. (2002). Use of field margins by foraging Yellowhammers *Emberiza citrinella*. *Agric. Ecosyst. & Environm.* **93(1/3)**: 413–420.
Perkins, D.W. & Vickery, P.D. (2001). Annual survival of an endangered passerine, the Florida Grasshopper Sparrow. *Wilson Bull.* **113(2)**: 211–216.
Perkins, D.W. & Vickery, P.D. (2005). Effects of altered hydrology on the breeding ecology of the Florida Grasshopper Sparrow and Bachman's Sparrow. *Florida Field Nat.* **33(2)**: 29–40.
Perkins, D.W., Shriver, W.G. & Vickery, P.D. (2009). The effects of fire on the breeding ecology of Florida Grasshopper Sparrows (*Ammodramus savannarum floridanus*) and Bachman's Sparrows (*Aimophila aestivalis*). *Florida Field Nat.* **37(4)**: 121–145.
Perkins, D.W., Vickery, P.D., Dean, T.F. & Scheuerell, M.D. (1998). Florida Grasshopper Sparrow reproductive success based on nesting records. *Florida Field Nat.* **26(1)**: 7–17.
Perkins, D.W., Vickery, P.D. & Shriver, W.G. (2008). Population viability analysis of the Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*): testing recovery goals and management options. *Auk* **125(1)**: 167–177.
van Perlo, B. (2009). *A Field Guide to the Birds of Brazil*. Oxford University Press, Oxford, UK.
Perritt, J.E. & Best, L.B. (1989). Effects of weather on the breeding ecology of Vesper Sparrows in Iowa crop fields. *Amer. Midl. Nat.* **121(2)**: 355–360.
Pesente, M., Maragna, P. & Cerato, E. (1997). Records of complete post-juvenile moult in the Reed Bunting *Emberiza schoeniclus* in north-eastern Italy. *Ringing & Migration* **18(1)**: 68–69.
Peterjohn, B.G. (1989). *The Birds of Ohio*. University of Indiana Press, Bloomington, Indiana.
Peters, J.L. (1929). An ornithological survey in the Caribbean lowlands of Honduras. *Bull. Mus. Comp. Zool. Harvard* **69**: 390–478.
Peters, J.L. & Griswold, J.A. (1943). Birds of the Harvard Peruvian Expedition. *Bull. Mus. Comp. Zool. Harvard* **92**: 281–327.
Petersen, K.L. & Best, L.B. (1985a). Brewer's Sparrow nest site characteristics in a sagebrush community. *J. Field Orn.* **56(1)**: 23–27.
Petersen, K.L. & Best, L.B. (1985b). Nest site selection by Sage Sparrows. *Condor* **87(2)**: 217–221.
Petersen, K.L. & Best, L.B. (1986). Diets of nestling Sage Sparrows and Brewer's Sparrows in an Idaho sagebrush community. *J. Field Orn.* **57(4)**: 283–294.
Petersen, K.L. & Best, L.B. (1987). Territory dynamics in a Sage Sparrow population: are shifts in site use adaptive? *Behav. Ecol. Sociobiol.* **21(6)**: 351–358.
Petersen, K.L., Best, L.B. & Winter, B.M. (1986). Growth of nestling Sage Sparrows and Brewer's Sparrows. *Wilson Bull.* **98(4)**: 535–546.
Peterson, A. & Young, H. (1950). A nesting study of the Bronzed Grackle. *Auk* **67(4)**: 466–476.
Peterson, A.T. (1998). The distribution and type locality of the extinct Slender-billed Grackle *Quiscalus palustris*. *Bull. Brit. Orn. Club* **118(2)**: 119–121.
Peterson, A.T. (2003). Projected climate change effects on Rocky Mountain and Great Plain birds: generalities of biodiversity consequences. *Global Change Biol.* **9**: 647–655.
Peterson, A.T., Escalante-Pliego, P. & Navarro-Sigüenza, A.G. (1992). Genetic variation and differentiation in Mexican populations of Common Bush-tanagers and Chestnut-capped Brush-finches. *Condor* **94(1)**: 244–253.
Peterson, A.T., Escalona-Segura, G. & Griffith, J.A. (1998). The birds of northern Central America: a preliminary distributional analysis. *Wilson Bull.* **110**: 534–543.
Peterson, A.T., Navarro-Sigüenza, A.G., Hernández-Baños, B.E., Escalona-Segura, G., Rebón-Gallardo, F., Rodríguez-Ayala, E., Figueroa-Esquivel, E.M. & Cabrera-García, L. (2003). The Chimalapas region, Oaxaca, Mexico: a high-priority region for bird conservation in Mesoamerica. *Bird Conserv. Int.* **13**: 227–254.
Peterson, A.T., Rice, N.H. & Navarro-Sigüenza, A.G. (2004). Geographic variation in the Rosy Thrush-tanager (*Rhodinocichla rosea*) complex of Mesoamerica (Aves: Passeriformes). *Biota Neotropica* **4(2)**: 1–7.
Peterson, R.T. & Chalif, E.L. (1973). *A Field Guide to Mexican Birds*. Moughton Mifflin, Boston.
Petren, K., Grant, B.R. & Grant, P.R. (1999a). A phylogeny of Darwin's finches based on microsatellite DNA length variation. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **266**: 321–329.
Petren, K., Grant, B.R. & Grant, P.R. (1999b). Low extrapair paternity in the Cactus Finch (*Geospiza scandens*). *Auk* **116(1)**: 252–256.
Petren, K., Grant, P.R., Grant, B.R. & Keller, L.F. (2005). Comparative landscape genetics and the adaptive radiation of Darwin's finches: the role of peripheral isolation. *Mol. Ecol.* **14**: 2943–2957.
Petrinovich, L. (1985). Factors influencing song development in the White-crowned Sparrow (*Zonotrichia leucophrys*). *J. Comp. Psychol.* **99(1)**: 15–29.
Petrinovich, L. (1988). Individual stability, local variability and the cultural transmission of song in White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*). *Behaviour* **107(3/4)**: 208–240.
Petrinovich, L. & Patterson, T.L. (1978). Polygyny in the White-crowned Sparrow (*Zonotrichia leucophrys*). *Condor* **80(1)**: 99–100.
Petrinovich, L. & Peeke, H.V.S. (1973). Habituation to territorial song in the White-crowned Sparrow (*Zonotrichia leucophrys*). *Behav. Biol.* **8(6)**: 743–748.
Petrinovich, L., Patterson, T. & Peeke, H.V.S. (1976). Reproductive condition and the response of White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*) to song. *Science (Washington, D.C.)* **191(4223)**: 206–207.
Petry, M.V. & Krüger, L. (2010). Frequent use of burned grasslands by the vulnerable Saffron-cowled Blackbird *Xanthopsar flavus*: implications for the conservation of the species. *J. Orn.* **151**: 599–605.
Pettet, A. (1977). Seasonal changes in nectar-feeding by birds at Zaria, Nigeria. *Ibis* **119**: 291–308.
Pettingill, O.S. (1973). Passerine birds of the Falkland Islands: their behavior and ecology. *Living Bird* **12**: 95–136.
Pfeffer, J.J. & Gilot, F. (2002). Statut du Bruant fou (*Emberiza cia*) dans les Vosges Haut-Rhinoises. *Ciconia* **26(2)**: 65–72. In French with English summary.
Phelps, K.D. (1954). *Cien de las Más Conocidas Aves Venezolanas*. Editorial Lectura, Caracas, Venezuela. In Spanish.
Phelps, W.H. (1938). La expedición del American Museum of Natural History al Monte Auyan-Tepui. *Bol. Soc. Venez. Cienc. Nat.* **4(32)**: 251–265. In Spanish.
Phelps, W.H. (1943). Las aves de Perijá. *Bol. Soc. Venez. Cienc. Nat.* **56**: 265–338. In Spanish.
Phelps, W.H. & Gilliard, E.T. (1940). Six new birds from the Perijá Mountains of Venezuela. *Amer. Mus. Novit.* **1100**: 1–8.
Phelps, W.H. & Phelps, W.H. (1950). Lista de las aves de Venezuela con su distributión. Part 2. Passeriformes. *Bol. Soc. Venez. Cienc. Nat.* **12(75)**: 1–427. In Spanish.
Phelps, W.H. & Phelps, W.H. (1963). Lista de las aves de Venezuela con su distributión. Vol. 1. Part 2. Passeriformes. 2nd edition. *Bol. Soc. Venez. Cienc. Nat.* **24(104–105)**: 1–479. In Spanish.
Philippi, R.A. (1940). Sobre *Phrygilus erythronotus* Philippi y Landbeck y *Phrygilus dorsalis* Cabanis. *Bol. Mus. Nac. Chile* **18**: 83–85. In Spanish.
Phillips, A.R. (1944). Status of Cassins Sparrow in Arizona. *Auk* **61**: 409–412.

Phillips, A.R. (1951). The molts of the Rufous-winged Sparrow. *Wilson Bull.* **63**: 323–326.
Phillips, A.R. (1994). A review of the northern *Pheucticus* grosbeaks. *Bull. Brit. Orn. Club* **114**: 162–170.
Phillips, A.R. (1995). The northern races of *Icterus pustulatus* (Icteridae), Scarlet-headed or Streaked-back Oriole. *Bull. Brit. Orn. Club* **115**: 98–105.
Phillips, A.R. & Farfan, R.P. (1993). Distribution, migration, ecology, and relationships of the Five-striped Sparrow, *Aimophila quinquestriata*. *Western Birds* **24(2)**: 65–72.
Phillips, A.R., Marshall, J. & Monson, G. (1964). *The Birds of Arizona*. University of Arizona Press, Tucson, Arizona.
Phillips, S.M. & Einem, G.E. (2003). Seaside Sparrows, *Ammodramus maritimus*, breeding in the Rio Grande delta, southern Texas. *Southwest. Nat.* **48(3)**: 465–467.
Piacentini, V.Q., Ghizoni, I.R., Azevedo, M.A.G. & Kirwan, G.M. (2006). Sobre a distribuição de aves em Santa Catarina, Brasil, parte 1: registros relevantes para o estado ou inéditos para a Ilha de Santa Catarina. *Cotinga* **26**: 25–31. In Portuguese.
Piana, R.P., Angulo, F., Ormaeche, E. & Mendoza, C. (2006). Two new species for Peru: Lemon-rumped Tanager *Ramphocelus icteronotus* and Black-cheeked Woodpecker *Melanerpes pucherani*. *Cotinga* **25**: 78–79.
Picman, J. (1981). The adaptive value of polygyny in marsh-nesting Red-winged Blackbirds: renesting, territory tenacity, and mate fidelity in females. *Can. J. Zool.* **59**: 2284–2296.
Picman, J. (1983). Aggression by Red-winged Blackbirds towards Marsh Wrens. *Can. J. Zool.* **61**: 1896–1899.
Picman, J. (1992). Egg destruction by Eastern Meadowlarks. *Wilson Bull.* **104**: 520–525.
Picman, J. & Isabelle, A. (1996). Sources of nesting mortality and correlates of nesting success in Yellow-headed Blackbirds. *Auk* **112**: 183–191.
Pidgeon, A.M., Radeloff, V.C. & Mathews, N.E. (2003). Landscape-scale patterns of Black-throated Sparrow (*Amphispiza bilineata*) abundance and nest success. *Ecol. Appl.* **13(2)**: 530–542.
Pidgeon, A.M., Radeloff, V.C. & Mathews, N.E. (2006). Contrasting measures of fitness to classify habitat quality for the Black-throated Sparrow (*Amphispiza bilineata*). *Biol. Conserv.* **132(2)**: 199–210.
Piechocki, R. & Bolod, A. (1972). Beiträge zur Avifauna der Mongolei. Teil II. Passeriformes. *Mitt. Zool. Mus. Berlin* **48(1)**: 41–175.
Pierce, W.M. (1921). Nesting of the Stephens Fox Sparrow. *Condor* **23**: 80–85.
Pilgrim, J.D., Bijlmakers, P., Crutchley, A., Crutchley, G., De Bruyn, T. & Tordoff, A.W. (2009). Common Ringed Plover *Charadrius hiaticula* and Black-headed Bunting *Emberiza melanocephala*: new records for Vietnam. *Forktail* **25**: 155–158.
Piloni, G. (2001). Ratification of the subspecies *Zonotrichia capensis argentina* (Todd 1920) and its geographical distribution in Argentina (Aves: Emberizidae). *Physis (Secc. C.)* **58(134/135)**: C9–C11.
Piloni, G. (2004a). The subspecific identity of *Zonotrichia capensis* (P.L.S. Müller) in the Republica Oriental del Uruguay (Aves, Emberizinae). *Physis (Secc. C.)* **59(136/137)**: 41–44.
Piloni, G. (2004b). Systematic revision of the subspecies of *Zonotrichia capensis* (P.L.S. Müller) (Aves: Emberizinae) and their geographical distribution in the Republic of Argentina. *Physis (Secc. C.)* **60(138/139)**: 1–23.
Pimental, L. (2006). Audio recording of *Orchesticus abeillei* from Reserva Ecologica do Guapissu, Rio de Janeiro. Xeno-Canto, XC11823. Unpubl.
Pinter, J.M. (1991). Cirl Bunting song types. *British Birds* **84**: 198.
Pinto, O.M.O. (1944a). *Catálogo das Aves do Brasil*. Part 2. Departamento de Zoologia, Secretaria da Agricultura, Indústria e Comércio de São Paulo, São Paulo. In Portuguese.
Pinto, O.M.O. (1944b). Sobre as aves do Distrito de Monte Alegre, Município de Amparo (São Paulo, Brasil). *Pap. Avuls. Dept. Zool. São Paulo* **4(9)**: 117–150. In Portuguese.
Pinto, O.M.O. (1951). Aves do Itatiaia: lista remissiva e novas achegas à avifauna da região. *Pap. Avuls. Dept. Zool. São Paulo* **10(9)**: 155–208. In Portuguese.
Pinto, O.M.O. (1954). Resultados ornitológicos de duas viagens científicas ao Estado de Alagoas. *Pap. Avuls. Dept. Zool. São Paulo* **12(1)**: 1–98. In Portuguese.
Pinto, O.M.O. (1967). Do parasitismo provável de *Icterus jamacaii* (Gmelin) em *Pseudoseisura cristata* (Gmelin). *Hornero* **10**: 447–449. In Portuguese.
Piper, W.H. (1990a). Exposure to predators and access to food in wintering White-throated Sparrows *Zonotrichia albicollis*. *Behaviour* **112(3/4)**: 284–298.
Piper, W.H. (1990b). Site tenacity and dominance in wintering White-throated Sparrows *Zonotrichia albicollis* (Passeriformes: Emberizidae). *Ethology* **85(2)**: 114–122.
Piper, W.H. & Wiley, R.H. (1990a). Correlates of range size in wintering White-throated Sparrows, *Zonotrichia albicollis*. *Anim. Behav.* **40(3)**: 545–552.
Piper, W.H. & Wiley, R.H. (1990b). The relationship between social dominance, subcutaneous fat, and annual survival in wintering White-throated Sparrows (*Zonotrichia albicollis*). *Behav. Ecol. Sociobiol.* **26(3)**: 201–208.
Piratelli, A. & Pereira, M.R. (2002). Dieta das aves na região leste de Mato Grosso do Sul, Brasil. *Ararajuba* **10**: 131–139. In Portuguese.
Pisulinska, N.A. (2008a). Arrival phenology and migration aspects of Reed Bunting in Roztochya and western Polissya regions. *Visnyk Lvivsk. Univ. (Ser. Biol.)* **48**: 109–114. In Ukranian with English summary.
Pisulinska, N.A. (2008b). [The main directions of orientation of the Reed Bunting *Emberiza schoeniclus* L. in Lviv region]. *Nauk. Visnyk Uzhhorods'koho Univ. Ser. Biol.* **23**: 105–109. In Ukrainian.
Pitelka, F.A. (1947). Taxonomy and distribution of the Mexican Sparrow *Xenospiza baileyi*. *Condor* **49**: 199–203.
Pitelka, F.A. (1951). Generic placement of the Rufous-winged Sparrow. *Wilson Bull.* **63**: 47.
Pittman, J.A. (1960). Bachman's Sparrow hiding in a burrow. *Auk* **77**: 80.
Pitzrick, V.M. & Pitzrick, M. (1992). Shrike captures Cardinal. *Kingbird* **42**: 15.
Pizo, M.A. (1996). Feeding ecology of two *Cacicus* species (Emberizidae, Icterinae). *Ararajuba* **4**: 87–92.
Pizo, M.A. (2008). An apparent instance of predation on a Yellow-billed Cardinal (*Paroaria capitata*) by the Chopi Blackbird (*Gnorimopsar chopi*). *Rev. Bras. Orn.* **16(3)**: 264–265.
Pizo, M.A. (2009). Nest associates and colony trees of the Red-rumped Cacique (*Cacicus haemorrhous*, Icteridae). *Orn. Neotropical* **20**: 623–627.
Plamondon, S.L., Goller, F. & Rose, G.J. (2008). Tutor model syntax influences the syntactical and phonological structure of crystallized songs of White-crowned Sparrows. *Anim. Behav.* **76(6)**: 1815–1827.
Plamondon, S.L., Rose, G.J. & Goller, F. (2010). Roles of syntax information in directing song development in White-crowned Sparrows (*Zonotrichia leucophrys*). *J. Comp. Psychol.* **124(2)**: 117–132.
Planqué, R. (2005). Audio recordings of *Tangara peruviana* from Parque Estadual Intervales, Sao Paulo, Brazil. Xeno-Canto, XC4261. Unpubl.
Plath, K. (1946). Color change in *Ramphocelus flammigerus*. *Auk* **62**: 304.
Pleasants, B.Y. (1981). Aspects of the breeding biology of a subtropical oriole, *Icterus gularis*. *Wilson Bull.* **93**: 531–537.
Pleasants, B.Y. (1993). Altamira Oriole (*Icterus gularis*). No. **56** in: Poole, A.F. & Gill, F.B. eds. (1993). *The Birds of North America*. Vol. 2. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington D.C. & Philadelphia, Pennsylvania.
Pleasants, B.Y. & Albano, D.J. (2001). Hooded Oriole (*Icterus cucullatus*). No. **568** in: Poole, A.F. & Gill, F.B. eds. (2001). *The Birds of North America*. Vol. 15. The Birds of North America Inc., Philadelphia, Pennsylvania.
Plenge, M.A. (1974). Notes on some birds in west-central Peru. *Condor* **76(3)**: 326–330.
Plentovich, S.M., Holler, N.R. & Hill, G.E. (1998). Site fidelity of wintering Henslow's Sparrows. *J. Field Orn.* **69(3)**: 486–490.
Plentovich, S.M., Holler, N.R. & Hill, G.E. (1999). Habitat requirements of Henslow's Sparrows wintering in silvicultural lands of the Gulf Coastal Plain. *Auk* **116(1)**: 109–115.
Plentovich, S.M., Tucker, J.W., Holler, N.R. & Hill, G.E. (1998). Enhancing Bachman's Sparrow habitat via management of Red-cockaded Woodpeckers. *J. Wildl. Management* **62(1)**: 347–354.
Pleszczynska, W.K. (1978). Microgeographic prediction of polygyny in the Lark Bunting. *Science (Washington, D.C.)* **201**: 935–937.
Pleszczynska, W.K. (1980). Interspecific and intraspecific song discrimination by *Zonotrichia albicollis* and *Z. leucophrys*. *Can. J. Zool.* **58(8)**: 1433–1438.
Podos, J. (2001). Correlated evolution of morphology and vocal signal structure in Darwin's Finches. *Nature (London)* **409**: 185–188.
Podos, J. (2007). Discrimination of geographical song variants by Darwin's finches. *Anim. Behav.* **73(5)**: 833–844.
Podos, J., Nowicki, S. & Peters, S. (1999). Permissiveness in the learning and development of song syntax in Swamp Sparrows. *Anim. Behav.* **58(1)**: 93–103.
Podos, J., Peters, S. & Nowicki, S. (2004). Calibration of song learning targets during vocal ontogeny in Swamp Sparrows, *Melospiza georgiana*. *Anim. Behav.* **68(4)**: 929–940.
Polak, S. & Trontelj, P. (2005). Rock Bunting *Emberiza cia*, *Acrocephalus (Ljubljana)* **26(126)**: 160.
Pollo, R. (2005). Il Migliarino di Palude *Emberiza schoeniclus* nella palude "Brusa-Vallette". *Quad. Staz. Ecol. Civ. Mus. Storia Nat. Ferrara* **15**: 125–148. In Italian with English summary.
Ponz, A., Barba, E. & Gil-Delgado, J.A. (1996). Population changes and breeding ecology of the Cirl Bunting *Emberiza cirlus* in eastern Spain. *Bird Study* **43(1)**: 38–46.
Poole, E.L. (1938). Weights and wing areas in North American birds. *Auk* **55**: 511–517.
Poole, R., Wilson, M. & Brown, C. (2003). Site fidelity and crown plumage in winter Swamp Sparrows in central Florida. *Florida Field Nat.* **31(1)**: 6–7.
Popovkina, A.B. (2004). [Foraging behaviour by a female Snow Bunting (*Plectrophenax nivalis townsendi*): observations on Copper Island, Commander Islands]. *Ornitologiya* **31**: 262–263. In Russian.
Portenko, L.A. (1929). Relations réciproques entre les formes du Bruant des Roseaux (*Emberiza schoeniclus*) et du Bruant polaire (*E. pallasi*). *Trudy Zool. Inst. (Leningr.)* **29**: 37–81. In Russian with French summary.
Portenko, L.A. (1930). Subdivision of the species *Emberiza rustica* into geographical races. *Auk* **47**: 205–207.
Portenko, L.A. & Stübs, J. (1971a). *Emberiza citrinella* L. und *Emberiza leucocephala* Gmelin. In: Stresemann *et al.* (1971).
Portenko, L.A. & Stübs, J. (1971b). *Emberiza stewarti* (Blyth). In: Stresemann *et al.* (1971).
Portenko, L.A. & Stübs, J. (1971c). *Emberiza rustica* Pallas. In: Stresemann *et al.* (1971).
Portenko, L.A. & Stübs, J. (1971d). *Emberiza aureola* Pallas. In: Stresemann *et al.* (1971).
Portenko, L.A. & Stübs, J. (1974). *Emberiza cioides* Brandt. In: Stresemann, E., Portenko, L.A., Dathe, H. & Mauersberger, G. eds. (1974). *Atlas der Verbreitung palaearktischer Vögel*. 4th instalment. Akademie-Verlag, Berlin. In German.
Portenko, L.A. & Vietinghoff-Scheel, E. von (1978). *Emberiza elegans* Temm. In: Dathe, H. & Neufeldt, I.A. eds. (1978). *Atlas der Verbreitung palaearktischer Vögel*. 7th instalment. Akademie-Verlag, Berlin. In German.
Porter, R.F. & Suleiman, A.S. (2011). The population and distribution of the breeding birds of Socotra. BirdLife International/Socotra Conservation & Development Programme. MS.
Porto, G.R. & Piratelli, A. (2005). Etograma da Maria-preta, *Molothrus bonariensis* (Gmelin) (Aves, Emberizidae, Icterinae). *Rev. Bras. Zool.* **22(2)**: 306–312. In Portuguese with English summary.
Post, W. (1981a). Biology of the Yellow-shouldered Blackbird (*Agelaius xanthomus*) on a tropical island. *Bull. Florida State Mus. (Biol. Sci.)* **26**: 125–202.
Post, W. (1981b). The prevalence of some ectoparasites, diseases, and abnormalities in the Yellow-shouldered Blackbird. *J. Field Orn.* **52**: 16–22.
Post, W. (1992). Dominance and mating success in male Boat-tailed Grackles. *Anim. Behav.* **44**: 917–929.
Post, W. (1994a). Are female Boat-tailed Grackle colonies neutral assemblages? *Behav. Ecol. Sociobiol.* **35(6)**: 401–407.
Post, W. (1994b). Redirected copulation by male Boat-tailed Grackles. *Wilson Bull.* **106(4)**: 770–771.
Post, W. (1995). Reproduction of female Boat-tailed Grackles: comparisons between South Carolina and Florida. *J. Field Orn.* **66**: 221–230.
Post, W. (1998a). Advantages of coloniality in female Boat-tailed Grackles. *Wilson Bull.* **110**: 489–496.
Post, W. (1998b). The status of Nelson's and Saltmarsh Sharp-tailed Sparrows on Waccasassa Bay, Levy County, Florida. *Florida Field Nat.* **26(1)**: 1–6.
Post, W. & Greenlaw, J.S. (1995). Seaside Sparrow (*Ammodramus maritimus*). No. **127** in: Poole, A. & Gill, F. eds. (1995). *The Birds of North America*. Vol. 4. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Post, W. & Greenlaw, J.S. (2000). The present and future of the Cape Sable Seaside Sparrow. *Florida Field Nat.* **28(3)**: 93–160.
Post, W. & Greenlaw, J.S. (2006). Nestling diets of coexisting salt marsh sparrows: opportunism in a food-rich environment. *Estuaries and Coasts* **29(5)**: 765–775.
Post, W. & Post, K.W. (1987). Roosting behaviour of the Yellow-shouldered Blackbird. *Florida Field Nat.* **15**: 93–105.
Post, W. & Seals, C.A. (1993). Nesting associations of Least Bitterns and Boat-tailed Grackles. *Condor* **95**: 139–144.
Post, W. & Wiley, J.W. (1976). The Yellow-shouldered Blackbird – present and future. *Amer. Birds* **30**: 13–20.
Post, W. & Wiley, J.W. (1977). Reproductive interactions of the Shiny Cowbird and the Yellow-shouldered Blackbird. *Condor* **79**: 176–184.
Post, W., Cruz, A. & McNair, D.B. (1993). The North American invasion pattern of the Shiny Cowbird. *J. Field Orn.* **64(1)**: 32–41.
Post, W., Nakamura, T.K. & Cruz, A. (1990). Patterns of Shiny Cowbird parasitism in St Lucia and southwestern Puerto Rico. *Condor* **92**: 461–469.
Post, W., Poston, J.P. & Bancroft, G.T. (1996). Boat-tailed Grackle (*Quiscalus major*). No. **207** in: Poole, A.F. & Gill, F.B. eds. (1996). *The Birds of North America*. Vol. 6. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Post, W., Sanders, F. & Wood, L. (2009). The history of Dickcissels (*Spiza americana*) nesting on the southeastern coast of North America. *Florida Field Nat.* **37(2)**: 45–50.
Poston, J.P. (1997a). Mate choice and competition for mates in the Boat-tailed Grackle. *Anim. Behav.* **54**: 525–534.
Poston, J.P. (1997b). Dominance, access to colonies, and queues for mating opportunities by male Boat-tailed Grackles. *Behav. Ecol. Sociobiol.* **41**: 89–98.
Poston, J.P., Wiley, R.H. & Westneat, D.F. (1999). Male rank, female breeding synchrony, and patterns of paternity in the Boat-tailed Grackle. *Behav. Ecol.* **10(4)**: 444–451.
Potter, K. (1997). Rose-breasted Grosbeak (*Pheucticus ludovicianus*) with young in Garfield County, Colorado. *J. Colorado Field Orn.* **31(1)**: 15.
Potter, P.E. (1974). Breeding behavior of Savannah Sparrows in southeastern Michigan. *Jack-Pine Warbler* **52(2)**: 50–63.
Potvin, D.A. & MacDougall-Shackleton, E.A. (2009). Parental investment amplifies effects of genetic complementarity on growth rates in Song Sparrows, *Melospiza melodia*. *Anim. Behav.* **78(4)**: 943–948.
Potvin, D.A. & MacDougall-Shackleton, E.A. (2010). Paternal song complexity predicts offspring sex ratios close to fledging, but not hatching, in Song Sparrows. *Wilson J. Orn.* **122(1)**: 146–152.
Pough, R.H. (1946). *Audubon Bird Guide: Small Land Birds of Eastern and Central North America from Southern Texas to Central Greenland*. Doubleday & Company, Garden City, New York.
Pough, R.H. (1957). *Audubon Western Bird Guide*. Doubleday & Company, Garden City, New York.
Poulin, B., Lefebvre, G. & McNeil, R. (1994). Diets of land birds from northeastern Venezuela. *Condor* **96(2)**: 354–367.
Poulson, T.L. (1969). Salt and water balance in Seaside and Sharp-tailed Sparrows. *Auk* **86**: 473–489.

Pounds, J.A., Fogden, M.P.L. & Campbell, J.H. (1999). Biological response to climate change on a tropical mountain. *Nature (London)* **398**: 611–615.
Powell, A.F.L.A. (2006). Effects of prescribed burns and bison (*Bos bison*) grazing on breeding bird abundances in tallgrass prairie. *Auk* **123(1)**: 183–197.
Powell, A.F.L.A. & Nyari, A.S. (2007). Interspecific interactions between marsh-dwelling *Ammodramus* sparrows at a migration stopover. *Wilson J. Orn.* **119(2)**: 304–306.
Powell, A.F.L.A., Baker, F.K. & Lanyon, S.M. (2008). A complete species-level phylogeny of the grackles (*Quiscalus*), including the extinct Slender-billed Grackle, inferred from mitochondrial DNA. *Condor* **110(4)**: 718–728.
Powell, A.N. (1993). Nesting habitat of Belding's Savannah Sparrows in coastal salt marshes. *Wetlands* **13**: 219–223.
Powell, G.V.N. (1979). Structure and dynamics of interspecific flocks in a Neotropical mid-elevation forest. *Auk* **96**: 375–390.
Powell, L.L., Hodgman, T.P. & Glanz, W.E. (2010). Home ranges of Rusty Blackbirds breeding in wetlands: how much would buffers from timber harvest protect habitat? *Condor* **112(4)**: 834–840.
Powell, L.L., Hodgman, T.P., Glanz, W.E., Osenton, J.D. & Fisher, C.M. (2010). Nest-site selection and nest survival of the Rusty Blackbird: does timber management adjacent to wetlands create ecological traps? *Condor* **112(4)**: 800–809.
Power, D.M. (1970). Geographic variation of Red-winged Blackbirds in central North America. *Univ. Kansas Publ. Mus. Nat. Hist.* **19**: 1–83.
Power, D.M. (1971a). Statistical analysis of character correlations in Brewer's Blackbirds. *Syst. Zool.* **20**: 186–203.
Power, D.M. (1971b). Range expansion of Brewer's Blackbird: phenetics of a new population. *Can. J. Zool.* **49**: 175–183.
Pranty, B. (2000). Three sources of Florida Grasshopper Sparrow mortality. *Florida Field Nat.* **28(1)**: 27–29.
Pranty, B. & Scheuerell, M.D. (1997). First summer record of the Henslow's Sparrow in Florida. *Florida Field Nat.* **25(2)**: 64–66.
Pranty, B. & Smith, P.W. (2001). Status, distribution, and taxonomy of the *Spindalis* complex ("Striped-headed Tanager") in Florida. *Florida Field Nat.* **29(1)**: 13–25.
Prasad, B.N. & Singh, A. (2000). Metabolic and reproductive activities in bunting (*Emberiza bruniceps*) in relation to some environmental factors. *Himalayan J. Environm. & Zool.* **14(1)**: 59–64.
Prasad, B.N., Singh, A. & Upadhyay, S.K. (2001). Circadian rhythm and photo-induced fattening behaviour in subtropical migratory finch, Redheaded Bunting, *Emberiza bruniceps*. *Environm. Ecol. (Kalyani)* **19(2)**: 387–391.
Pratt, H.D. (1991). Hybridization of Great-tailed and Boat-tailed Grackles (*Quiscalus*) in Louisiana. *J. Louisiana Orn.* **2**: 2–14.
Pratt, H.D., Ortego, B. & Guillory, H. (1977). Spread of the Great-tailed Grackle in Louisiana. *J. Field Orn.* **89**: 483–485.
Pregill, G.K. & Olson, S.L. (1981). Zoogeography of West Indian vertebrates in relation to Pleistocene climatic cycles. *Ann. Rev. Ecol. Syst.* **12**: 75–98.
Prescott, K.W. (1964). Constancy of incubation for the Scarlet Tanager. *Wilson Bull.* **76**: 37–42.
Prescott, K.W. (1965). *The Scarlet Tanager*. Investigations **2**. New Jersey State Museum, Trenton, New Jersey.
Prescott, K.W. (1974). Summer Tanager southern range extension in Chile. *Auk* **91**: 617–618.
Prescott, K.W. (1978). Weight, fat class and wing measurements of living Dark-eyed Juncos (*Junco hyemalis*). *Inl. Bird Banding News* **50(5)**: 163–183.
Price, J.J. & Lanyon, S.M. (2002a). Reconstructing the evolution of complex bird song in the oropendolas. *Evolution* **56**: 1514–1529.
Price, J.J. & Lanyon, S.M. (2002b). A robust phylogeny of the oropendolas: polyphyly revealed by mitochondrial sequence data. *Auk* **119(2)**: 335–348.
Price, J.J. & Lanyon, S.M. (2004a). Patterns of song evolution and sexual selection in the oropendolas and caciques. *Behav. Ecol.* **15**: 485–497.
Price, J.J. & Lanyon, S.M. (2004b). Song and molecular data identify congruent but novel affinities of the Green Oropendola (*Psarocolius viridis*). *Auk* **121(1)**: 224–229.
Price, J.J., Friedman, N.R. & Omland, K.E. (2007). Song and plumage evolution in new World orioles (*Icterus*) show similar lability and convergence in patterns. *Evolution* **61(4)**: 850–863.
Price, J.J., Lanyon, S.M. & Omland, K.E. (2009). Losses of female song with changes from tropical to temperate breeding in the New World blackbirds. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **276**: 1971–1980.
Price, J.J., Yunes-Jiménez, L., Osorio-Beristain, M., Omland, K.E. & Murphy, T.G. (2008). Sex-role reversal in song? Females sing more frequently than males in the Streak-backed Oriole. *Condor* **110**: 387–392.
Price, K. (1996). Begging as competition for food in Yellow-headed Blackbirds. *Auk* **113**: 963–967.
Price, M.R. & Hayes, W.K. (2009). Conservation taxonomy of the Greater Antillean Oriole (*Icterus dominicensis*): diagnosable plumage variation among allopatric populations supports species status. *J. Caribb. Orn.* **22**: 19–25.
Price, R.D. & Dagleish, R.C. (2006). *Myrsidea* Waterston (Phthiraptera: Menoponidae) from tanagers (Passeriformes: Thraupidae) with descriptions of 18 new species. *Zootaxa* **1174**: 1–25.
Price, T.D. (1984a). The evolution of sexual size dimorphism in Darwin's finches. *Amer. Naturalist* **123(4)**: 500–518.
Price, T.D. (1984b). Sexual selection on body size, territory and plumage variables in a population of Darwin's finches. *Evolution* **38(2)**: 327–341.
Price, T.D. (1985). Reproductive responses to varying food supply in a population of Darwin's finches: clutch size, growth rates and hatching synchrony. *Oecologia (Berlin)* **66(3)**: 411–416.
Price, T.D. (1987). Diet variation in a population of Darwin's finches. *Ecology* **60(4)**: 1015–1028.
Price, T.D. & Gibbs, H.L. (1987). Brood division in Darwin's ground finches. *Anim. Behav.* **35(1)**: 299–301.
Price, T.D. & Grant, P.R. (1984). Life history traits and natural selection for small body size in a population of Darwin's finches. *Evolution* **38(3)**: 483–494.
Price, T.D. & Grant, P.R. (1985). The evolution of ontogeny in Darwin's finches: a quantitative genetic approach. *Amer. Naturalist* **125(2)**: 169–188.
Price, T.D., Grant, P.R., Gibbs, H.L. & Boag, P.T. (1984). Recurrent patterns of natural selection in a population of Darwin's finches. *Nature (London)* **309(5971)**: 787–789.
Price, T.D., Millington, S.J. & Grant, P.R. (1983). Helping at the nest in Darwin's finches as misdirected parental care. *Auk* **100(1)**: 192–194.
Prochazka, P. & Honza, M. (2004). Egg discrimination in the Yellowhammer. *Condor* **106(2)**: 405–410.
Proctor, B. & Donald, C. (2003). Yellow-headed Blackbirds in Britain and Europe. *Birding World* **16(2)**: 69–81.
Prokopchuk, L.M. & Petrusenko, A.A. (1976). [The nutrition of *Emberiza schoeniclus* L. and *Emberiza citrinella* L. in Ukrainean Polesye]. *Visnyk Kyyisk. Univ. (Ser. Biol.)* **18**: 102–105. In Ukrainian.
Prokopyeva, E.A., Goroshko, O.A. & Ilyashenko, V.Y. (2007). [The natal plumage of the "Mongolian" Bunting *Emberiza* (*pallasi*) *lydiae*]. *Ornitologiya* **34(1)**: 110–115. In Russian.
Pruett, C.L. & Winker, K. (2008). The effects of sample size on population genetic diversity estimates in Song Sparrows *Melospiza melodia*. *J. Avian Biol.* **39(2)**: 252–256.
Pruett, C.L., Arcese, P., Chan, Y.L., Wilson, A.G., Patten, M.A., Keller, L.F. & Winker, K. (2008). Concordant and discordant signals between genetic data and described subspecies of Pacific coast Song Sparrows. *Condor* **110(2)**: 359–364.
Pruett, C.L., Gibson, D.D. & Winker, K. (2004). Amak Island Song Sparrows (*Melospiza melodia amaka*) are not evolutionarily significant. *Orn. Sci.* **3(2)**: 133–138.
Prum, R.O., Andersson, S., Torres, R.H. & Grubb, T. (2009). Coherent scattering of ultraviolet light by avian feather barbs. *Auk* **120(1)**: 163–170.
Prys-Jones, R.P. (1977). *Aspects of Reed Bunting Ecology with Comparisons with the Yellowhammer*. PhD thesis, University of Oxford, Oxford, UK.
Prys-Jones, R.P. (1982). Molt and weight of some land-birds on Dominica, West Indies. *J. Field Orn.* **53(4)**: 352–362.
Prys-Jones, R.P. (1984). Migration patterns of the Reed Bunting *Emberiza schoeniclus schoeniclus*, and the dependence of wintering distribution on environmental conditions. *Gerfaut* **74(1)**: 15–37.
Przybylo, R., Sheldon, B.C. & Merilä, J. (2000). Climatic effects on breeding and morphology: evidence for phenotypic plasticity. *J. Anim. Ecol.* **69**: 395–403.
Pugnali, G. (2007). Notes on seasonal distribution of tanagers in Buenos Aires province, Argentina and on range expansion of White-lined Tanager, *Tachyphonus rufus*. Unpubl.
Pühringer, N. (2002). Die Zippammer (*Emberiza cia*) als Brutvogel in Oberösterreich. *Egretta* **45(1/2)**: 146–151. In German with English title.
Pulgarín-R., P.C. & Múnera-P., W.A. (2006). New bird records from Farallones del Citará, Colombian Western Cordillera. *Bol. Soc. Antioqueña Orn.* **16(1)**: 44–53.
Pulgarín-R., P.C., Múnera, W.A. & Solís, I. (2005). Ilustraciones y fotografías de aves. *Bol. Soc. Antioqueña Orn.* **15(2)**: 138–142. In Spanish.
Pulich, W.M. (1963). Some recent records of the Varied Bunting for Texas. *Condor* **65**: 334–335.
Pulido, F. (2007). Phenotypic changes in spring arrival: evolution, phenotypic plasticity, effects of weather and condition. *Climate Res.* **35**: 5–23.
Pulido, F. & Berthold, P. (2004). Microevolutionary response to climate change. Pp. 151–183 in: Møller *et al.* (2004).
Pulido, F. & Berthold, P. (2010). Current selection for lower migratory activity will drive the evolution of residency in a migratory bird population. *Proc. Natl. Acad. Sci. USA* **107**: 7341–7346.
Pulido, F. & Coppack, T. (2004). Correlation between timing of juvenile moult and onset of migration in the Blackcap, *Sylvia atricapilla*. *Anim. Behav.* **68**: 167–173.
Pulliainen, E. & Saari, L. (1989). Breeding biology of Rustic Buntings *Emberiza rustica* in eastern Finnish Lapland. *Ornis Fenn.* **66(4)**: 161–165.
Pulliam, H.R., Anderson, K.A., Misztal, A. & Moore, N. (1974). Temperature-dependant social behaviour in juncos. *Ibis* **116(3)**: 360–364.
Purcell, K.L. & Verner, J. (1998). Density and reproductive success of California Towhees. *Conserv. Biol.* **12(2)**: 442–450.
Purger, J.J. (1990). On state of Rock Bunting, *Emberiza cia cia* L., in Vojvodina. *Glasnik Prirodnj. Muz. Beogr. Ser. B Biol. Nauke* **45**: 169–170. In Serbo-Croatian with English summary.
Pyle, P. (1997). *Identification Guide to North American Birds: a Compendium of Information on Identifying, Ageing, and Sexing "Near-passerines" and Passerines in the Hand*. Part 1. Columbidae to Ploceidae. Slate Creek Press, Bolinas, California.
Pyle, P. & Henderson, R.P. (1991). The birds of southeast Farallon Island: occurrence and seasonal distribution of migratory species. *Western Birds* **22**: 41–84.
Pyle, R.L. & Pyle, P. (2009). The birds of the Hawaiian Islands: occurrence, history, distribution, and status. B.P. Bishop Museum, Honolulu, Hawaii. URL: *http://hbs.bishopmuseum.org/birds/rlp-monograph* (download 14 August 2010).
Quay, T.L., Funderburg, J.B., Lee, D.S., Potter, E.F. & Robbins, C.S. (1983). *The Seaside Sparrow, its Biology & Management*. Occasional Papers of the North Carolina Biological Survey **5**. North Carolina Museum of Natural Sciences, Raleigh, North Carolina.
Quay, W.B. (1987). Physical characteristics and arrival times of Indigo Buntings in eastern Missouri. *North Amer. Bird Bander* **12**: 2–7.
Quay, W.B. (1989). Timing of sperm releases and inseminations in resident emberizids: a comparative study. *Condor* **91(4)**: 941–961.
Quevedo, A. & López-Lanús, B. (2002). Registro extralimital de *Sturnella magna* en Colombia: Tolima, Cordillera Central. *Bol. Soc. Antioqueña Orn.* **13(24/25)**: 46–47. In Spanish.
Quevedo, A., Salaman, P.G.W. & Donegan, T.M. (2006). Serrania de las Quinchas: establishment of a first protected area in the Magdalena Valley of Colombia. *Cotinga* **25**: 24–32.
Quiroga, M.A. & Beltzer, A.H. (2002). Ecología alimentaria del Tordo Negro de Laguna *Agelaius cyanopus cyanopus* (Aves: Icteridae) en el valle del río Paraná, Argentina. *Rev. Facult. Bioquim. Cienc. Biol.* **6**: 105–112. In Spanish with English summary.
Rada Quintero, E. (2002). *Molothrus armenti*. Pp. 453–457 in: Renjifo *et al.* (2002).
Radamaker, K.A. & Powell, D.J. (2010). A Little Bunting reaches Baja California Sur. *Western Birds* **41(1)**: 55–58.
Radjabli, S.I., Bulatova, N.S. & Panov, E.N. (1970). [Comparative studies of the karyotypes of two closely related species of buntings (*Emberiza citrinella* L. and *E. leucocephalos* Gm.) hybridized in areas of overlap]. *Zoologicheskii Zhurnal* **49**: 1857–1862. In Russian.
Raffaele, H.A. (1977). Comments on the extinction of *Loxigilla portoricensis grandis* in St. Kitts, Lesser Antilles. *Condor* **19(3)**: 389–390.
Raffaele, H.A. (1983). *A Guide to the Birds of Puerto Rico and the Virgin Islands*. Fondo Educativo Interamericano, San Juan, Puerto Rico.
Raffaele, H.A. (1989). *A Guide to the Birds of Puerto Rico and the Virgin Islands*. Revised edition. Princeton University Press, Princeton, New Jersey.
Raffaele, H.A. & Roby, D. (1977). The Lesser Antillean Bullfinch in the Virgin Islands. *Wilson Bull.* **89(2)**: 338–342.
Raffaele, H.A., Wiley, J., Garrido, O., Keith, A. & Raffaele, J. (1998). *A Guide to the Birds of the West Indies*. Princeton University Press, Princeton, New Jersey.
Ragusa-Netto, J. (1997). Seasonal variation in foraging behavior of *Cypsnagra hirundinacea* in the campo-cerrado. *Ararajuba* **5(1)**: 72–75.
Ragusa-Netto, J. (2000). Raptors and "campo-cerrado" bird mixed flock led by *Cypsnagra hirundinacea* (Emberizidae: Thraupinae). *Rev. Bras. Biol.* **60(3)**: 461–467.
Ragusa-Netto, J. (2001). Sentinels in *Saltator atricollis* (Passeriformes: Emberizidae). *Rev. Bras. Biol.* **61**: 317–322.
Ragusa-Netto, J. (2002a). Exploitation of *Erythrina dominguezii* Hassl. (Fabaceae) nectar by perching birds in a dry forest in western Brazil. *Braz. J. Biol.* **62(4)**: 877–883.
Ragusa-Netto, J. (2002b). Vigilance towards raptors by nuclear species in bird mixed flocks in a Brazilian savannah. *Stud. Neotrop. Fauna Environm.* **37(3)**: 219–226.
Rahbek, C., Bloch, H., Poulsen, M.K. & Rasmussen, J.F. (1993). Avian body weights from southern Ecuardor. *Bull. Brit. Orn. Club* **113(2)**: 103–108.
Rahmig, C.J., Jensen, W.E. & With, K.A. (2009). Grassland bird responses to land management in the largest remaining tallgrass prairie. *Conserv. Ecol.* **23(2)**: 420–432.
Rahn, H., Curran-Everett, L. & Booth, D.T. (1988). Eggshell differences between parasitic and non-parasitic Icteridae. *Condor* **90**: 962–964.
Raikow, R.J. (1978). Appendicular myology and relationships of the New World nine-primaried oscines (Aves: Passeriformes). *Bull. Carnegie Mus. Nat. Hist.* **7**: 1–43.
Raikow, R.J. (1982). Monophyly of the Passeriformes: test of a phylogenetic hypothesis. *Auk* **99(3)**: 431–445.
Rainwater, T.R., England, M.C., Platt, S.G. & McMurry, S.T. (2001). Predation of Yellow-winged Tanager *Thraupis abbas* by an arboreal snake in Belize. *Cotinga* **15**: 8–9.
Rakestraw, J.L. & Baker, J.L. (1982). Dusky Seaside Sparrow feeds Red-winged Blackbird fledglings. *Wilson Bull.* **93(4)**: 540.
Ralph, C.J. & Vroman, D.P. (1990). Unusual recovery of a Golden-crowned Sparrow. *North Amer. Bird Bander* **15(2)**: 65.

Ramenofsky, M., Agatsuma, R. & Ramfar, T. (2008). Environmental conditions affect the behavior of captive, migratory White-crowned Sparrows. *Condor* **110(4)**: 658–671.
Ramírez-Llorens, P., White, E.E. & Rotundo, M. (2003). Sobre algunas aves de la estancia Guaycolec, provincia de Formosa, Argentina. *Nuestras Aves* **46**: 36–40. In Spanish.
Ramo, C. & Busto, B. (1981). La reproducción de un ave parásita: el Tordo Mirlo (*Molothrus bonariensis*) en los Llanos de Apure (Venezuela). *Doñana Acta Vertebrata* **8**: 215–224. In Spanish.
Ramo, C. & Busto, B. (1984). Nidificación de los Passeriformes en los llanos de Apure (Venezuela). *Biotropica* **16**: 59–68. In Spanish.
Ramoni-Perazzi, P., Bianchi-Ballesteros, G., Otero, L.D., Soto-Werschitz, A. & Bianchi-Pérez, G. (2010). Giant Cowbird (*Molothrus oryzivora*) as brood-parasite of the Green Jay (*Cyanocorax yncas*) in the Venezuelan Andes. *Orn. Neotropical* **20**: 305–309.
Rand, A.L. (1955). The origin of landbirds of Tristan da Cunha, Nightingale and Inaccessible Islands. *Fieldiana Zool.* **37**: 139–166.
Rand, A.L. & Traylor, M.A. (1954). *Manual de las Aves de El Salvador*. University of El Salvador, San Salvador, El Salvador. In Spanish.
Rani, S., Malik, S., Trivedi, A.K., Singh, S. & Kumar, V. (2006). A circadian clock regulates migratory restlessness in the Black-headed Bunting, *Emberiza melanocephala*. *Curr. Sci.* **91(8)**: 1093–1096.
Rani, S., Singh, S., Misra, M., Malik, S., Singh, B.P. & Kumar, V. (2005). Daily light regulates seasonal responses in the migratory male Redheaded Bunting (*Emberiza bruniceps*). *J. Exper. Zool.* **303A(7)**: 541–550.
Raouf, S.A., Parker, P.G., Ketterson, E.D., Nolan, V. & Ziegenfus, C. (1997). Testosterone affects reproductive success by influencing extra-pair fertilizations in male Dark-eyed Juncos (Aves: *Junco hyemalis*). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **264**: 1599–1603.
Raposo, M.A. (1997). A new species of *Arremon* (Passeriformes: Emberizidae) from Brazil. *Ararajuba* **5**: 3–9.
Raposo, M.A. & Parrini, R. (1997). On the validity of the Half-collared Sparrow *Arremon semitorquatus* Swainson, 1837. *Bull. Brit. Orn. Club* **117(4)**: 294–298.
Rashkevich, N.A. (1965). [On the ecology of some passerine birds in the Lower Amur]. *Zoologicheskii Zhurnal* **44**: 1532–1537. In Russian.
Rasmussen, J.E., Rahbek, C., Poulsen, B.O., Poulsen, M.K. & Bloch, H. (1996). Distributional records and natural history notes on threatened and little know birds of southern Ecuador. *Bull. Brit. Orn. Club* **116(1)**: 26–46.
Rasmussen, P.C. & Anderton, J.C. (2005a). *Birds of South Asia. The Ripley Guide*. Vol. 1. Field guide. Smithsonian Institution & Lynx Edicions, Washington, D.C. & Barcelona.
Rasmussen, P.C. & Anderton, J.C. (2005b). *Birds of South Asia. The Ripley Guide*. Vol. 2. Attributes and status. Smithsonian Institution & Lynx Edicions, Washington, D.C. & Barcelona.
Rasner, C.A., Yeh, P., Eggert, L.S., Hunt, K.E., Woodruff, D.S. & Price, T.D. (2004). Genetic and morphological evolution following a founder event in the Dark-eyed Junco, *Junco hyemalis thurberi*. *Mol. Ecol.* **13(3)**: 671–681.
Rastogi, A.D., Zanette, L. & Clinchy, M. (2006). Food availability affects diurnal nest predation and adult antipredator behaviour in Song Sparrows, *Melospiza melodia*. *Anim. Behav.* **72(4)**: 933–940.
Ratcliffe, L.M. & Grant, P.R. (1983). Species recognition in Darwin's finches (*Geospiza*, Gould). 2. Geographic variation in mate preference. *Anim. Behav.* **31(4)**: 1154–1165.
Rattenborg, N.C., Mandt, B.H., Obermeyer, W.H., Winsauer, P.J., Huber, R., Wikelski, M. & Benca, R.M. (2004). Migratory sleeplessness in the White-crowned Sparrow (*Zonotrichia leucophrys gambelii*). *PLoS Biol.* **2(7)**: 0924–0936.
Rattigan, G.E. (1921). Nesting notes on the Yellow-billed Cardinal (*Paroaria capitata*). *Bird Notes Ashbourne* **Ser. 3, no. 4**: 164–168.
Raven, P.H. (1979). *Erythrina* symposium III. Introduction to symposium III. *Ann. Missouri Bot. Garden* **66**: 417–421.
Raynor, G.S. (1976). Decrease in breeding Brown Thrashers and Rufous-sided Towhees on central Long Island. *Kingbird* **26(4)**: 190–193.
Read, M.E. (1982). Birds attracted to salt lick. *Bokmakierie* **34**: 40.
Reader, S.M., Morand-Ferron, J., Cote, I. & Lefebvre, L. (2002). Unusual feeding behaviors in five species of Barbadian birds. *Pitirre* **15(3)**: 117–123.
Reader, S.M., Nover, D. & Lefebvre, L. (2002). Local-specific sugar packet opening by Lesser Antillean Bullfinches in Barbados. *J. Field Orn.* **73(1)**: 82–85.
Reboreda, J.C., Mermoz, M.E., Massoni, V., Astié, A.A. & Rabuffetti, F.L. (2003). Impacto del parasitismo de cría del Tordo Renegrido (*Molothrus bonariensis*) sobre el éxito reproductivo de sus hospedadores. *Hornero* **18(2)**: 77–88. In Spanish with English summary.
Redkin, Y.A. & Koblik, E.A. (2001a). Song Sparrow, *Melospiza melodia* (Wilson, 1810) and Oregon Junco *Junco* (*hyemalis*) *oreganus* – new taxons in the avifauna of Russia. *Ornitologiya* **29**: 305–307.
Redkin, Y.A. & Koblik, E.A. (2001b). [Japanese Reed Bunting (*Emberiza yessoensis* Swinhoe, 1874), a new breeding species in the Mongolian avifauna]. *Ornitologiya* **29**: 307. In Russian.
Reed, J.M. (1985). A comparison of the "flush" and spot-map methods for estimating the size of Vesper Sparrow territories. *J. Field Orn.* **56(2)**: 131–137.
Reed, J.M. (1986). Vegetation structure and Vesper Sparrow territory location. *Wilson Bull.* **98(1)**: 144–147.
Reed, T.E., Warzybok, P., Wilson, A.J., Bradley, R.W., Wanless, S. & Sydeman, W.J. (2009). Timing is everything: flexible phenology and shifting selection in a colonial seabird. *J. Anim. Ecol.* **78(2)**: 376–387.
Reese, J.G. (1975). Fall remix and rectrix molt in the Cardinal. *Bird-Banding* **46**: 305–310.
Reid, J.M., Arcese, P., Cassidy, A.L.E.V., Hiebert, S.M., Smith, J.N.M., Stoddard, P.K., Marr, A.B. & Keller, L.F. (2004). Song repertoire size predicts initial mating success in male Song Sparrows, *Melospiza melodia*. *Anim. Behav.* **68(5)**: 1055–1063.
Reid, J.M., Arcese, P., Cassidy, A.L.E.V., Hiebert, S.M., Smith, J.N.M., Stoddard, P.K., Marr, A.B. & Keller, L.F. (2005). Fitness correlates of song repertoire size in free-living Song Sparrows (*Melospiza melodia*). *Amer. Naturalist* **165(3)**: 299–310.
Reid, J.M., Arcese, P., Cassidy, A.L.E.V., Marr, A.B., Smith, J.N.M. & Keller, L.F. (2005). Hamilton and Zuk meet heterozygosity? Song repertoire size indicates inbreeding and immunity in Song Sparrows (*Melospiza melodia*). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **272**: 481–487.
Reid, J.M., Arcese, P. & Keller, L.F. (2003). Inbreeding depresses immune response in Song Sparrows (*Melospiza melodia*): direct and inter-generational effects. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **270**: 2151–2157.
Reid, J.M., Arcese, P. & Keller, L.F. (2006). Intrinsic parent-offspring correlation in inbreeding level in a Song Sparrow (*Melospiza melodia*) population open to immigration. *Amer. Naturalist* **168(1)**: 1–13.
Reid, J.M., Arcese, P. & Keller, L.F. (2008). Individual phenotype, kinship, and the occurrence of inbreeding in Song Sparrows. *Evolution* **62(4)**: 887–899.
Reid, J.M., Arcese, P., Keller, L.F., Elliott, K.H., Sampson, L. & Hasselquist, D. (2007). Inbreeding effects on immune response in free-living Song Sparrows (*Melospiza melodia*). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **274**: 697–706.
Reidy, J.L. (2009). Nest predators of Lance-tailed Manakins on Isla Boca Brava, Panamá. *J. Field Orn.* **80**: 115–118.
Reiner, L. (1989). High altitude capture of a Northern Cardinal. *North Amer. Bird Bander* **14(4)**: 125.
Reinert, S.E. & Golet, F.C. (1979). Breeding ecology of the Swamp Sparrow in a southern Rhode Island peatland. *Trans. NE Fish. Wildl. Conf.* **36**: 1–13.
Reinking, D.L. (2002). Rare, local, little-known, and declining North American breeders. A closer look: Henslow's Sparrow. *Birding (USA)* **34(2)**: 146–150, 152–153.
Reinking, D.L. & Hendricks, D.P. (1993). Occurrence and nesting of Henslow's Sparrow in Oklahoma. *Bull. Okla. Orn. Soc.* **26(4)**: 33–36.
Reinking, D.L., Wiedenfeld, D.A., Wolfe, D.H. & Rohrbaugh, R.W. (2000). Distribution, habitat use, and nesting success of Henslow's Sparrow in Oklahoma. *Prairie Nat.* **32(4)**: 219–232.
Remsen, J.V. (1976). Observations of vocal mimicry in the Thick-billed Euphonia. *Wilson Bull.* **88**: 487–488.
Remsen, J.V. (1977). Five bird species new to Colombia. *Auk* **94**: 363.
Remsen, J.V. (1984). Natural history notes on some poorly known Bolivian birds. Part 2. *Gerfaut* **74**: 163–179.
Remsen, J.V. (1985). Community organization and ecology of birds of high elevation humid forest of the Bolivian Andes. Pp. 733–757 in: Buckley *et al.* (1985).
Remsen, J.V. (1993). Zoogeography and geographic variation of *Atlapetes rufinucha* (Aves: Emberizinae), including a distinctive new subspecies, in southern Peru and Bolivia. *Proc. Biol. Soc. Washington* **106(3)**: 429–435.
Remsen, J.V. ed. (1997a). *Studies in Neotropical Ornithology Honoring Ted Parker*. Ornithological Monographs **48**. American Ornithologists' Union, Washington, D.C.
Remsen, J.V. (1997b). A new genus for the Yellow-shouldered Grosbeak. Pp. 89–90 in: Remsen (1997a).
Remsen, J.V. & Cardiff, S. (1979). First records of the race *scottii* of the Rufous-crowned Sparrow in California. *Western Birds* **10(1)**: 45–46.
Remsen, J.V. & Graves, W.S. (1995a). Distribution patterns and zoogeography of *Atlapetes* brush-finches (Emberizinae) of the Andes. *Auk* **112**: 210–224.
Remsen, J.V. & Graves, W.S. (1995b). Distribution patterns of *Buarremon* brush-finches (Emberizinae) and interspecific competition in Andean birds. *Auk* **112**: 225–236.
Remsen, J.V. & Hunn, E.S. (1979). First records of *Sporophila caerulescens* from Colombia, a probable long-distance migrant from southern South America. *Bull. Brit. Orn. Club* **99**: 24–26.
Remsen, J.V. & Parker, T.A. (1983). Contribution of river-created habitats to bird species richness in Amazonia. *Biotropica* **15**: 223–231.
Remsen, J.V. & Parker, T.A. (1984). Arboreal dead-leaf-searching birds of the Neotropics. *Condor* **86**: 36–41.
Remsen, J.V. & Ridgely, R.S. (1980). Additions to the avifauna of Bolivia. *Condor* **82(1)**: 69–75.
Remsen, J.V. & Traylor, M.A. (1983). Additions to the avifauna of Bolivia. Part 2. *Condor* **85**: 95–98.
Remsen, J.V., Cadena, C.D., Jaramillo, A., Nores, M., Pacheco, J.F., Robbins, M.B., Schulenberg, T.S., Stiles, F.G., Stotz, D.F. & Zimmer, K.J. (2010). A classification of the bird species of South America. South American Classification Committee. American Ornithologists' Union. URL: http://www.museum.lsu.edu/~Remsen/SACCBaseline.html (download 26 August 2010).
Remsen, J.V., Schmitt, C.G. & Schmitt, D.C. (1988). Natural history notes on some poorly known Bolivian birds. Part 3. *Gerfaut* **78(4)**: 363–381.
Remsen, J.V., Traylor, M.A. & Parkes, K.C. (1987). Range extensions for some Bolivian birds (Tyrannidae to Passeridae). *Bull. Brit. Orn. Club* **107**: 6–16.
Renaudier, A., Ingels, J. & Hilty, S.L. (2008). Nesting and general behavior of Hooded Tanager *Nemosia pileata* in French Guiana and Suriname. *Cotinga* **30**: 54–56.
Renfrew, R. & Saavedra, A.M. (2007). Ecology and conservation of Bobolinks (*Dolichonyx oryzivorus*) in rice production regions of Bolivia. *Orn. Neotropical* **18**: 61–73.
Renjifo, L.M. (1991). Discovery of the Masked Saltator in Colombia, with notes on its ecology and behavior. *Wilson Bull.* **103(4)**: 685–690.
Renjifo, L.M. (1999). Composition changes in a Subandean avifauna after long-term forest fragmentation. *Conserv. Biol.* **13**: 1124–1139.
Renjifo, L.M. (2002). *Saltator cinctus*. Pp. 449–452 in: Renjifo *et al.* (2002).
Renjifo, L.M., Franco-Maya, A.M., Amaya-Espinel, J.D., Kattan, G.H. & López-Lanús, B. eds. (2002). *Libro Rojo de Aves de Colombia*. Serie Libros Rojos de Especies Amenazadas de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente, Bogotá, Colombia. In Spanish.
Renner, S.C. (2009). Spatial post-breeding segregation of 1-year and adult Common Bush-tanagers in a Guatemalan cloud forest. *Open Ecol. J.* **2**: 47–51.
Renssen, T.A. (1974). Twelve bird species new for Surinam. *Ardea* **62**: 118–122.
Renwald, J.D. (1977). Effect of fire on Lark Sparrow nesting densities. *J. Range Manage.* **30(4)**: 283–285.
Repenning, M., Rovedder, C.E. & Fontana, C.S. (2010). Another color morph of *Sporophila* seedeater from the *capuchinos* group (Aves, Emberizidae). *Iheringia (Ser. Zool.)* **100(4)**: 369–378.
Restall, R.L. (1970). The Elegant Bunting (*Emberiza elegans*). *Aviculr. Mag.* **76**: 41–46.
Restall, R.L. (1974). Breeding the Pope Cardinal, *Paroaria dominicana*. *Aviculr. Mag.* **80**: 98–104.
Restall, R.L. (1976). The Black-faced Grassquit *Tiaris bicolor*. *Aviculr. Mag.* **83(3)**: 151–159.
Restall, R.L. (2002). Is the Ring-necked Seedeater (*Sporophila insularis*) from Trinidad extinct, or is it a cryptic species widespread in Venezuela? *Occas. Pap. Dept. Life Sci. Univ. West Indies* **11**: 37–44.
Restall, R.L. (2003). Breeding the Black-faced Grassquit *Tiaris bicolor omissa*, with some notes on behaviour. *Aviculr. Mag.* **109(4)**: 174–179.
Restall, R.L. (2005a). Breeding the Yellow-bellied Seedeater *Sporophila nigricollis*. *Aviculr. Mag.* **111(1)**: 14–20.
Restall, R.L. (2005b). Breeding the Sooty Grassquit *Tiaris fuliginosa*, with some observations on comparative behaviour. *Aviculr. Mag.* **111(2)**: 64–74.
Restall, R.L. (2006). The Chestnut-bellied Seed-finch *Oryzoborus angolensis* in the wild and in aviculture. *Aviculr. Mag.* **112(1)**: 10–18.
Restall, R.L. (2009). A long-term study suggests that the Slate-coloured Seedeater *Sporophila schistacea* is both monotypic and polymorphic. *Aviculr. Mag.* **115(4)**: 172–180.
Restall, R.L., Rodner, C. & Lentino, M. (2006). *Birds of Northern South America. An Identification Guide*. Vol. 1. Species accounts. Vol. 2. Plates and Maps. Christopher Helm, London.
Retter, M.L.P. (2010). Sightings [Sonora, Mexico: Greyish Saltator]. *Winging It* **22(4)**: 12.
Revaz, E., Posse, B., Gerber, A., Sierro, A. & Arlettaz, R. (2005). Quel avenir pour le Bruant Ortolan *Emberiza hortulana* en Suisse? *Nos Oiseaux* **52(2)**: 67–82. In French with English summary.
Reynard, G.B. (1969). *Caribbean Bird Songs*. Sound recording (LP). Laboratory of Ornithology, Cornell University, Ithaca, New York.
Reynard, G.B. (1981). *Bird Songs in the Dominican Republic*. Sound recording. Laboratory of Ornithology, Cornell University, Ithaca, New York.
Reynard, G.B. (1982). *Whisper Song of the Stripe-headed Tanager*. Broadsheet **38**. Gosse Bird Club, Jamaica, West Indies.
Reynolds, J.D. & Knapton, R.W. (1984). Nest-site selection and breeding biology of the Chipping Sparrow. *Wilson Bull.* **96(3)**: 488–493.
Reynolds, P.W. (1932). Notes on the birds of Snipe, and the Woodcock Islands, in the Beagle Channel. *Ibis* **Ser. 13, no. 2**: 34–39.
Reynolds, T.D. (1981). Nesting of the Sage Thrasher, Sage Sparrow and Brewer's Sparrow in southeastern Idaho. *Condor* **83(1)**: 61–64.
Rhoads, S.N. (1903). Exit the Dickcissel. A remarkable case of local extinction. *Cassinia* **7**: 17–28.
Ribon, R. & Simon, J.E. (1997). The nest and eggs of the Chestnut-vented Conebill *Conirostrum speciosum* (Temminck, 1824). *Orn. Neotropical* **8**: 71–72.
Rice, J.O. & Thompson, W.L. (1968). Song development in the Indigo Bunting. *Anim. Behav.* **16**: 462–469.
Rice, O.O. (1969). Record of female Cardinals sharing nest. *Wilson Bull.* **81**: 216.
Rich, T.D.G. (1978). Cowbird parasitism of Sage and Brewer's Sparrows. *Condor* **80(3)**: 348.
Rich, T.D.G. (1980a). Nest placement in Sage Thrashers, Sage Sparrows and Brewer's Sparrows. *Wilson Bull.* **92(3)**: 362–368.
Rich, T.D.G. (1980b). Territorial behavior of the Sage Sparrow: spatial and random aspects. *Wilson Bull.* **92(4)**: 425–438.
Rich, T.D.G. (1981). Microgeographic variation in the song of the Sage Sparrow. *Condor* **83(2)**: 113–119.

Rich, T.D.G. (1983a). "Walking-in-line" behaviour in Sage Sparrow territorial encounters. *Condor* **85(4)**: 496–497.
Rich, T.D.G. (1983b). Incomplete songs and associated behavior of Sage Sparrows. *Wilson Bull.* **95(2)**: 281–282.
Rich, T.D.G. (1985a). Directionality of displaying territorial Sage Sparrows: optimal paths? *Anim. Behav.* **33(4)**: 1390–1392.
Rich, T.D.G. (1985b). The organization and structure of Sage Sparrow song: locatability, distance transmission, and contrast. *Murrelet* **66(1)**: 1–10.
Rich, T.D.G. (2002). The short song of Brewer's Sparrow: individual and geographic variation in southern Idaho. *West. North Amer. Nat.* **62(3)**: 288–299.
Rich, T.D.G., Beardmore, C.J., Berlanga, H., and 15 other authors (2004). *Partners in Flight. North American Landbird Conservation Plan*. Cornell Lab of Ornithology, Ithaca, New York.
Richards, D.G. (1979). Recognition of neighbours by associative learning in Rufous-sided Towhees. *Auk* **96(4)**: 688–693.
Richards, D.G. (1981). Alerting and message components in songs of Rufous-sided Towhees. *Behaviour* **76(3/4)**: 223–249.
Richardson, C. (1961). Tricolored Blackbirds nesting in Jackson County, Oregon. *Condor* **63**: 507.
Richardson, D.S. & Bolen, G.M. (1999). A nesting association between semi-colonial Bullock's Orioles and Yellow-billed Magpies: evidence for the predator protection hypothesis. *Behav. Ecol. Sociobiol.* **46**: 373–380.
Richardson, D.S. & Burke, T. (1999). Extra-pair paternity in relation to male age in Bullock's Orioles. *Mol. Ecol.* **8**: 2115–2126.
Richardson, D.S. & Burke, T. (2001). Extrapair paternity and variance in reproductive success related to breeding density in Bullock's Orioles. *Anim. Behav.* **62(3)**: 519–525.
Richardson, M.E. (1984). Aspects of the ornithology of the Tristan da Cunha group and Gough Island. *Cormorant* **12**: 123–201.
Richmond, C.W. (1893). Notes on a collection of birds from eastern Nicaragua and the Río Frío, Costa Rica, with a description of a supposed new trogon. *Proc. US Natl. Mus.* **16**: 470–530.
Richmond, C.W. & Swales, B.H. (1924). Descriptions of three new birds from Gonave Island, Haiti. *Proc. Biol. Soc. Washington* **37**: 105–107.
Richmond, S., Nol, E., Campbell, M. & Burke, D. (2007). Conspecific and interspecific nest reuse by Wood Thrush (*Hylocichla mustelina*). *Northeastern Naturalist* **14(4)**: 629–636.
Richter, K. (1998). Auswirkungen von Pflegemaßnahmen auf den Brutbestand der Heidelerche (*Lullula arborea*) und Zippammer (*Emberiza cia*) in Trockenstandorten von Unterfranken. *Acta Ornithoecol. (Jena)* **4(1)**: 29–39. In German with English summary.
Richter, W. (1984). Nestling survival and growth in the Yellow-headed Blackbird. *Ecology* **65(2)**: 597–608.
Ricklefs, R.E. (1968). Patterns of growth in birds. *Ibis* **110**: 419–451.
Ricklefs, R.E. (1976). Growth rates of birds in the humid New World tropics. *Ibis* **118(2)**: 179–207.
Riddiford, N. & Broome, T. (1983). Identification of first-winter Pallas's Reed Bunting. *British Birds* **76(4)**: 174–182.
Riddington, R. (1995). A Pine Bunting hybrid on Fair Isle. *Birding World* **8(11)**: 430–431.
Ridgely, R.S. (1980). Notes on some rare or previously unrecorded birds in Ecuador. *Amer. Birds* **34**: 242–248.
Ridgely, R.S. & Gaulin, S.J.C. (1980). The birds of Finca Merenberg, Huila Department, Colombia. *Condor* **82**: 379–391.
Ridgely, R.S. & Greenfield, P.J. (2001a). *The Birds of Ecuador*. Vol. 1. Status, distribution and taxonomy. Cornell University Press, Ithaca, New York.
Ridgely, R.S. & Greenfield, P.J. (2001b). *The Birds of Ecuador*. Vol. 2. A field guide. Cornell University Press & Christopher Helm, Ithaca & London.
Ridgely, R.S. & Gwynne, J.A. (1989). *A Guide to the Birds of Panama with Costa Rica, Nicaragua, and Honduras*. 2nd edition. Princeton University Press, Princeton, New Jersey.
Ridgely, R.S. & Tudor, G. (1989). *The Birds of South America*. Vol. 1. The oscine passerines. Oxford University Press & University of Texas Press, Oxford & Austin.
Ridgely, R.S. & Tudor, G. (1994). *The Birds of South America*. Vol. 2. The suboscine passerines. University of Texas Press, Austin, Texas.
Ridgely, R.S. & Tudor, G. (2009). *Field Guide to the Songbirds of South America. The Passerines*. University of Texas Press, Austin, Texas.
Ridgway, R. (1888). Catalogue of a collection of birds made by Mr. Chas. H. Townsend, on islands in the Caribbean Sea and in Honduras. *Proc. US Natl. Mus.* **10**: 572–597.
Ridgway, R. (1899). New species, etc., of American birds. – III. Fringillidae (continued). *Auk* **16**: 35–37.
Ridgway, R. (1901). *The Birds of North and Middle America: a Descriptive Catalogue* [...]. Part 1. Bulletin of the United States National Museum **50**. Government Printing Office, Washington, D.C.
Ridgway, R. (1902). *The Birds of North and Middle America: a Descriptive Catalogue* [...]. Part 2. Bulletin of the United States National Museum **50**. Government Printing Office, Washington, D.C.
Riede, T. & Suthers, R.A. (2009). Vocal tract motor patterns and resonance during constant frequency song: the White-throated Sparrow. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* **195(2)**: 183–192.
Riede, T., Suthers, R.A., Fletcher, N.H. & Blevins, W.E. (2006). Songbirds tune their vocal tract to the fundamental frequency of their song. *Proc. Natl. Acad. Sci. USA* **103**: 5543–5548.
Rimmer, C.C. (1986). Identification of juvenile Lincoln's and Swamp Sparrows. *J. Field Orn.* **57**: 114–125.
Rimmer, C.C., Townsend, J.M., Townsend, A.K., Fernandez, E.M. & Almonte, J. (2005). Avian diversity, abundance, and conservation status in the Macaya Biosphere Reserve of Haiti. *Orn. Neotropical* **16**: 219–230.
Rimmer, C.C., Woolaver, L.G., Nichols, R.K., Fernández, E.M., Latta, S.C. & Garrido, E. (2008). First description of nests and eggs of two Hispaniolan endemic species: Western Chat-tanager (*Calyptophilus tertius*) and Hispaniolan Highland-tanager (*Xenoligea montana*). *Wilson Bull.* **120(1)**: 190–195.
Ringleben, H. (1993). Isländische Schneeammer *Plectrophenax nivalis insulae* für Deutschland nachgewiesen. *Limicola* **7(3)**: 140–141. In German with English summary.
del Rio, C.M. & Eguiarte, L.E. (1987). Bird visitation to *Agave salmiana*: comparisons among hummingbirds and perching birds. *Condor* **89(2)**: 357–363.
Rios, M., Londoño, G. & Biancucci, L. (2008). Notes on birds that follow army ants in the northern Andes. *Orn. Neotropical* **19**: 137–142.
Ríos-Uzcategui, G. (1997). Nuevo registro para el estado Trujillo (Venezuela), y extensión de distribución del Haplospiza Apizarrado (*Haplospiza rustica*) (Aves, Passeriformes, Fringillidae). *BioLlania (Guanare)* **13**: 209–211. In Spanish.
Ripley, S.D. & Bond, G.M. (1966). The birds of Socotra and Abd-el-Kuri. *Smithsonian Misc. Coll.* **151(7)**: 1–37.
Risch, T.S. & Robinson, T.J. (2006). First observation of cavity nesting by a female Blue Grosbeak. *Wilson J. Orn.* **118(1)**: 107–108.
Rising, J.D. (1970). Morphological variation and evolution in some North American orioles. *Syst. Zool.* **19**: 315–351.
Rising, J.D. (1973). Morphological variation and status of the orioles *Icterus galbula*, *I. bullockii*, and *I. abeillei* in the northern Great Plains and in Durango, Mexico. *Can. J. Zool.* **51(12)**: 1267–1273.
Rising, J.D. (1983). The progress of oriole hybridization in Kansas. *Auk* **100(4)**: 885–897.
Rising, J.D. (1987a). Geographic variation in testis size in Savannah Sparrows (*Passerculus sandwichensis*). *Wilson Bull.* **99(1)**: 63–72.
Rising, J.D. (1987b). Geographic variation of sexual dimorphism in size of Savanna Sparrows (*Passerculus sandwichensis*): a test of hypotheses. *Evolution* **41(3)**: 514–524.
Rising, J.D. (1988). Geographic variation in sex ratios and body size in wintering flocks of Savannah Sparrows (*Passerculus sandwichensis*). *Wilson Bull.* **100(2)**: 183–203.
Rising, J.D. (1989). Sexual dimorphism in *Passerculus sandwichensis* as it is. *Evolution* **43(5)**: 1121–1123.
Rising, J.D. (1991). Phenetic variation in Nearctic Emberizinae. Pp. 534–544 in: Bell, B.D., Cossee, R.O., Flux, J.E.C., Heather, B.D., Hitchmough, R.A., Robertson, C.J.R. & Williams, M.J. eds. (1991). *Acta XX Congressus Internationalis Ornithologici*. New Zealand Ornithological Congress Trust Board, Wellington, New Zealand.
Rising, J.D. (1995). Taxonomy and identification of Fox Sparrows. *Birders J.* **4**: 159–166.
Rising, J.D. (1996a). *A Guide to the Identification and Natural History of the Sparrows of the United States and Canada*. Academic Press, London, UK.
Rising, J.D. (1996b). The stability of the oriole hybrid zone in Western Kansas. *Condor* **98(3)**: 658–663.
Rising, J.D. (2001). Geographic variation in size and shape of Savannah Sparrows (*Passerculus sandwichensis*). *Studies Avian Biol.* **23**: 1–65.
Rising, J.D. (2007). Named subspecies and their significance in contemporary ornithology. *Orn. Monogr.* **63**: 45–54.
Rising, J.D. (2010). The many Savannah Sparrows. *Birding (USA)* **42**: 44–55.
Rising, J.D. & Avise, J.C. (1993). Application of genealogical-concordance principles to the taxonomy and evolutionary history of the Sharp-tailed Sparrow (*Ammodramus caudacutus*). *Auk* **110(4)**: 844–856.
Rising, J.D. & Beadle, D.D. (1996). *A Guide to the Identification and Natural History of the Sparrows of the United States and Canada*. Academic Press, San Diego, California.
Rising, J.D. & Flood, N.J. (1998). Baltimore Oriole (*Icterus galbula*). No. **384** in: Poole, A.F. & Gill, F.B. eds. (1998–1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.
Rising, J.D. & Williams, P.L. (1999). Bullock's Oriole (*Icterus bullockii*). No. **416** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 11. The Birds of North America Inc., Philadelphia, Pennsylvania.
Rising, J.D., Jackson, D.A. & Fokidis, H.B. (2009). Geographic variation in plumage pattern and coloration of Savannah Sparows. *Wilson J. Orn.* **121**: 253–264.
Ritchison, G. (1980). The two-voice phenomenon in Vesper Sparrows. *Kentucky Warbler* **56(2)**: 27–30.
Ritchison, G. (1981a). Variation in the songs of Vesper Sparrows *Pooecetes gramineus*. *Amer. Midl. Nat.* **106(2)**: 392–398.
Ritchison, G. (1981b). Distraction behavior in the Black-headed Grosbeak *Pheucticus melanocephalus*. *Inl. Bird Banding* **53(3)**: 49–53.
Ritchison, G. (1982). Singing behavior of the Black-headed Grosbeak, *Pheucticus melanocephalus*, with emphasis on the function of singing by females. *Diss. Abstr. Int. B Sci. Eng.* **42(7)**: 2738.
Ritchison, G. (1983a). Breeding biology of the Black-headed Grosbeak in northern Utah. *Western Birds* **14**: 159–167.
Ritchison, G. (1983b). Possible 'deceptive' use of song by female Black-headed Grosbeaks. *Condor* **85(2)**: 250–251.
Ritchison, G. (1983c). Responses of Black-headed Grosbeaks to songs of conspecifics. *Wilson Bull.* **95(1)**: 132–138.
Ritchison, G. (1983d). The function of singing in female Black-headed Grosbeaks (*Pheucticus melanocephalus*): family-group maintenance. *Auk* **100**: 105–116.
Ritchison, G. (1985a). Variation in the songs of female Black-headed Grosbeaks. *Wilson Bull.* **97(1)**: 47–56.
Ritchison, G. (1985b). Vocalizations of the Black-headed Grosbeak. *Western Birds* **16**: 143–145.
Ritchison, G. (1985c). Responses of neighboring conspecifics to typical and atypical songs of a Rufous-sided Towhee. *J. Field Orn.* **56(3)**: 280–282.
Ritchison, G. (1986). The singing behavior of female Northern Cardinals. *Condor* **88**: 156–159.
Ritchison, G. (1988). Song repertoires and the singing behavior of male Northern Cardinals. *Wilson Bull.* **100**: 583–603.
Ritchison, G. (1997). *Wild Bird Guides: Northern Cardinal*. Stackpole Books, Mechanicsburg, Pennsylvania.
Ritchison, G., Klatt, P.H. & Westneat, D.F. (1994). Mate guarding and extra-pair paternity in Northern Cardinals. *Condor* **96**: 1055–1063.
Ritter, L.V. (1983). Cavity-nesting Brewer's Blackbirds. *Western Birds* **14**: 205.
Rivera, J.H.V., Huerta, M.A.O. & Guerrer, R. (2008). Análisis de la distribución del Colorín Pecho Naranja (*Passerina leclancherii*): una especie endémica de la vertiente del Pacífico mexicano. *Orn. Neotropical* **19(2)**: 265–274. In Spanish.
Rivers, J.W., Jensen, W.E., Kosciuch, K.L. & Rothstein, S.I. (2010). Community-level patterns of host use by the Brown-headed Cowbird (*Molothrus ater*), a generalist brood parasite. *Auk* **127(2)**: 263–273.
Robbins, J.D. & Schnell, G.D. (1971). Skeletal analysis of the *Ammodramus-Ammospiza* grassland sparrow complex: a numerical taxonomic study. *Auk* **88**: 567–590.
Robbins, M.B. (2010). Notes on *Tangara meyerdeschauenseei*. Unpubl.
Robbins, M.B. & Easterla, D.A. (1981). Range expansion of the Bronzed Cowbird with the first Missouri record. *Condor* **83(3)**: 270–272.
Robbins, M.B. & Glenn, G.S. (1988). First description of the nest and eggs of the Moss-backed Tanager (*Buthraupis* [*Bangsia*] *edwardsi*). *Condor* **90**: 947–948.
Robbins, M.B., Braun, M.J., Huddleston, C.J., Finch, D.W. & Milensky, C.M. (2005). First Guyana records, natural history and systematics of the White-naped Seedeater *Dolospingus fringilloides*. *Ibis* **147**: 334–341.
Robbins, M.B., Braun, M.J., Milensky, C.M., Schmidt, B.K., Prince, W., Rice, N.H., Finch, D.W. & O'Shea, B.J. (2007). Avifauna of the upper Essequibo river and Acary Mountains, southern Guyana. *Orn. Neotropical* **18**: 339–368.
Robbins, M.B., Parker, T.A. & Allen, S.E. (1985). The avifauna of Cerro Pirre, Darién, eastern Panama. Pp. 198–232 in: Buckley *et al.* (1985).
Robbins, S.D. (1991). *Wisconsin Birdlife*. The University of Wisconsin Press, Madison, Wisconsin.
Robel, J. (1997). First record of Cretzschmar's Bunting (*Emberiza caesia*) in Austria in the 20th century. *Egretta* **40(1)**: 60–61.
Robert, H. (1971). First record of Field Sparrow in California. *Calif. Birds* **2**: 72.
Roberts, C. & Norment, C.J. (1999). Effects of plot size and habitat characteristics on breeding success of Scarlet Tanagers. *Auk* **116(1)**: 73–82.
Roberts, E.P. & Weigl, P.D. (1984). Habitat preference in the Dark-eyed Junco (*Junco hyemalis*): the role of photoperiod and dominance. *Anim. Behav.* **32(3)**: 709–714.
Roberts, J.B. (1969). Vocalizations of the Rufous-sided Towhee, *Pipilo erythrophthalmus oregonus*. *Condor* **71**: 257–266.
Roberts, T.J. (1992). *The Birds of Pakistan*. Vol. 2. Passeriformes: pittas to buntings. Oxford University Press, Karachi & Oxford.
Roberts, T.S. (1907). A Lapland Bunting tragedy: being an account of a great destruction of these birds during a storm in southwestern Minnesota and northwestern Iowa in March, 1904. *Auk* **24(4)**: 369–377.
Roberts, T.S. (1936). *The Birds of Minnesota*. 2nd edition. University Minnesota Press, Minneapolis, Minnesota.
Robins, C.R. & Heed, W.B. (1951). Bird notes from la Joya de Salas, Tamaulipas. *Wilson Bull.* **63**: 263–270.
Robinson, S.K. (1985a). The Yellow-rumped Cacique and its associated nest pirates. *Orn. Monogr.* **36**: 898–907.
Robinson, S.K. (1985b). Coloniality in the Yellow-rumped Cacique as a defense against nest predators. *Auk* **102**: 506–519.
Robinson, S.K. (1985c). Fighting and assessment in the Yellow-rumped Cacique (*Cacicus cela*). *Behav. Ecol. Sociobiol.* **18**: 39–44.

Robinson, S.K. (1986a). The evolution of social behavior and mating systems in the blackbirds (Icterinae). Pp. 175–200 in: Rubenstein, D. & Wrangham, R.W. eds. (1986). *Ecological Aspects of Social Evolution: Birds and Mammals*. Princeton University Press, Princeton, New Jersey.

Robinson, S.K. (1986b). Three-speed foraging during the breeding cycle of Yellow-rumped Caciques (Icterinae: *Cacicus cela*). *Ecology* **67(2)**: 394–405.

Robinson, S.K. (1986c). Competitive and mutualistic interactions among females in a Neotropical oriole. *Anim. Behav.* **34(1)**: 113–122.

Robinson, S.K. (1986d). Benefits, costs, and determinants of dominance in a polygynous oriole. *Anim. Behav.* **34(1)**: 241–255.

Robinson, S.K. (1986e). Social security for birds. *Nat. Hist. (New York)* **95(3)**: 38–47.

Robinson, S.K. (1988a). Foraging ecology and host relationships of Giant Cowbirds in southeastern Peru. *Wilson Bull.* **100**: 224–235.

Robinson, S.K. (1988b). Anti-social and social behaviour of adolescent Yellow-rumped Caciques (Icterinae: *Cacicus cela*). Anim. Behav. **36(5)**: 1482–1495.

Robinson, S.K. (1997). Birds of a Peruvian oxbow lake. *Orn. Monogr.* **48**: 613–639.

Robinson, S.K., Hoover, J., Herkert, J.R. & Jack, R. (1999). *Ecology and Management of Cowbirds*. University of Texas Press, Austin, Texas.

Robinson, W.D. (1997). Summer Tanager (*Piranga rubra*). No. **248** in: Poole, A.F. & Gill, F.B. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington, D.C. & Philadelphia.

Robson, C.R. (1986). Recent observations on the birds of Xizang and Qinghai provinces, China. *Forktail* **2**: 67–82.

Robson, C.R. (2000). *A Field Guide to the Birds of South-east Asia*. New Holland & Princeton University Press, London & Princeton.

Rocca, M.A. & Sazima, M. (2008). Ornithophilous canopy species in the Atlantic rain forest of south-eastern Brazil. *J. Field Orn.* **79(2)**: 130–137.

Rocha, G. (2006). *Aves del Uruguay: el País de los Pájaros Pintados*. Vol. 2. Banda Oriental, Montevideo, Uruguay. In Spanish.

Rocha, O. & Quiroga, C. (1996). *Aves de la Reserva Nacional de Fauna Andina Eduardo Avaroa*. Museo Nacional de Historia Natural, La Paz, Bolivia. In Spanish.

Roda, M.A. & López-Lanús, B. (2008). The range of Rufous-rumped Seedeater *Sporophila hypochroma* extends to the Pampas region of Argentina, with the first nests of the species. *Cotinga* **30**: 61–62.

Rodenhouse, N.L. & Best, L.B. (1983). Breeding ecology of Vesper Sparrows in corn and soybean fields. *Amer. Midl. Nat.* **110(2)**: 265–275.

Rodenhouse, N.L. & Best, L.B. (1994). Foraging patterns of Vesper Sparrows (*Pooecetes gramineus*) breeding in cropland. *Amer. Midl. Nat.* **131(1)**: 196–206.

Roder, J. (1991). Haltung und Zucht des Zwergkardinals. *Voliere* **14**: 307–309. In German.

Rodgers, R.D. (1983). Reducing wildlife losses to tillage in fallow wheat fields. *Wildl. Soc. Bull.* **11(1)**: 31–38.

Rodrigues, M. & Gomes, H.B. (2004). Range extension for Grey-headed Tanager *Eucometis penicillata* in south-east Brazil. *Bull. Brit. Orn. Club* **124(3)**: 177–184.

Rodrigues, M., Machado, C.G., Alvares, S.M.R. & Galetti, M. (1994). Association of the Black-goggled Tanager (*Trichothraupis melanops*) with flushers. *Biotropica* **26(4)**: 472–475.

Rodríguez-Ferraro, A. (2006). Notes on the behavior of the Olive Oropendola (*Psarocolius yuracares*) during the breeding season. *Orn. Neotropical* **17**: 57–62.

Rodríguez-Ferraro, A. (2008). *Community Ecology and Phylogeography of Bird Assemblages in Arid Zones of Northern Venezuela: Implications for the Conservation of Restricted-range Birds*. PhD thesis, University of Missouri, Saint Louis, Missouri.

Rodríguez-Ferraro, A. & Blake, J.G. (2008). Diversity patterns of bird assemblages in arid zones of northern Venezuela. *Condor* **110(3)**: 405–420.

Rodríguez-Ferraro, A. & Trujillo, A. (2004). Observaciones de la biología reproductiva del Cardenal Coriano (*Cardinalis phoeniceus*) en la Isla de Margarita, Venezuela. *Orn. Neotropical* **15**: 253–256. In Spanish.

Rodríguez-Ferraro, A., García-Amado, M.A. & Bosque, C. (2007). Diet, food preferences, and digestive efficiency of the Grayish Saltator, a partly folivorous passerine. *Condor* **109(4)**: 824–840.

Roe, N.A. & Rees, W.E. (1979). Notes on the Puna avifauna of Azangáro Province, Department of Puno, southern Peru. *Auk* **96**: 475–482.

Roesler, I., Povedano, H., Di Giacomo, A.S. & Spitznagel, O. (2006). La Monterita Canela (*Poospiza ornata*) en la provincia de Entre Ríos, Argentina. *Nuestras Aves* **51**: 34–35. In Spanish.

Rogacheva, E. V.[=H.] (1992). *The Birds of Central Siberia*. Husum Druck- und Verlagsgesellschaft, Husum, Germany.

Rogers, C. (1994). Avian nest success, brood parasitism, and edge-independent reproduction in an Alaskan wetland. *J. Field Orn.* **65**: 433–440.

Rogers, C.M., Smith, J.N.M., Hochachka, W.M., Cassidy, A.L.E.V., Taitt, M.J., Arcese, P. & Schluter, D. (1991). Spatial variation in winter survival of Song Sparrows *Melospiza melodia*. *Ornis Scand.* **22(4)**: 387–395.

Rogers, D.T. & Odum, E.P. (1966). A study of autumnal postmigrant weights and vernal flattening of North American migrants in the tropics. *Wilson Bull.* **78**: 415–433.

Rogers, D.T., Hicks, D.L., Wischusen, E.W. & Parrish, J.R. (1982). Repeats, returns, and estimated flight ranges of some North American migrants in Guatemala. *J. Field Orn.* **53**: 133–138.

Rogers, J. (2005). Identifying McKay's Buntings. *Birding (USA)* **37**: 618–626.

Rohwer, S.A. (1972a). *Systematics and Evolution of Great Plains Meadowlarks, Genus* Sturnella. PhD thesis, University of Kansas, Lawrence, Kansas.

Rohwer, S.A. (1972b). A multivariate assessment of interbreeding between the meadowlarks, *Sturnella*. *Syst. Biol.* **21(3)**: 313–338.

Rohwer, S.A. (1972c). Distribution of meadowlarks in the central and southern Great Plains and the desert grasslands of eastern New Mexico and west Texas. *Trans. Kansas Acad. Sci.* **75(1)**: 1–19.

Rohwer, S.A. (1976). Specific distinctness and adaptive differences in southwestern meadowlarks. *Occas. Pap. Mus. Nat. Hist. Univ. Kansas* **44**: 1–14.

Rohwer, S.A. (1986). A previously unknown plumage of first-year Indigo Buntings and theories of delayed plumage maturation. *Auk* **103(2)**: 281–292.

Rohwer, S.A. & Johnson, M.S. (1992). Scheduling differences of molt and migration for Baltimore and Bullock's Orioles persist in a common environment. *Condor* **94(4)**: 992–994.

Rohwer, S.A. & Manning, J. (1990). Differences in timing and number of molts for Baltimore and Bullock's Orioles: implications to hybrid fitness and theories of delayed plumage maturation. *Condor* **92(1)**: 125–140.

Rohwer, S.A. & Roskaft, E. (1989). Results of dyeing male Yellow-headed Blackbird solid black: implications for the arbitrary identity badge hypothesis. *Behav. Ecol. Sociobiol.* **25**: 39–48.

Rohwer, S.A., Fretwell, S.D. & Niles, D.M. (1980). Delayed maturation in passerine plumages and the deceptive acquisition of resources. *Amer. Naturalist* **115(3)**: 400–437.

Rohwer, S.A., Hobson, K.A. & Rohwer, V.G. (2009). Migratory double breeding in Neotropical migrant birds. *Proc. Natl. Acad. Sci. USA* **106(45)**: 19050–19055.

Rohwer, S.A., Langston, N. & Gori, D. (1996). Body size and harem size in male Red-winged Blackbirds: manipulating selection with sex-specific feeders. *Evolution* **50**: 2049–2065.

Rohwer, S.A., Ricklefs, R.E., Rohwer, V.G. & Copple, M.M. (2009). Allometry of the duration of flight feather molt in birds. *PLoS Biol.* **7(6)**: e1000132.

Rohwer, S.A., Spaw, C.D. & Roskaft, E. (1989). Costs to Northern Orioles of puncture-ejecting parasitic cowbird eggs from their nests. *Auk* **106**: 734–738.

Roitman, G.G., Montaldo, N.H. & Medán, D. (1997). Pollination biology of *Myrrhinium atropurpureum* (Myrtaceae): sweet, fleshy petals attract frugivorous birds. *Biotropica* **29**: 162–168.

Rojas-Nossa, S.V. (2007). Estrategias de extracción de néctar por pinchaflores (Aves: *Diglossa* y *Diglossopis*) y sus efectos sobre la polinización de plantas de los altos Andes. *Orn. Colombiana* **5**: 21–39. In Spanish with English summary.

Rojas-Soto, O.R., Martínez-Meyer, E., Navarro-Sigüenza, A.G., Oliveras de Ita, A., Gómez de Silva, H. & Peterson, A.T. (2008). Modeling distributions of disjunct populations of the Sierra Madre Sparrow. *J. Field Orn.* **79**: 245–253.

Roles, D.G. (1971). Breeding the Thick-billed Euphonia at the Jersey Zoo Park (*Tanagra laniirostris*). *Avicult. Mag.* **77**: 101–102.

Romanov, A.A. & Morozov, V.V. (1993). [On ecology of *Emberiza pusilla* Pallas on Putorana Plateau]. *Byull. Mosk. Obsh. Ispyt. Prir. (Otd. Biol.)* **98(4)**: 28–33. In Russian.

Romero, L.M., Soma, K.K., O'Reilly, K.M., Suydam, R. & Wingfield, J.C. (1998). Hormones and territorial behavior during breeding in Snow Buntings (*Plectrophenax nivalis*): an arctic-breeding songbird. *Horm. Behav.* **33(1)**: 40–47.

Romero-Zambrano, H. (1977). Status taxonomica de *Catamenia oreophila* Todd. *Lozania* **23**: 1–7.

Root, O.M. (1968). Clay-colored Sparrow. Pp. 1186–1208 in: Bent & Austin (1968).

Root, T. (1988a). Energy constraints on avian distributions and abundances. *Ecology* **69**: 330–339.

Root, T. (1988b). Environmental factors associated with avian distributional boundaries. *J. Biogeogr.* **15**: 489–505.

Root, T., Price, J.T., Hall, K.R., Schneider, S.H., Rosenzweig, C. & Pounds, J.A. (2003). Fingerprints of global warming on wild animals and plants. *Nature (London)* **421**: 57–60.

Rosa, A.O. & Agne, C.E. (2010). Primeiro registro documentado da Saíra-sapucaia *Tangara peruviana* (Passeriformes: Thraupidae) para o Rio Grande do Sul. *Atualidades Orn.* **155**: 26. In Portuguese.

Roseberry, J.L. & Klimstra, W.D. (1970). The nesting ecology and reproductive performance of the Eastern Meadowlark. *Wilson Bull.* **82**: 243–267.

Roselaar, C.S. (1995). *Songbirds of Turkey: an Atlas of Biodiversity of Turkish Passserine Birds*. Pica Press, Robertsbridge, UK.

Roselaar, C.S. & Aliabadian, M. (2009). Review of rare birds in Iran, 1860s–1960s. *Podoces* **4(1)**: 1–27.

Roselaar, C.S., Visser, J., Wijker, A. & Castricum, V. (2010). Maskergors bij Castricum in November 2007 en herkenning van ondersoorten. *Dutch Birding* **32(1)**: 1–9. In Dutch.

Rosenberg, G. (1990). Habitat specialization and foraging behavior by birds of Amazonian river islands in northeastern Peru. *Condor* **92**: 427–443.

Rosenberg, G. & Witzmann, J. (1999). Arizona bird committee report, 1974–1996. Part 2. Passerines. *Western Birds* **30**: 94–120.

Rosenberg, K.V., Ohmart, R.D. & Anderson, B.K. (1982). Community organization of riparian breeding birds: response to an annual resource peak. *Auk* **99**: 260–274.

Ross, D.L. & Whitney, B.M. (1995). *Voices of Costa Rican Birds: Caribbean Slope*. CD 2. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York.

Ross, H.A. (1980). The reproductive rates of yearling and older Ipswich Sparrows, *Passerculus sandwichensis princeps*. *Can. J. Zool.* **58(9)**: 1557–1563.

van Rossem, A.J. (1932). On the validity of the San Clemente Island Bell's Sparrow. *Auk* **49**: 490–491.

van Rossem, A.J. (1935). Notes on the forms of *Spizella atrogularis*. *Condor* **37**: 282–284.

van Rossem, A.J. (1945). A distributional survey of the birds of Sonora, Mexico. *Occas. Pap. Mus. Zool. Louisiana State Univ.* **21**: 1–379.

van Rossem, A.J. (1946). Two new races of birds from the lower Colorado River valley. *Condor* **48**: 80–82.

van Rossem, A.J. (1947). A synopsis of the Savannah Sparrows of northwestern Mexico. *Condor* **49**: 97–107.

Rotenberry, J.T., Patten, M.A. & Preston, K.L. (1999). Brewer's Sparrow (*Spizella breweri*). No. **390** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.

Rothschild, W. (1901). On the male of *Dacnis berlepschi*. *Bull. Brit. Orn. Club* **11**: 70–71.

Rothstein, S.I. (1973). Extreme overlap between first and second nestings in the Rose-breasted Grosbeak. *Wilson Bull.* **85**: 242–243.

Rothstein, S.I. (1975). An experimental and teleonomic investigation of avian brood parasitism. *Condor* **77**: 250–271.

Rothstein, S.I. (1977). Cowbird parasitism and egg recognition of the Northern Oriole. *Wilson Bull.* **89**: 21–32.

Rothstein, S.I. (1978a). Geographical variation in the nestling coloration of parasitic cowbirds. *Auk* **95**: 152–160.

Rothstein, S.I. (1978b). Mechanisms of avian egg-recognition: additional evidence for learned components. *Anim. Behav.* **26(3)**: 671–677.

Rothstein, S.I. (1990). A model system for coevolution: avian brood parasitism. *Ann. Rev. Ecol. Syst.* **21**: 481–508.

Rothstein, S.I. (1994). The cowbird's invasion of the Far West: history, causes and consequences experienced by host species. *Studies Avian Biol.* **15**: 301–315.

Rothstein, S.I. (2004). Brown-headed Cowbird – villain of scapegoat? *Birding (USA)* **36(4)**: 374–384.

Rothstein, S.I. & Robinson, S.K. eds. (1998). *Parasitic Birds and their Hosts. Studies in Coevolution*. Oxford University Press, Oxford, UK.

Rothstein, S.I., Yokel, D.A. & Fleischer, R.C. (1986). Social dominance, mating & spacing systems, female fecundity, and vocal dialects in captive & free-ranging Brown-headed Cowbirds. *Curr. Orn.* **3**: 127–185.

Rothstein, S.I., Yokel, D.A. & Fleischer, R.C. (1988). The agonistic and sexual functions of vocalizations of male Brown-headed Cowbirds, *Molothrus ater*. *Anim. Behav.* **36(1)**: 73–86.

Rougès, M. & Blake, J.G. (2001). Tasas de captura y dietas de aves del sotobosque en el Parque Biológico Sierra de San Javier, Tucumán. *Hornero* **16(1)**: 7–15. In Spanish with English summary.

Roux, P., Chakir, N. & Lesne, L. (1990). Étude comparée de la reproduction du Bruant striolé (*Emberiza striolata sahari* Levaillant) dans deux types d'environnement urbain à Marrakech (Maroc). *Bièvre* **11**: 13–20. In French with English summary.

Rowley, J.S. (1962). Nesting of the birds of Morelos, Mexico. *Condor* **64**: 253–272.

Rowley, J.S. (1966). Breeding records of birds of the Sierra Madre del Sur, Oaxaca, Mexico. *Proc. West. Found. Vert. Zool.* **1**: 107–204.

Rowley, J.S. (1984). Breeding records of land birds in Oaxaca, Mexico. *Proc. West. Found. Vert. Zool.* **2(3)**: 76–221.

Roxero-Bixby, L., Maldonado-Ulloa, T. & Bonilla-Carrion, R. (2002). Bosque y población en la Península de Osa, Costa Rica. *Rev. Biol. Trop.* **50**: 585–598. In Spanish.

Rubinic, B. (2002). Black-headed Bunting. *Acrocephalus (Ljubljana)* **23(112)**: 108–109.

Rubolini, D., Moller, A.P., Rainio, K. & Lehikoinen, E. (2007). Intraspecific consistency and geographic variability in temporal trends of spring migration phenology among European bird species. *Climate Res.* **35**: 135–146.

Rubolini, D., Saino, N. & Moller, A.P. (2010). Does migratory behaviour constrain the phenological response of birds to climate change? *Climate Res.* **42**: 45–55.

Rubtsov, A.S. (2007). [The variation of songs in the Yellowhammer (*Emberiza citrinella*) and Pine Bunting (*Emberiza leucocephala*) as an evidence of the population structure and evolutionary history of the species]. *Zoologicheskii Zhurnal* **86(7)**: 863–876. In Russian.

Rudebeck, G. (1958). A new race of the bunting *Fringillaria capensis* (L.) from Angola. *Bull. Brit. Orn. Club* **78**: 129–132.

Rui de Camargo, P. (1995). Criação em gaiola do Canarinho-tipio (*Sicalis luteola luteiventris*). *Atualidades Orn.* **67**: 5. In Portuguese.

Ruíz Gutiérrez, R. (1981). Estudio sobre la nidificación del Zanate *Cassidix mexicanus mexicanus*. *Centzontle* **1(2)**: 105–113. In Spanish.

Runnacles, D. (1933–1940). Field notebooks on an egg collection of breeding birds from Buenos Aires, Argentina. Unpubl. [originals kept at Museo de La Plata, La Plata, Argentina].
Ruschi, A. (1979). *Aves do Brasil*. Vol. 1. Editora Rios, São Paulo. In Portuguese.
Ruschi, A. (1981). *Aves do Brasil*. Vol. 2. Chaves artificiais e analíticas. Editora Rios, São Paulo. In Portuguese.
Russell, P.S. (1951). Florida Cardinal, *Richmondena cardinalis floridanus*, as honey-gatherer. *Auk* **68(4)**: 516.
Russell, S.M. (1964). *A Distributional Study of the Birds of British Honduras*. Ornithological Monographs **1**. American Ornithologists' Union, Washington, D.C.
Russell, S.M. & Monson, G. (1998). *The Birds of Sonora*. University of Arizona Press, Tucson, Arizona.
Ruth, J.M. (2008). Distribution and abundance of breeding Arizona Grasshopper Sparrow (*Ammodramus savannarum ammolegus*) in the southwestern United States: past, present, and future. *Studies Avian Biol.* **37**: 113–124.
Ruthke, P. (1973). Über Eier und Nest von *Zonotrichia albicollis*. *Orn. Mitt.* **25(5)**: 96. In German.
Rutkis, E. (1972). Observaciones acerca de algunas aves y su proceso de nidificatión. *Bol. Soc. Venez. Cienc. Nat.* **29(122/123)**: 432–458. In Spanish.
Rutkowska-Guz, J.M. & Osiejuk, T.S. (2004). Song structure and variation in Yellowhammers *Emberiza citrinella* from western Poland. *Polish J. Ecol.* **52(3)**: 333–345.
Rutledge, J.T. & Chandler, R.S. (1979). Nest-site competition between Red-winged Blackbirds and Great-tailed Grackles. *Auk* **96(4)**: 789.
Rutter, R.J. (1958). Cardinal versus Northern Shrike. *Can. Field-Nat.* **72**: 172.
Ruzic, M. (2005). Rock Bunting *Emberiza cia*. *Acrocephalus (Ljubljana)* **26(124)**: 58.
Ryabitsev, V.K. (1997). [New records of rare and migrant species of birds in Pribaikal]. *Russ. Orn. Zhurnal Ekspress Vypusk* **30**: 8–10. In Russian.
Ryabitsev, V.K. & Shubenkin, V.P. (1986). [Territorial behaviour as a regulator of density and spatial structure of populations of Little Bunting]. Pp. 55–70 in: Danilov, N.N. ed. (1986). [*Regulation of Numbers and Density of Animal Populations of the Sub-Arctic*]. Akademiya nauk SSSR, Urals Science Centre, Sverdlovsk, Russia. In Russian.
Ryabitsev, V.K., Polents, E.A., Alekseeva, N.S., Tyulkin, Y.A. & Tarasov, V.V. (1999). [The timing of passerine bird nesting in the Yamal Peninsula]. *Ekologiya* **3**: 201–205. In Russian.
Ryan, A.G. (1974). An incubation period and a nestling period for the Fox Sparrow. *Can. Field-Nat.* **88**: 230–231.
Ryan, P.G. (2001). Morphological heritability among a hybrid bunting complex: *Nesospiza* at Inaccessible Island. *Condor* **103**: 429–438.
Ryan, P.G. (2007). *Field Guide to the Animals and Plants of Tristan da Cunha and Gough Island*. Pisces Publications, Newbury, UK.
Ryan, P.G. (2008). Taxonomic and conservation implications of ecological speciation in *Nesospiza* buntings at Tristan da Cunha. *Bird Conserv. Int.* **18**: 30–39.
Ryan, P.G. & Cuthbert, R.J. (2008). The biology and conservation status of the Gough Bunting *Rowettia goughensis*. *Bull. Brit. Orn. Club* **128**: 242–253.
Ryan, P.G. & Moloney, C.L. (2002). Breeding behaviour, clutch size and egg dimensions of *Nesospiza* buntings at Inaccessible Island, Tristan da Cunha. *Ostrich* **73**: 52–58.
Ryan, P.G., Bloomer, P., Moloney, C.L., Grant, T. & Delport, W. (2007). Ecological speciation in South Atlantic island finches. *Science (Washington, D.C.)* **315**: 1420–1423.
Ryan, P.G., Cooper, J., Stutterheim, C.J. & Loutit, R. (1984). An annotated list of the birds of the Skeleton Coast Park. *Madoqua* **14**: 79–90.
Ryan, P.G., Moloney, C.L. & Hudon, J. (1994). Colour variation and hybridization among *Nesospiza* buntings on Inaccessible Island, Tristan da Cunha. *Auk* **111**: 314–327.
Ryan, P.G., Porter, R.F., Rose, B. & Suleiman, A.S. (2009). Juvenile plumage of the Socotra Bunting *Emberiza socotrana*. *Sandgrouse* **31**: 109–111.
Rymkevich, T.A. (1976). [The formation of juvenal plumage and post juvenal moult in *Emberiza rustica* Pall.]. *Zoologicheskii Zhurnal* **55(11)**: 1695–1704. In Russian.
Rymkevich, T.A. (1979). [Material on the ecology of Rustic Bunting (*Emberiza rustica* Pall.) in Leningrad region]. *Vest. Leningr. Univ. (Ser. Biol.)* **1979(1)**: 37–47. In Russian.
Ryttman, H., Susanna, K. & Hall-Karlsson, S. (2009). Brood size of twelve farmland bird species in Sweden during 1962–2001. *Ornis Svecica* **19(1)**: 3–12.
Ryves, B.H. & Ryves, [I.] (1934a). The breeding-habits of the Corn-bunting as observed in North Cornwall: with special reference to its polygamous habit. *British Birds* **28**: 2–26.
Ryves, B.H. & Ryves, [I.] (1934b). Supplementry notes on the breeding-habits of the Corn-bunting as observed in North Cornwall in 1934. *British Birds* **28**: 154–164.
Ryzhanovsky, V.N. (1986). [Moulting in the Little Bunting (*Emberiza pusilla*)]. *Zoologicheskii Zhurnal* **65(7)**: 1041–1050. In Russian.
Ryzhanovsky, V.N. (1988). [Determination of postjuvenile molting terms and rates in Little Bunting (*Emberiza pusilla* Pall.) in the Subarctic]. *Ekologiya* **4**: 60–64. In Russian.
Sabel, K. (1981). Erstzucht des Braunkehlpfäffchens (*Sporophila telasco*). *Gefiederte Welt* **105(11)**: 204–206. In German.
Sabine, W.S. (1952). Sex displays of the Slate-colored Junco, *Junco hyemalis*. *Auk* **69**: 313–314.
Sabo, S.R. & Holmes, R.T. (1983). Foraging niches and the structure of forest bird communities in contrasting montane habitats. *Condor* **85**: 121–138.
Sackl, P. & Sackl, T.P. (2008). Some notes on the winter diet and feeding behaviour of the Rock Bunting *Emberiza cia* in southern Montenegro. *Acrocephalus (Ljubljana)* **29(137)**: 108–109.
Sæther, B.E. & Engen, S. (2010). Population consequences of climate change. Pp. 191–212 in: Møller *et al.* (2010).
Sæther, B.E., Engen, S., Grøtan, V., and 12 other authors (2007). The extended Moran effect and large-scale synchronous fluctuations in the size of Great Tit and Blue Tit populations. *J. Anim. Ecol.* **76**: 315–325.
Sæther, B.E., Engen, S., Møller, A.P., and 14 other authors (2003). Climate variation and regional gradients in population dynamics of two hole-nesting passerines. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **270**: 2397–2404.
Sæther, B.E., Engen, S., Møller, A.P., and 14 other authors (2005). Time to extinction of bird populations. *Ecology* **86**: 693–700.
Sæther, B.E., Sutherland, W.J. & Engen, S. (2004). Climate influences on avian population dynamics. Pp. 185–209 in: Møller *et al.* (2004).
Sæther, B.E., Tufto, J., Engen, S., Jerstad, K., Røstad, O.W. & Skåtan, J.E. (2000). Population dynamical consequences of climate change for a small temperate songbird. *Science (Washington, D.C.)* **287**: 854–856.
Sage, B.L. (1976). The breeding distribution of Smith's Longspur in Alaska. *Condor* **78(1)**: 116–117.
Sage, R., Cunningham, M., Haughton, A.J., Mallott, M.D., Bohan, D.A., Riche, A. & Karp, A. (2010). The environmental impacts of biomass crops: use by birds of *Miscanthus* in summer and winter in southwestern England. *Ibis* **152(3)**: 487–499.
Sagitov, A.K., Levitskaya, E.M. & Kalushina, M.V. (1966). [Materials on biology of the Red-headed Bunting]. *Nauchn. Trudy Samarkand. Univ.* **156**: 60–62. In Russian.
Saino, N., Rubolini, D., Jonzén, N., Ergon, T., Montemaggiori, A., Stenseth, N.C. & Spina, F. (2007). Temperature and rainfall anomalies in Africa predict timing of spring migration in trans-Saharan migratory birds. *Climate Res.* **35**: 123–134.
Saino, N., Rubolini, D., Lehikoinen, E., Sokolov, L.V., Bonisoli-Alquati, A., Ambrosini, R., Boncoraglio, G. & Møller, A.P. (2009). Climate change effects on migration phenology may mismatch brood parasitic cuckoos and their hosts. *Biol. Letters (London)* **5(4)**: 539–541.
Saino, N., Szép, T., Romano, M., Rubolini, D., Spina, F. & Møller, A.P. (2004). Ecological conditions during winter predict arrival date at the breeding quarters in a trans-Saharan migratory bird. *Ecol. Letters* **7**: 21–25.
Salaman, P.G.W., Cuadros, T., Jaramillo, J.G. & Weber, W.H. (1990). *Lista de Chequeo de las Aves de Colombia*. Sociedad Antioqueña de Ornitología, Medellín, Colombia. In Spanish.
Salaman, P.G.W., Dávalos, L. & Kirwan, G.M. (1998). First breeding records of White-rimmed Brushfinch *Atlapetes leucopis* with ecological notes. *Cotinga* **9**: 24–26.
Salaman, P.G.W., Donegan, T.M. & Caro, D. (2008). Checklist to the birds of Colombia 2008. Listado de Aves de Colombia 2008. *Conserv. Colombiana* **5**: 1–81. In Spanish and English.
Salaman, P.G.W., Donegan, T.M. & Cuervo, A.M. (1999). Ornithological surveys in Serranía de los Churumbelos. *Cotinga* **12**: 29–39.
Salaman, P.G.W., Donegan, T.M., Cuervo, A.M. & Ochoa, J.M. (2001). Biodiversity studies: birds. Pp. 11–17 in: Salaman, P.G.W. & Donegan, T.M. eds. (2001). *Presenting the First Biological Assessment of Serranía de San Lucas*. Colombian EBA Project Report Series **3**. Fundación ProAves, Santa Fé de Bogotá, Colombia. 36 pp.
Salaman, P.G.W., Stiles, F.G., Bohórquez, C.I., Álvarez-Rebolledo, M., Umaña, A.M., Donegan, T.M. & Cuervo, A.M. (2002). New and noteworthy bird records from the east slope of the Andes of Colombia. *Caldasia* **24(1)**: 157–189.
Salathé, T. (1979). Beobachtungen zur Ökologie und Ethologie von Zaunammern (*Emberiza cirlus*) an einem Überwinterungsplatz bei Basel. *Orn. Beob.* **76(5)**: 247–256. In German with French summary.
Salewski, V., Hochachka, W.M. & Fiedler, W. (2010). Global warming and Bergmann's rule: do central European passerines adjust their body size to rising temperatures? *Oecologia (Berlin)* **162**: 247–260.
Salewski, V., Rainey, H. & Bairlein, F. (2001). Have birds shifted their range limits southwards in Cote d'Ivoire, West Africa? *Bull. Afr. Bird Club* **8**: 117–120.
Salgado, A.C., Rodrigues, E.A. & Antunes, A.Z. (2008). Comércio ilegal de avifauna na Região Metropolitana de São Paulo. *Inst. Florestal Sér. Reg. São Paulo* **36**: 41–47. In Portuguese.
Salgado-Ortiz, J., Figueroa-Esquivel, E.M., Larios-Guzmán, S. & Robertson, R.J. (2001). Descriptions of nests and eggs of the Green-backed Sparrow and the Grey-throated Chat from the Yucatan Peninsula, Mexico. *Wilson Bull.* **113(3)**: 328–331.
Salinas, L.M. (2000). Avistamiento de *Pheucticus aureoventris* (Passeriformes, Emberizidae) en la desembocadura del Río Lluta, I región de Chile. *Bol. Chileno Orn.* **7**: 37. In Spanish.
Salomonsen, F. (1950). *The Birds of Greenland*. Ejnar Munksgaard, Copenhagen.
Salt, G.W. (1957). An analysis of avifaunas in the Teton Mountains and Jackson Hole, Wyoming. *Condor* **59**: 373–393.
Salt, W.R. (1966). A nesting study of *Spizella pallida*. *Auk* **83**: 274–281.
Salt, W.R. & Salt, J.R. (1976). *The Birds of Alberta with their Ranges in Saskatchewan and Manitoba*. Hurtig Publishers, Edmonton, Alberta.
Salvador, S.A. (1983). Parasitismo de cría del Renegrido (*Molothrus bonariensis*) en Villa María, Córdoba, Argentina (Aves: Icteridae). *Hist. Nat., Corrientes* **3(16)**: 149–158. In Spanish with English summary.
Salvador, S.A. (1984). Estudio de parasitismo de cría del Renegrido (*Molothrus bonariensis*) en Calandria (*Mimus saturninus*), en Villa María, Córdoba. *Hornero* **12(3)**: 141–149. In Spanish.
Salvador, S.A. & Narosky, S. (1984). Nuevos nidos de aves argentinas. *Hornero* **12(2)**: 134–137. In Spanish with English summary.
Salvador, S.A. & Salvador, L.A. (1986). Nota sobre la reproducción del Misto (*Sicalis luteola*) en Córdoba, Argentina. *Hornero* **12(4)**: 275–280. In Spanish with English summary.
Salvadori, A. (1999). Longevity record for Chipping Sparrow. *North Amer. Bird Bander* **24(3)**: 74.
Salvin, O. (1870). On some collections of birds from Veragua. Part 2. *Proc. Zool. Soc. London* **1870(2)**: 175–219.
Salvin, O. & Godman, F.D. (1883). *Biológia Centrali-Americana: Aves*. Vol. 1. Published privately, London. In English with taxonomic descriptions in Latin.
Samuelson, G.A. (1980). Northern Cardinals feeding on flying termites. *Elepaio* **40**: 157.
Sánchez, B., Navarro, N., Oviedo, R., Peña, C., Hernández, A., Reyes, E., Blanco, P., Sánchez, R. & Herrera, A. (2003). Composición y abundancia de las aves en tres formaciones vegetales de la altiplanicie de Nipe, Holguín, Cuba. *Orn. Neotropical* **14(2)**: 215–231. In Spanish with English summary.
Sánchez, C. (2005). First description of the nest and eggs of the Slaty Finch (*Haplospiza rustica*) and observations on song and breeding behavior. *Orn. Neotropical* **16**: 493–501.
Sánchez, J.E. & Campos Ramírez, R.G. (1988). Un nuevo registro de aves para Costa Rica, Tangara Aliamarilla (*Thraupis abbas*: Emberizidae). *Brenesia* **25/26**: 327–328. In Spanish.
Sánchez, J.E., Naoki, K. & Zook, J. (1998). New information about Costa Rican birds. *Orn. Neotropical* **9(1)**: 99–101.
Sánchez, O. (2005). Aves del área urbana de Toluca, Estado de México. *Vertebrata Mexicana* **16**: 1–10. In Spanish with English summary.
Sánchez, S., Vaclav, R. & Prokop, P. (2009). An inter-regional approach to intraspecific variation in habitat association: Rock Buntings *Emberiza cia* as a case study. *Ibis* **151(1)**: 88–98.
Sánchez-González, L.A. & Navarro-Sigüenza, A.G. (2009). History meets ecology: a geographical analaysis of ecological restriction in the Neotropical humid montane forests avifaunas. *Divers. Distr.* **15(1)**: 1–11.
Sánchez-González, L.A., Navarro-Sigüenza, A.G., Peterson, A.T. & García-Moreno, J. (2007). Taxonomy of *Chlorospingus ophthalmicus* in Mexico and northern Central America. *Bull. Brit. Orn Club* **127(1)**: 34–49.
Sánchez-Pérez, J.E. & Hernández-Esquivel, D.A. (1990). El nido y huevos de *Acanthidops bairdii* (Emberizidae). *Brenesia* **34**: 155–157. In Spanish with English summary.
Sandberg, R. & Pettersson, J. (1996). Magnetic orientation of Snow Buntings (*Plectrophenax nivalis*), a species breeding in the High Arctic: passage migration through temperate-zone areas. *J. Exper. Biol.* **199(9)**: 1899–1905.
Sandberg, R., Backman, J. & Ottosson, U. (1998). Orientation of Snow Buntings (*Plectrophenax nivalis*) close to the magnetic North Pole. *J. Exper. Biol.* **201(12)**: 1859–1870.
Sandercock, B.K. & Jaramillo, A. (2002). Annual survival rates of wintering sparrows: assessing demographic consequences of migration. *Auk* **119**: 149–165.
Sandercock, B.K., Hewett, E.L. & Kosciuch, K.L. (2008). Effects of experimental cowbird removals on brood parasitism and nest predation in a grassland songbird. *Auk* **125(4)**: 820–830.
Sanderson, F.J., Donald, P.F., Pain, D.J., Burfield, I.J. & van Bommel, F.P.J. (2006). Long-term population declines in Afro-Palearctic migrant birds. *Biol. Conserv.* **131(1)**: 93–105.
Sanderson, J.G. (2000). Testing ecological patterns. A well-known algorithm from computer science aids the evaluation of species distribution. *Amer. Sci.* **88**: 332–339.
Sandoval, L. & Gallo, A. (2009). Description of the nest and eggs of the Black-cheeked Ant Tanager (*Habia atrimaxillaris*). *Wilson J. Orn* **121(3)**: 635–637.
Sandoval, L., Sánchez, C., Biamonte, E., Zook, J.R., Sánchez, J.E., Martínez, D., Loth, D. & O'Donahoe, J. (2010). Recent records of new and rare bird species in Costa Rica. *Bull. Brit. Orn. Club* **130(4)**: 237–245.
Santos, E. (1948). *Pássaros do Brazil*. F. Briguiet, Rio de Janeiro. In Portuguese.
Santos, E.S.A., Maia, R. & Macedo, R.H. (2009). Condition-dependent resource value affects male-male competition in the Blue-black Grassquit. *Behav. Ecol.* **20(3)**: 553–559.
Santos, M.P.D., Cerqueira, P.V. & dos Santos Soares, L.M. (2010). Avifauna em seis localidades no Centro Sul do Estado do Maranhão, Brasil. *Ornithologia (CEMAVE)* **4(1)**: 49–65. In Portuguese with English summary.
dos Santos Alves, M.A. & Cavalcanti, R.B. (1990). Ninhos, ovos e crescimento de filhotes de *Neothraupis fasciata*. *Ararajuba* **1**: 91–94. In Portuguese.
Sanz, J.J. (2002). Climate change and breeding parameters of Great and Blue Tits throughout the Western Palaearctic. *Global Change Biol.* **8**: 409–422.
Sargent, S. (1993). Nesting biology of the Yellow-throated Euphonia: Large clutch size in a Neotropical frugivore. *Wilson Bull.* **105(2)**: 285–300.

Sarmiento, F.O. (2005). Ethnoecology of the tropical Andes: avian indicators of landscape changes in highland Ecuador. *Pirineos* **160**: 87–119.
Sarmiento, F.O. (2010). The lapwing in Andean ethnoecology: proxy for landscape transformation. *Geograph. Rev.* **100(2)**: 229–245.
Sassi, M. (1939). Die Vögel der österreichischen Costa-Rica-Expedition (Zweiter Teil). *Temminckia* **4**: 135–222. In German.
Sato, A., O'hUigin, C., Figueroa, F., Grant, P.R., Grant, B.R., Tichy, H. & Klein, J. (1999). Phylogeny of Darwin's finches as revealed by mtDNA sequences. *Proc. Natl. Acad. Sci. USA* **96**: 5101–5106.
Sato, A., Tichy, H., O'hUigin, C., Grant, P.R., Grant, B.R. & Klein, J. (2001). On the origin of Darwin's finches. *Mol. Biol. Evol.* **18(3)**: 299–311.
Sauer, J.R., Hines, J.E. & Fallon, J. (2008). The North American breeding bird survey: results and analysis 1966–2007. Version 5.15.2008. *United States Geological Survey Patuxent Wildlife Research Center, Laurel, Maryland.* URL: http://www.mbr-pwrc.usgs.gov/bbs (download 16 August 2010).
Sauer, J.R., Hines, J.E., Gough, G., Thomas, I. & Peterjohn, B.G. (1997). *The North American Breeding Bird Survey: Results and Analysis, version 96.3.* Patuxent Wildlife Research Center, Laurel, Maryland.
Saunders, A.A. (1922). The song of the Field Sparrow (*Spizella pusilla*). *Auk* **39**: 386–399.
Savage, H. & Dick, J.A. (1969). Fowl pox in Cassin's Sparrow, *Aimophila cassinii*. *Condor* **71**: 71–72.
Sawjalow, E.W. & Tabatschischin, W.G. (2006). Verbreitungsdynamik der Braunkopfammer *Emberiza bruniceps* im Norden des Niederwolgagebietes. *Orn. Mitt.* **58(3)**: 101–103. In German.
Sazima, I. (2008). Dancing in the rain: swarms of winged termites congregate a varied bird assemblage at an urban backyard in southeastern Brazil. *Rev. Bras. Orn.* **16(4)**: 402–405.
Sazima, I. & Marques, O.A.V. (2007). A reliable customer: hunting site fidelity by a actively foraging neotropical colubrid snake. *Herpetol. Bull.* **99**: 36–38.
Sazima, I. & Sazima, M. (2007). Petiscos florais: pétalas de *Acca sellowiana* (Myrtaceae) como fonte alimentar para aves em área urbana no Sul do Brasil. *Biota Neotropica* **7(2)**: 1–6. In Portuguese.
Sazima, I., Buzato, S. & Sazima, M. (1993). The bizarre inforescence of *Norantea brasiliensis* (Marcgraviaceae): visits of hovering and perching birds. *Bot. Acta* **106**: 507–513.
Sazima, M. & Sazima, I. (1999). The perching bird *Coereba flaveola* as a co-pollinator of bromeliad flowers in southeastern Brazil. *Can. J. Zool.* **77**: 47–51.
Scamel, K.M. (1970). Breeding the Lemon-rumped Tanager (*Ramphocelus icteronotus*). *Avicult. Mag.* **76**: 216–219.
Schaefer, H.M., Schmidt, V. & Bairlein, F. (2003). Discrimination abilities for nutrients: which difference matters for choosy birds and why? *Anim. Behav.* **65(3)**: 531–541.
Schaefer, V.H. (1976). Geographic variation in the placement and structure of oriole nests. *Condor* **78**: 443–448.
Schäfer, E. (1938). Ornithologische Ergebnisse zweier Forschungsreisen nach Tibet. *J. Orn.* **86** (Suppl.): 1–349. In German.
Schäfer, E. (1953). Contribution to the life history of the Swallow-tanager. *Auk* **70**: 440–460.
Schäfer, E. (1957). Les Conotos. Étude comparative de *Psarocolius angustifrons* et *Psarocolius decumanus*. *Bonn. Zool. Beitr.* **8** (Suppl.): 1–148. In French.
Schäfer, E. (1984). Icterids. Pp. 396–401 in: Grzimek *et al.* (1984).
Schäfer, E. (1986). Zur Biologie des Krähenstirnvogels (*Psarocolius decumanus*) und des Breithaubenstirnvogels (*Psarocolius angustifrons*). *Zool. Garten* **56(3)**: 232–240. In German.
Schäfer, E. & Meyer de Schauensee, R. (1939). Zoological results of the second Dolan expedition to western China and eastern Tibet, 1934–1936. *Proc. Acad. Nat. Sci. Philadelphia* **90**: 185–260.
Schäfer, E. & Phelps, W.H. (1954). Las aves del Parque Nacional "Henri Pittier" (Rancho Grande) y sus funciónes ecológicas. *Bol. Soc. Venez. Cienc. Nat.* **16**: 1–171. In Spanish.
Schaldach, W.J. (1963). The avifauna of Colima and adjacent Jalisco, Mexico. *Proc. West. Found. Vert. Zool.* **1**: 1–10.
Schaldach, W.J. (1973). Further notes on the avifauna of Colima and adjacent Jalisco, Mexico. *An. Inst. Biol. Univ. Nac. Aut. Mex. (Ser. Zool.)* **40(2)**: 299–316.
Scharf, W.C. (2005). New westward breeding records for Eastern Towhees in central Nebraska. *Nebraska Bird Rev.* **73(1)**: 26–28.
Scharf, W.C. & Kren, J. (1997). Orchard Oriole (*Icterus spurius*). No. **255** in: Poole, A.F. & Gill, F.B. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington D.C. & Philadelphia, Pennsylvania.
Schartz, R.L. & Zimmerman, J.L. (1971). The time and energy budget of the male Dickcissel (*Spiza americana*). *Condor* **73**: 65–76.
Schepers, F., Rutten, J. & Hustings, F. (1992). De Grauwe Gors, een verdwijnende Broedvogel in Belgisch en Nederlands Limburg? *Limburgse Vogels* **3(1)**: 8–16. In Dutch.
Schiegg, K., Eger, M. & Pasinelli, G. (2007). Nest predation in Reed Buntings *Emberiza schoeniclus*: an experimental study. *Ibis* **149(2)**: 365–373.
Schifter, H. (1984). Cardinals. Pp. 366–370 in: Grzimek, B., Meise, W., Niethammer, G. & Steinbacher, J. eds. (1984). *Grzimek's Animal Life Encyclopedia*. Vol. 9. Birds, 3. English edition. Van Nostrand Reinhold Company, New York.
Schild, U. (1998). Beobachtungen bei der Zucht von Purpurkronfinken. *Gefiederte Welt* **122(7)**: 254–255. In German.
Schill, K.L. & Yahner, R.H. (2009). Nest-site selection and nest survival of early successional birds in central Pennsylvania. *Wilson J. Orn.* **121(3)**: 476–484.
Schlatter, R.P. & Vergara, P. (2005). Magellanic Woodpecker (*Campephilus magellanicus*) sap feeding and its role in the Tierra del Fuego forest bird assemblage. *J. Orn.* **146**: 188–190.
Schlegel, R. (1920). Bemerkungen über die Eier einiger zentralasiatischer Arten. *Zs. Oologie (Neumark)* **25**: 29–35. In German.
Schluter, D. (1982a). Seed and patch selection by Galápagos ground finches: relation to foraging efficiency and food supply. *Ecology* **63(4)**: 1106–1120.
Schluter, D. (1982b). Distributions of Galápagos ground finches along an altitudinal gradient: the importance of food supply. *Ecology* **63(5)**: 1504–1517.
Schluter, D. (1984). Feeding correlates of breeding and social organization in two Galápagos finches. *Auk* **101(1)**: 59–68.
Schluter, D. (1986). Character displacement between distantly related taxa? Finches and bees in the Galápagos. *Amer. Naturalist* **127(1)**: 95–102.
Schluter, D. & Grant, P.R. (1982). The distribution of *Geospiza difficilis* in relation to *G. fuliginosa* in the Galápagos Islands: tests of three hypotheses. *Evolution* **36(6)**: 1213–1226.
Schluter, D. & Grant, P.R. (1984). Ecological correlates of morphological evolution in a Darwin's finch *Geospiza difficilis*. *Evolution* **38(4)**: 856–869.
Schluter, D. & Smith, J.N.M. (1986). Genetic and phenotypic correlations in a natural population of Song Sparrows. *Biol. J. Linn. Soc.* **29(1)**: 23–36.
Schluter, D., Price, T.D. & Grant, P.R. (1985). Ecological character displacement in Darwin's finches. *Science (Washington, D.C.)* **227**: 1056–1059.
Schmid, R. (1975). Erfolgreiche Jungenaufzucht beim Graukardinal (*Paroaria coronata*). *Gefiederte Welt* **96(9)**: 167–168. In German.
Schmidt, E. & Hüppop, K. (2007). Erstbeobachtungen und Sangesbeginn von 97 Vogelarten in den Jahren 1963 bis 2006 in einer Gemeinde im Landkreis Parchim (Mecklenburg-Vorpommern). *Vogelwarte* **45(1)**: 27–58. In German with English summary.
Schmitt, C.G. & Schmitt, D.C. (1987). Extensions of range of some Bolivian birds. *Bull. Brit. Orn. Club* **107(3)**: 129–134.
Schmitz, P. & Steiner, F. (2006). Autumn migration of Reed Buntings *Emberiza schoeniclus* in Switzerland. *Ringing & Migration* **23(1)**: 33–38.
Schmitz, P., Steiner, F. & Kestenholz, M. (2007). Analyse des données suisses de reprises du Bruant des Roseaux *Emberiza schoeniclus*. *Nos Oiseaux* **54(3)**: 131–138. In French.
Schnase, J.L., Grant, W.E., Maxwell, T.C. & Leggett, J.J. (1991). Time and energy budgets of Cassin's Sparrow (*Aimophila cassinii*) during the breeding season: evaluation through modelling. *Ecol. Modelling* **55(3/4)**: 285–319.
Schneider, K.J. (1981). Age determination by skull pneumatization in the Field Sparrow. *J. Field Orn.* **52(1)**: 57–59.
Schneider, R. (1998). Untersuchungen zur Nistplatzwahl der Hausammer (*Emberiza striolata sahari*) in Südtunesien. *Acta Ornithoecol. (Jena)* **4(1)**: 47–52. In German with English summary.
Schneider, R. (2005). Notes on the distribution of House Bunting *Emberiza striolata* in Tunisia. *Bull. Afr. Bird Club* **12**: 14–17.
Schoepf, D. ed. (1985). *L'Art de la Plume. Brésil*. Muséum National d'Histoire Naturelle & Musée d'Ethnographie de Genève, Paris & Geneva.
Scholte, P. (1994). The birds of Wadi Rima, a permanently flowing mountain wadi in western Yemen. *Sandgrouse* **14**: 93–108.
Schondube, J.E. & del Rio, C.M. (2003). The flowerpiercers' hook: an experimental test of an evolutionary trade-off. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **270(1511)**: 195–198.
Schondube, J.E. & del Rio, C.M. (2004). Sugar and protein digestion in flowerpiercers and hummingbirds: a comparative test of adaptive convergence. *J. Comp. Physiol. B Biochem. Syst. Environm. Physiol.* **174(3)**: 263–273.
Schondube, J.E., Santana, C. & Ruán-Tejeda, I. (2003). Biannual cycles of the Cinnamon-bellied Flowerpiercer. *Biotropica* **35(2)**: 250–261.
Schönwetter, M. & Meise, W. (1981). *Handbuch der Oologie*. Vol. 3(30–33). Passeriformes 2. Akademie-Verlag, Berlin. In German.
Schönwetter, M. & Meise, W. (1982). *Handbuch der Oologie*. Vol. 3(34). Passeriformes 2. Akademie-Verlag, Berlin. In German.
Schook, D.M., Collins, M.D., Jensen, W.E., Williams, P.J., Bader, N.E. & Parker, T.H. (2008). Geographic patterns of song similarity in the Dickcissel (*Spiza americana*). *Auk* **125(4)**: 953–964.
Schram, B. (2009). Juvenal plumage of the Rufous-crowned Sparrow. *Western Birds* **40(4)**: 310–312.
Schroeder, M.H. (1972). Vesper Sparrow nests abandoned after snow. *Wilson Bull.* **84(1)**: 98–99.
Schubart, O., Aguirre, A.C. & Sick, H. (1965). Contribuição para o conhecimento da alimentação das aves Brasileiras. *Arq. Zool. Est. São Paulo* **12**: 95–249. In Portuguese.
Schuchmann, K.L. (1986). Zur Biologie des Bananaquit. *Trochilus* **7(1)**: 25–27. In German.
Schueller, G.H. (2000). Venezuela: Audubon's Ricebird Alliance. URL: http://www.audubonmagazine.org/auduboninaction/action0009.html#imposer (download 16 August 2010).
Schulenberg, T.S. (1985). An intergeneric hybrid conebill (*Conirostrum* × *Oreomanes*) from Peru. Pp. 954–974 in: Buckley *et al.* (1985).
Schulenberg, T.S. (1987). Observations on two rare birds, *Upucerthia albigula* and *Conirostrum tamarugense*, from the Andes of southwestern Peru. *Condor* **89(3)**: 654–658.
Schulenberg, T.S. (2000a). *Voices of Andean Birds*. Vol. 1. Birds of the hill forest of southern Peru and Bolivia. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York.
Schulenberg, T.S. (2000b). *Voices of Andean Birds*. Vol. 2. Birds of the cloud forest of southern Peru and Bolivia. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York.
Schulenberg, T.S. (2000c). *Voices of Amazonian Birds*. Vol. 1. Birds of the rainforests of southern Peru and Bolivia. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York.
Schulenberg, T.S. & Binford, L.C. (1985). A new species of tanager (Emberizidae, Thraupinae, *Tangara*) from southern Peru. *Wilson Bull.* **97**: 413–420.
Schulenberg, T.S. & Gill, F. (1987). First description of the nest of the Olive Finch, *Lysurus castaneiceps*. *Condor* **89**: 673–574.
Schulenberg, T.S. & Parker, T.A. (1981). Status and distribution of some northwest Peruvian birds. *Condor* **83**: 209–216.
Schulenberg, T.S. & Plenge, M.A. (1980). The type locality and taxonomy of *Anisognathus flavinucha somptuosus*. *Bull. Brit. Orn. Club* **100**: 147–149.
Schulenberg, T.S. & Remsen, J.V. (1982). Eleven bird species new to Bolivia. *Bull. Brit. Orn. Club* **102(2)**: 52–57.
Schulenberg, T.S., Stotz, D.F., Lane, D.F., O'Neill, J.P. & Parker, T.A. (2007). *Birds of Peru*. Princeton University Press, Princeton, New Jersey.
Schulenberg, T.S., Stotz, D.F., Lane, D.F., O'Neill, J.P. & Parker, T.A. (2010). *Birds of Peru*. Revised edition. Princeton University Press, Princeton, New Jersey.
Schuphan, I. (2011a). Habitat-Strukturen und populationsdynamische Parameter einer Population der Zippammer (*Emberiza cia*): Nutzbare Basisdaten für zukünftige Zippammer-Managementpläne. *Vogelwarte* **49(2)**: 65–74. In German with English summary.
Schuphan, I. (2011b). Bestand und Verbreitung der Zippammer *Emberiza cia* in Bayern im Bereich des Mains zwischen Karlstadt und Veitshöchheim und an der Fränkischen Saale bei Hammelburg 2009. *Orn. Anz.* **50(1)**: 61–68. In German with English summary.
Schwartz, M.D., Ahas, R. & Aasa, A. (2006). Onset of spring starting earlier across the Northern Hemisphere. *Global Change Biol.* **12**: 343–351.
Schwartz, P. (1975). Solved and unsolved problems in the *Sporophila lineola/bouvronides* complex (Aves: Emberizidae). *Ann. Carnegie Mus.* **45**: 277–285.
Schwarzenberger, A. & Dean, W.R.J. (2003). The influence of vegetation structure on bird communities in a Karoo village, South Africa. *Ostrich* **74**: 209–216.
Schwilling, M.D. (1954). Black-throated Sparrow in Kansas. *Wilson Bull.* **66**: 151.
Sclater, P.L. (1875). Synopsis of the species of the subfamily Diglossinae. *Ibis* **Ser. 3, no. 5**: 204–221.
Sclater, P.L. (1883). A review of the family Icteridae. Part 2. Icterinae. *Ibis* **Ser. 5, no. 1**: 352–374.
Sclater, P.L. (1886). *Catalogue of the Passeriformes, or Perching Birds in the Collection of the British Museum*. Vol. 11. Fringilliformes: part 2, containing the families Coerebidae, Tanagridae, and Icteridae. Trustees of the British Museum (Natural History), London.
Sclater, P.L. & Hudson, W.H. (1888). *Argentine Ornithology*. Vol. 1. R.H. Porter, London.
Sclater, P.L. & Salvin, O. (1859). On the ornithology of Central America. *Ibis* **Ser. 1, no. 1**: 1–22.
Sclater, P.L. & Salvin, O. (1879). On the birds collected by the late Mr. T. K. Salmon in the State of Antioquia, United States of Colombia. *Proc. Zool. Soc. London* **1879(3)**: 486–550.
Sclater, W.L. (1939). A note on some American orioles of the Family Icteridae. *Ibis* **Ser. 14, no. 3**: 140–145.
Scott, D.A. (1997). A possible re-sighting of the Cherry-throated Tanager *Nemosia rourei* in Espírito Santo, Brazil. *Cotinga* **7**: 61–63.
Scott, D.A. & Brooke, M.L. (1985). The endangered avifauna of southeastern Brazil: a report on the BOU/WWF expeditions of 1980/81 and 1981/82. Pp. 115–139 in: Diamond, A.W. & Lovejoy, T.E. eds. (1985). *Conservation of Tropical Forest Birds*. Technical Publication **4**. International Council for Bird Preservation, Cambridge, UK.
Scott, D.M. (1988). House Sparrow and Chipping Sparrow feed the same fledgling Brown-headed Cowbird. *Wilson Bull.* **100(2)**: 323–324.
Scott, D.M. (1991). The time of day of egg laying by the Brown-headed Cowbird and other icterines. *Can. J. Zool.* **69**: 2093–2099.
Scott, D.M. (1998). Laying hours and other nesting data of Rose-breasted Grosbeaks. *Ontario Birds* **16**: 88–93.
Scott, D.M. & Ankney, C.D. (1983). The laying cycle of Brown-headed Cowbirds: passerine chickens? *Auk* **100**: 583–593.
Scott, D.M. & Lemon, R.E. (1996). Differential reproductive success of Brown-headed Cowbirds with Northern Cardinals and three other hosts. *Condor* **98(2)**: 259–271.
Scott, D.M., Lemon, R.E. & Darley, J.A. (1987). Relaying interval after nest failure in Gray Catbirds and Northern Cardinals. *Wilson Bull.* **99(4)**: 708–712.

Scott, J.M., Thackaberry, W. & Bertrand, G.A. (1971). A specimen of the Black-throated Sparrow from western Oregon. *Murrelet* **52(3)**: 41.

Scott-Moreles, L., Nocedal, J., Cotera, M. & Canales-Delgadillo, J. (2008). Worthen's Sparrow (*Spizella wortheni*) in the northern Mexican Plateau. *Southwest. Nat.* **53**: 91–95.

Sealy, S.G. (1967). The occurrence and possible breeding of McKay's Bunting on St. Lawrence Island. *Condor* **69**: 531–532.

Sealy, S.G. (1969). Apparent hybridization between Snow Bunting and McKay's Bunting on St. Lawrence Island, Alaska. *Auk* **86**: 350–351.

Sealy, S.G. (1972). Additional winter records of the McKay's Bunting. *Can. Field-Nat.* **86**: 386–388.

Sealy, S.G. (1976). The 1973 Dickcissel invasion of southern Manitoba. *Can. Field-Nat.* **90**: 464–466.

Sealy, S.G. (1980). Breeding biology of Orchard Orioles in a new population in Manitoba. *Can. Field-Nat.* **94**: 154–158.

Sealy, S.G. (1999). Cowbird parasitism on Lark Buntings: frequency, acceptance, and fledging. *J. Field Orn.* **70**: 182–186.

Sealy, S.G. & Neudorf, D.L. (1995). Male Northern Orioles eject cowbird eggs: implications for the evolution of rejection behavior. *Condor* **97(2)**: 369–375.

Sealy, S.G. & Underwood, T.J. (2004). Accepters and rejecters of cowbird parasitism in the New World orioles (*Icterus* sp.). *Orn. Neotropical* **15**: 331–347.

Sealy, S.G., Neudorf, D.L. & Hill, D.P. (1995). Rapid laying by Brown-headed Cowbirds *Molothrus ater* and other parasitic birds. *Ibis* **137**: 76–84.

Sealy, S.G., Sánchez, J.E., Campos, R.G. & Marín, M. (1997). Bronzed Cowbird hosts: new records, trends in host use, and cost of parasitism. *Orn. Neotropical* **8(2)**: 175–184.

Searcy, W.A. (1979). Sexual selection and body size in male Red-winged Blackbirds. *Evolution* **33**: 649–661.

Searcy, W.A. (1986). Are female Red-winged Blackbirds territorial? *Anim. Behav.* **34**: 1381–1391.

Searcy, W.A. & Yasukawa, K. (1981). Sexual size dimorphism and survival of male and female blackbirds (Icteridae). *Auk* **98**: 457–465.

Searcy, W.A. & Yasukawa, K. (1995). *Polygyny and Sexual Selection in Red-winged Blackbirds*. Princeton University Press, Princeton, New Jersey.

Searcy, W.A., Yasukawa, K. & Lanyon, S. (1999). Evolution of polygyny in the ancestors of Red-winged Blackbirds. *Auk* **116**: 5–19.

Sedano, R.E. & Burns, K.J. (2010). Are the Northern Andes a species pump for Neotropical birds? Phylogenetics and biogeography of a clade of Neotropical tanagers (Aves: Thraupini). *J. Biogeogr.* **37**: 325–343.

Sedinger, J.S. (1986). Two adult male Lapland Longspurs, *Calcarius lapponicus*, feed the same fledgling. *Can. Field-Nat.* **100(2)**: 269–270.

Sekercioglu, C.H., Daily, G.C. & Ehrlich, P.R. (2004). Ecosystem consequences of bird declines. *Proc. Natl. Acad. Sci. USA* **101**: 18042–18047.

Sekercioglu, C.H., Schneider, S.H., Fay, J.P. & Loarie, S.R. (2008). Climate change, elevational range shifts, and bird extinctions. *Conserv. Biol.* **22(1)**: 140–150.

Selander, R.K. (1960). Sex ratio of nestlings and clutch size in the Boat-tailed Grackle. *Condor* **62**: 34–44.

Selander, R.K. (1964). Behavior of captive South American cowbirds. *Auk* **81**: 394–402.

Selander, R.K. (1970). Parental feeding in a male Great-tailed Grackle. *Condor* **72**: 238.

Selander, R.K. (1971). Systematics and speciation in birds. Pp. 57–147 in: Farner, D.S., King, J.R. & Parkes, K.C. eds. (1971). *Avian Biology*. Vol. 1. Academic Press, New York & London.

Selander, R.K. & Giller, D.R. (1959). The avifauna of the Barranca de Oblatos, Jalisco, Mexico. *Condor* **61**: 210–222.

Selander, R.K. & Giller, D.R. (1961). Analysis of sympatry of Great-tailed and Boat-tailed Grackles. *Condor* **63**: 29–86.

Selander, R.K. & Kuich, L.L. (1963). Hormonal control and development of the incubation patch in icterids, with notes on behavior of cowbirds. *Condor* **65**: 73–90.

Selander, R.K., Yang Suhyung & Cantú, G. (1969). Extension of zone of sympatry of *Quiscalus mexicanus* and *Q. major*. *Condor* **71**: 435–436.

Semenchuk, G.P. (1992). *The Atlas of Breeding Birds of Alberta*. Federation of Alberta Naturalists, Edmonton, Alberta.

Semple, J.B. & Sutton, G.M. (1932). Nesting of Harris's Sparrow (*Zonotrichia querula*) at Churchill, Manitoba. *Auk* **49**: 166–183.

Semrad, J. (2002). Besiedelung agrarökologisch bedeutsamer Landschaftselemente durch Goldammer (*Emberiza citrinella*) und Neuntöter (*Lanius collurio*) in Münichsthal (Niederösterreich). *Egretta* **45(1/2)**: 59–90. In German with English summary.

Serié, P. (1917). Sobre un Boyerito en cautividad (*Xanthornus pyrrhopterus*). *Hornero* **1**: 35–36. In Spanish.

Serié, P. (1932). El Boyero, *Amblycercus solitarius*, en cautividad. *Hornero* **5**: 46–51. In Spanish.

Serle, W. (1940). Field observations on some northern Nigerian birds. Part 2. *Ibis* **Ser. 14, no. 4**: 1–47.

Servat, G.P. (2002). A case of partial albinism in Giant Conebill *Oreomanes fraseri*. *Cotinga* **18**: 80.

Seutin, G. & Bermingham, E. (1997). *Rhodinocichla rosea* is an emberizid (Aves; Passeriformes) based on mitochondrial DNA analyses. *Mol. Phylogen. Evol.* **8**: 260–274

Seutin, G., Brawn, J., Ricklefs, R.E. & Bermingham, E. (1993). Genetic divergence among populations of a tropical passerine, the Streaked Saltator (*Saltator albicollis*). *Auk* **110(1)**: 117–126.

Seutin, G., Klein, N.K., Ricklefs, R.E. & Bermingham, E. (1994). Historical biogeography of the Bananaquit (*Coereba flaveola*) in the Caribbean region: a mitochondrial DNA assessment. *Evolution* **48**: 1041–1061.

Seyffert, K.D. (1988). First winter sighting of the Clay-colored Sparrow in the Texas Panhandle. *Bull. Okla. Orn. Soc.* **21(4)**: 34.

Sferco, G.D. & Baldo, J.L. (1995). Nuevos registros de aves poco frecuentes para Santiago del Estero. *Hornero* **14(1/2)**: 78–79. In Spanish with English summary.

Sgueo, C.E. (2009). *Seasonal Acclimatization through Physiological Changes in Northern Cardinals (*Cardinalis cardinalis*)*. MSc thesis, Miami University, Oxford, Ohio.

Shackford, J.S. (1989). Sage Sparrow: a new species for Oklahoma. *Bull. Okla. Orn. Soc.* **22(1)**: 1–2.

Shackford, J.S. (2003). Possible sighting of Black-chinned Sparrow in Oklahoma. *Bull. Okla. Orn. Soc.* **36(1/2)**: 3–6.

Shackleton, S.A., Ratcliffe, L., Horn, A.G. & Naugler, C.T. (1991). Song repertoires of Harris' Sparrows (*Zonotrichia querula*). *Can. J. Zool.* **69(7)**: 1867–1874.

Shaffer, J.A., Igl, L.D. & Vanhove, F. (2003). Historical and recent records and first nest records of Henslow's Sparrow in North Dakota. *Prairie Nat.* **35(2)**: 81–94.

Shane, T.G. (2000). Lark Bunting (*Calamospiza melanocorys*). No. **542** in: Poole, A. & Gill, F. eds. (2000). *The Birds of North America*. Vol. 14. The Birds of North America Inc., Philadelphia, Pennsylvania.

Shane, T.G. & Seltman, S.S. (1995). The historical development of wintering Lark Bunting populations north of the thirty-seventh parallel in Colorado and Kansas. *Kansas Orn. Soc. Bull.* **46(4)**: 36–39.

Shapoval, A.V. (1997). [First record of the Black-headed Bunting *Emberiza melanocephala* on the Kurish Spit, Baltic Sea]. *Russ. Orn. Zhurnal Ekspress Vypusk* **8**: 17–18. In Russian.

Sharpe, C.J. (2003). Shiny Cowbird *Molothrus bonariensis venezuelensis* Stone 1891 as a successful brood parasite of Fulvous-headed Tanager *Thlypopsis fulviceps fulviceps* Cabanis 1851. *Mem. Fund. la Salle Cienc. Nat.* **61(155)**: 139–141.

Sharpe, R.B. (1888). *Catalogue of the Passeriformes, or Perching Birds, in the Collection of the British Museum*. Vol. 12. Fringilliformes. Part III, containing the family Fringillidae. Trustees of the British Museum (Natural History), London.

Sharpe, R.S., Silcock, W.R. & Jorgensen, J.G. (2001). *Birds of Nebraska*. University of Nebraska Press, Lincoln, Nebraska.

Shaver, J.M. & Roberts, M.B. (1930). Some nesting habits of the Cardinal. *J. Tennessee Acad. Sci.* **5**: 157–170.

Shaw, D.N. (2004). The Chestnut-eared Bunting on Fair Isle – a new Western Palearctic bird. *Birding World* **17(10)**: 415–419.

Shaw, D.N. (2008). Chestnut-eared Bunting on Fair Isle – new to Britain. *British Birds* **101(5)**: 235–240.

Shcherbakov, B.V. (1978). [Ecological data on new nesting birds for western Altai and Kazakhstan]. *Trudy Inst. Zool. Akad. Nauk Kazakh. SSR (Ser. Zool.)* **38**: 127–132. In Russian.

Shegolev, V.I. (1974). [Dynamics of bird abundance in Tambov region]. *Doklady Mosk. Obshch. Ispyt. Prir. (Zool. Bot.)* **1971/1972**: 17–18. In Russian.

Sheldon, B.C. (2010). Genetic perspectives on the evolutionary consequences of climate change in birds. Pp. 149–168 in: Møller, Fiedler & Berthold (2010).

Sheldon, B.C., Kruuk, L.E. & Merilä, J. (2003). Natural selection and inheritance of breeding time and clutch size in the Collared Flycatcher. *Evolution* **57**: 406–420.

Sheldon, K.S. & Greeney, H.F. (2007). Nest and parental care of the Beryl-spangled Tanager (*Tangara nigroviridis*) in northeastern Ecuador. *Orn. Neotropical* **18**: 603–606.

Sheldon, K.S. & Greeney, H.F. (2008). First description of the nest of Yellow-bellied Dacnis. *Cotinga* **29**: 78–79.

Shepard, T.M. & Burns, K.J. (2007). Intraspecific genetic analysis of the Summer Tanager (*Piranga rubra*): implications for species limits and conservation. *J. Avian Biol.* **38**: 12–37.

Sherrell, P. (1994). Oregon's first verified Rustic Bunting. *Oregon Birds* **20(4)**: 111–112.

Shigeta, Y. & Mano, T. (1979). Records of the Pallas's Reed Bunting *Emberiza pallasi* from Japan. *Tori* **28(4)**: 117–124.

Shiovitz, K.A. (1975). The process of species-specific song recognition in the Indigo Bunting (*Passerina cyanea*) and its relationship to the organization of avian acoustical behaviour. *Behaviour* **55**: 128–179.

Shiovitz, K.A. & Thompson, W.L. (1970). Geographic variation in song composition of the Indigo Bunting, *Passerina cyanea*. *Anim. Behav.* **18**: 151–158.

Shirihai, H. (1996). *The Birds of Israel: a Complete Avifauna and Bird Atlas of Israel*. Academic Press, London.

Shirihai, H. (2002). *The Complete Guide to Antarctic Wildlife*. Princeton University Press, Princeton & Oxford.

Shirihai, H. & Gantlett, S. (1993). Identification of female and immature Black-headed Buntings. *Birding World* **6(5)**: 194–197.

Shirihai, H., Christie, D.A. & Harris, A. (1995). Field identification of Pine Bunting. *British Birds* **88(12)**: 621–626.

Shivrajkumar, Y.S. (1954). The occurrence of the Crested Bunting (*Melophus lathami*) in Saurashtra. *J. Bombay Nat. Hist. Soc.* **52(2/3)**: 598.

Shkatulova, A.P. (1962). [On the biology of the Yellow-breasted Bunting and the Pine Bunting in the Chita province]. *Ornitologiya* **4**: 177–180. In Russian.

Shore-Baily, W. (1931a). On the nest and eggs of *Zonotrichia querula* laid in captivity. *Bull. Brit. Orn. Club* **52**: 22.

Shore-Baily, W. (1931b). The nesting of the Harris Sparrow (*Zonotrichia querula*). *Avicult. Mag.* **Ser. 4, no. 9**: 252–254.

Short, L.L. (1966). Field Sparrow sings Chipping Sparrow song. *Auk* **83**: 665.

Short, L.L. (1968). Sympatry of red-breasted meadowlarks in Argentina, and the taxonomy of meadowlarks (Aves: *Leistes*, *Pezites* and *Sturnella*). *Amer. Mus. Novit.* **2349**: 1–30.

Short, L.L. (1969). Relationships among some South American seedeaters (*Sporophila*), with a record of *S. hypochroma* for Argentina. *Wilson Bull.* **81**: 216–219.

Short, L.L. (1971). Aves nuevas o poco comunes de Corrientes, República Argentina. *Rev. Mus. Arg. Cienc. Nat. Bernardino Rivadavia* **9**: 283–309. In Spanish.

Short, L.L. (1975). A zoogeographic analysis of the South American Chaco avifauna. *Bull. Amer. Mus. Nat. Hist.* **154(3)**: 165–352.

Short, L.L. (1976). *Aimophila strigiceps* new to Paraguay. *Auk* **93(1)**: 189–190.

Short, L.L. & Morony, J.J. (1969). Notes on some birds of central Peru. *Bull. Brit. Orn. Club* **89**: 112–115.

Short, L.L. & Parkes, K.C. (1979). The status of *Agelaius forbesi* Sclater. *Auk* **96(1)**: 179–183.

Shriver, W.G. & Vickery, P.D. (1999). Aerial assessment of potential Florida Grasshopper Sparrow habitat: conservation in a fragmented landscape. *Florida Field Nat.* **27(1)**: 1–9.

Shriver, W.G., Gibbs, J.P., Vickery, P.D., Gibbs, H.L., Hodgman, T.P., Jones, P.T. & Jacques, C.N. (2005). Concordance between morphological and molecular markers in assessing hybridization between sharp-tailed sparrows in New England. *Auk* **122(1)**: 94–107.

Shriver, W.G., Hodgman, T.P., Gibbs, J.P. & Vickery, P.D. (2010). Home range sizes and habitat use of Nelson's and Saltmarsh Sparrows. *Wilson J. Orn.* **122(2)**: 340–345.

Shriver, W.G., Hodgman, T.P. & Hanson, A.R. (2011). Nelson's Sparrow (*Ammodramus nelsoni*). No. **719** in: Poole, A. ed. (2011). The birds of North America online. Cornell Lab of Ornithology, Ithaca. URL: http://bna.birds.cornell.edu/bna/species/719 (download 15 June 2011).

Shriver, W.G., Vickery, P.D., Hodgman, T.P. & Gibbs, J.P. (2007). Flood tides affect breeding ecology of two sympatric sharp-tailed sparrows. *Auk* **124(2)**: 552–560.

Shuford, W.D. & Gardali, T. eds. (2008). *California Species of Special Concern: a Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds **1**. Western Field Ornithologists & California Department of Fish and Game, Camarillo & Sacramento.

Shuman, T.W., Robel, R.J., Zimmerman, J.L. & Kemp, K.E. (1989). Variance in digestive efficiencies of four sympatric avian granivores. *Auk* **106(2)**: 324–326.

Shuman, T.W., Robel, R.J., Zimmerman, J.L. & Kemp, K.E. (1992). Time budgets of confined Northern Cardinals and Harris' Sparrows in flocks of different size and composition. *J. Field Orn.* **63**: 129–137.

Shy, E. (1983). The relation of geographical variation in song to habitat characteristics and body size in North American tanagers (Thraupinae: *Piranga*). *Behav. Ecol. Sociobiol.* **12**: 71–76.

Shy, E. (1984a). The structure of song and its geographical variation in the Scarlet Tanager (*Piranga olivacea*). *Amer. Midl. Nat.* **112**: 119–130.

Shy, E. (1984b). Sympatry and allopatry of song in North American tanagers. *Behav. Ecol. Sociobiol.* **15**: 189–195.

Shy, E. (1984c). Habitat shift and geographical variation in North American tanagers (Thraupinae: *Piranga*). *Oecologia (Berlin)* **63(2)**: 281–285.

Sibley, C.G. (1950). Species formation in the red-eyed towhees of Mexico. *Univ. Calif. Publ. Zool.* **50**: 109–194.

Sibley, C.G. (1954). Hybridization in the red-eyed towhees of Mexico. *Evolution* **8(3)**: 252–290.

Sibley, C.G. (1955a). The generic allocation of the Green-tailed Towhee. *Auk* **72**: 420–423.

Sibley, C.G. (1955b). Nesting of the Western Tanager in the Santa Cruz Mountains, California. *Condor* **57**: 307.

Sibley, C.G. (1958). Hybridization in some Colombian tanagers, avian genus *Ramphocelus*. *Proc. Amer. Phil. Soc.* **102**: 448–453.

Sibley, C.G. (1970). A comparative study of the egg-white proteins of passerine birds. *Peabody Mus. Nat. Hist. Yale Univ. Bull.* **32**: 1–131.

Sibley, C.G. (1973). The relationships of the Swallow-tanager *Tersina viridis*. *Bull. Brit. Orn. Club* **93**: 75–78.

Sibley, C.G. (1996). *Birds of the World*. Version 2.0. Thayer Birding Software, Naples, Florida.

Sibley, C.G. & Ahlquist, J.E. (1985). The phylogeny and classification of the passerine birds, based on comparisons of the genetic material, DNA. Pp. 83–121 in: Ilyichev, V.D. & Gavrilov, V.M. eds. (1985). *Acta of the XVIII International Ornithological Congress, Moscow, August 16–24, 1982*. Vol. 1. Nauka, Moscow.

Sibley, C.G. & Ahlquist, J.E. (1990). *Phylogeny and Classification of Birds: a Study in Molecular Evolution*. Yale University Press, New Haven & London.
Sibley, C.G. & Monroe, B.L. (1990). *Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven & London.
Sibley, C.G. & Monroe, B.L. (1993). *A Supplement to Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven & London.
Sibley, C.G. & Short, L.L. (1959). Hybridization in the buntings (*Passerina*) of the Great Plains. *Auk* **76**: 443–463.
Sibley, C.G. & Short, L.L. (1964). Hybridization in the orioles of the Great Plains. *Condor* **66**: 130–150.
Sibley, C.G. & West, D.A. (1958). Hybridization in the Red-eyed To-whees of Mexico: the Eastern Plateau populations. *Condor* **60**: 85–104.
Sibley, C.G. & West, D.A. (1959). Hybridization in the Rufous-sided Towees of the Great Plains. *Auk* **76(3)**: 326–338.
Sibley, C.G., Ahlquist, J.E. & Monroe, B.L. (1988). A classification of the living birds of the world based on DNA-DNA hybridization studies. *Auk* **105(3)**: 409–423.
Sibley, D.A. (1996). Field identification of the sharp-tailed sparrow complex. *Birding (USA)* **28(3)**: 196–208.
Sibley, D.A. (2000). *The Sibley Guide to Birds*. The National Audubon Society & Alfred A. Knopf, New York.
Sibley, D.A. (2003). *The Sibley Field Guide to Birds of Western North America*. Alfred A. Knopf, New York.
Sick, H. (1958). Notas biológicas sobre o Gaudério, *Molothrus bonariensis* (Gmelin) (Icteridae, Aves). *Rev. Bras. Biol.* **18**: 417–431. In Portuguese.
Sick, H. (1960). The honeycreeper *Dacnis albiventris* in Brazil. *Condor* **62**: 66–67.
Sick, H. (1962). Reivindicação do Papa-capini *Sporophila ardesiaca* (Dubois). Sua ocorrência no Brasil. *Bol. Mus. Nac. Rio J. (Zool.)* **235**: 1–33. In Portuguese.
Sick, H. (1968). Hennenfedrige Rasse eines Pfäffchens aus Brasilien: *Sporophila bouvreuil crypta* subsp. nov. *Beitr. Neotrop. Fauna* **5**: 153–159. In German.
Sick, H. (1979). Notes on some Brazilian birds. *Bull. Brit. Orn. Club* **99**: 115–120.
Sick, H. (1983). *Migrações de Aves na América do Sul Continental*. Publicação Técnica **2**. Centro de Estudo de Migração de Aves & Instituto Brasileiro de Desenvolvimento Florestal, Brasília. 86 pp. In Portuguese.
Sick, H. (1985). *Ornitologia Brasileira, uma Introdução*. Universidade de Brasília, Brasília. In Portuguese.
Sick, H. (1993). *Birds in Brazil: a Natural History*. Princeton University Press, Princeton, New Jersey.
Sick, H. (1997). *Ornitologia Brasileira*. Revised edition. Nova Fronteira, Rio de Janeiro. In Portuguese.
Sick, H. & Pabst, L.F. (1968). As aves do Rio de Janeiro (Guanabara) (lista sistemática anotada). *Arq. Mus. Nac. Rio J.* **53**: 99–160. In Portuguese.
Sick, H. & Teixeira, D.M. (1979). Notas sobre aves brasileiras raras ou ameaçadas de extinção. *Publ. Avuls. Mus. Nac.* **62**: 1–39. In Portuguese.
Sidnei de Melo, D. (2004). Audio recordings of *Conirostrum bicolor* from Receife, Pernambuco, Brazil. Xeno-Canto, XC4874. Unpubl.
Sierro, A. & Arlettaz, R. (2003). L' avifaune du vignoble en Valais central: évaluation de la diversité à l'aide de transects. *Nos Oiseaux* **50(2)**: 89–100. In French with English summary.
Silcock, W.R. & Jorgensen, J.G. (2007). Henslow's Sparrow status in Nebraska. *Nebraska Bird Rev.* **75(1)**: 13–16.
da Silva, J.F. & Colombo Rubio, T. (2007). *Combretum lanceolatum* como recurso alimentar para aves no Pantanal. *Rev. Bras. Orn.* **15(3)**: 459–460. In Portuguese with English summary.
Silva, J.L. & Strahl, S.D. (1994). Usos folclóricos de la fauna silvestre en nueve parques nacionales al norte de Venezuela. *Vida Silvestre Neotropical* **3**: 100–107. In Spanish.
da Silva, J.M.C. (1990). Description of a new subspecies of *Saltator aurantiirostris*, with comments on *S. maxillosus*. *Bull. Brit. Orn. Club* **110(4)**: 171–175.
da Silva, J.M.C. (1991). Geographical variation in the Saffron-billed Sparrow *Arremon flavirostris*. *Bull. Brit. Orn. Club* **111(3)**: 152–155.
da Silva, J.M.C. (1995). Seasonal distribution of the Lined Seedeater *Sporophila lineola*. *Bull. Brit. Orn. Club* **115**: 14.
da Silva, J.M.C. (1998). Birds of the Ilha de Maracá. Pp. 211–229 in: Milliken, W. & Ratter, J.A. eds. (1998). *Maracá: the Biodiversity and Environment of an Amazonian Rainforest*. John Wiley & Sons, London.
da Silva, J.M.C. (1999). Seasonal movements and conservation of seedeaters of the genus *Sporophila* in South America. *Studies Avian Biol.* **19**: 272–280.
da Silva, J.M.C. & Bates, J.M. (2002). Biogeographic patterns and conservation in the South American Cerrado: a tropical savanna hotspot. *BioScience* **52**: 225–233.
da Silva, J.M.C. & O'Neill, W.E. (1986). Nota sobre a distribuição de quatro espécies de aves da Amazônia Brasileira. *Bol. Mus. Paraense Emílio Goeldi (Nova Sér. Zool.)* **2(2)**: 151–158. In Portuguese with English summary.
da Silva, J.M.C. & Oren, D.C. (1990). Introduced and invading birds in Belém, Brazil. *Wilson Bull.* **102(2)**: 309–313.
Silva-Aranguiz, E. (2010). Recopilación de la literatura ornitológica chilena desde 1810 hasta 2010. URL: http://www.bio.puc.cl/auco/artic01/ornito01.htm (download 14 October 2010). In Spanish.
de Silva Garza, H.G. (1997). Further observations on the nesting of the Azure-rumped Tanager. *Bull. Brit. Orn. Club* **117(1)**: 16–18.
Silveira, L.F., Olmos, F., Roda, S.A. & Long, A.J. (2003). Notes on the Seven-colored Tanager, *Tangara fastuosa*, in northeast Brazil. *Cotinga* **20**: 82–88.
Simeonov, S. (1983). Investigation on the food of the Yellowhammer (*Emberiza citrinella* L.) in Bulgaria. *Godishnik na Sofiiskiya Univ. Biol. Fak.* **72/73(1)**: 69–79. In Bulgarian with English summary.
Simmons, G.A. & Sloan, N.F. (1974). Consumption of jack-pine budworm, *Choristoneura pinus* Freeman, by the eastern Chipping Sparrow, *Spizella passerina* (Bechstein). *Can. J. Zool.* **52(7)**: 817–821.
Simonetti, G., Tubaro, P.L. & Segura, E. (1996). Evaluation of the alerted detection hypothesis in the song of the Rufous-collared Sparrow. 2. Effect of acoustic degradation in playbacks of complete and sectioned songs. *Hornero* **14(3)**: 35–43.
Simons, S. & Alcock, J. (1971). Learning and the foraging persistence of White-crowned Sparrows *Zonotrichia leucophrys*. *Ibis* **113**: 477–482.
Sinclair, P.H., Nixon, W.A., Eckert, C.D. & Hughes, N.L. eds. (2003). *Birds of the Yukon Territory*. University of British Columbia Press, Vancouver, British Columbia.
Singh, J., Rani, S. & Kumar, V. (2010). Presence of a conspecific renders survival advantages in the migratory Redheaded Bunting: test through the effects of restricted feeding on circadian response and survivorship. *Chronobiol. Internat.* **27(1)**: 111–127.
Singh, V.K. (2001). Ecological and endocrinological aspects of migration and reproduction in male Redheaded Bunting, *Emberiza bruniceps*. *J. Nat. Conserv.* **13(2)**: 211–220.
Siriwardena, G. & Wernham, C. (2002). Synthesis of the migration patterns of British and Irish birds. Pp. 70–102 in: Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. eds. (2002). *The Migration Atlas: Movements of the Birds of Britain and Ireland*. T.&A.D. Poyser & A&C Black, London.
Skead, C.J. (1995). *Life-history Notes on East Cape Bird Species (1940–1990)*. Vol. 1. Algoa Regional Services Council, Port Elizabeth, South Africa.
Skead, D.M. (1960). *The Canaries, Seedeaters and Buntings of Southern Africa*. South African Bird Book Fund, Cape Town.
Skead, D.M. (1966a). Some observations on the Cape Bunting *Emberiza capensis* (Linnaeus). *Ostrich* **37**: 59–60.
Skead, D.M. (1966b). Birds frequenting the intertidal zone of the Cape Peninsula. *Ostrich* **37**: 10–16.
Skead, D.M. (1975). Drinking habits of birds in the central Transvaal bushveld. *Ostrich* **46**: 139–146.
Skierczynski, M. & Osiejuk, T.S. (2010). Sharing songs within a local dialect does not hinder neighbour-stranger discrimination in Ortolan Bunting (*Emberiza hortulana*) males. *Behaviour* **147(3)**: 333–351.
Skinner, K.L. (1930). Eggs of *Emberiza rustica latifascia*. *Ool. Rec.* **10**: 53–54.
Skinner, K.L. (1935). *Phrygilus alaudinus alaudinus* (Kittlitz). *Ool. Rec.* **15**: 59–61.
Skipper, C.S. (1998). Henslow's Sparrows return to previous nest site in western Maryland. *North Amer. Bird Bander* **23(2)**: 36–41.
Skorupa, J.P., Hothem, R.L. & DeHaven, R.W. (1980). Foods of breeding Tricolored Blackbirds in agricultural areas of Merced County, California. *Condor* **82**: 465–467.
Skutch, A.F. (1945). Incubation and nesting periods of Central American birds. *Auk* **62**: 8–37.
Skutch, A.F. (1950). Outline for an ecological life history of a bird, based upon the Song Tanager *Ramphocelus passerinii costaricensis*. *Ecology* **31**: 464–469.
Skutch, A.F. (1953). How the male bird discovers the nestlings. *Ibis* **95**: 1–37, 505–542.
Skutch, A.F. (1954). *Life Histories of Central American Birds*. Part 1. Families Fringillidae, Thraupidae, Icteridae, Parulidae and Coerebidae. Pacific Coast Avifauna **31**. Cooper Ornithological Society, Berkely, California. 448 pp.
Skutch, A.F. (1961). Helpers among birds. *Condor* **63**: 198–226.
Skutch, A.F. (1962a). On the habits of the Queo, *Rhodinocichla rosea*. *Auk* **79**: 633–639.
Skutch, A.F. (1962b). Life histories of honeycreepers. *Condor* **64**: 92–116.
Skutch, A.F. (1967a). *Life Histories of Central American Highland Birds*. Publications of the Nuttall Ornithological Club **7**. Nuttall Ornithological Club, Cambridge, Massachusetts. vi, 213 pp.
Skutch, A.F. (1967b). Life history notes on the Oriole Blackbird (*Gymnomystax mexicanus*) in Venezuela. *Hornero* **10**: 379–388.
Skutch, A.F. (1968). The nesting of some Venezuelan birds. *Condor* **70**: 66–82.
Skutch, A.F. (1969). A study of the Rufous-fronted Thornbird and associated birds. Part 2. Birds which breed in thornbirds' nests. *Wilson Bull.* **81**: 123–139.
Skutch, A.F. (1972). *Studies of Tropical American Birds*. Publications of the Nuttall Ornithological Club **10**. Nuttall Ornithological Club, Cambridge, Massachusetts. vi, 228 pp.
Skutch, A.F. (1976). *Parent Birds and their Young*. University of Texas Press, Austin & London.
Skutch, A.F. (1977). *A Birdwatcher's Adventures in Tropical America*. University of Texas Press, Austin & London.
Skutch, A.F. (1980a). Arils as food of tropical American birds. *Condor* **82(1)**: 31–42.
Skutch, A.F. (1980b). The birds of hacienda Palo Verde, Guanacaste, Costa Rica. *Smithsonian Contrib. Zool.* **292**: 1–92.
Skutch, A.F. (1983). *Nature through Tropical Windows*. University of California Press, Berkeley, Los Angeles & London.
Skutch, A.F. (1984). Subfamily tanagers. Pp. 370–380 in: Grzimek, B., Meise, W., Niethammer, G. & Steinbacher, J. eds. (1984). *Grzimek's Animal Life Encyclopedia*. Vol. 9. Birds, 3. English edition. Van Nostrand Reinhold Company, New York.
Skutch, A.F. (1989a). *A Naturalist among Tropical Splendour*. University of Iowa Press, Iowa City, Iowa.
Skutch, A.F. (1989b). *Life of the Tanager*. Comstock Publishing, Ithaca, New York.
Skutch, A.F. (1996). *Orioles, Blackbirds and their Kin*. University of Arizona Press, Tucson, Arizona.
Slabbekoorn, H., Jesse, A. & Bell, D.A. (2003). Microgeographic song variation in island populations of the White-crowned Sparrow (*Zonotrichia leucophrys nutalli*): innovation through recombination. *Behaviour* **140(7)**: 947–963.
Slack, R. (2009). *Rare Birds. Where and When: an Analysis of Status and Distribution in Britain and Ireland*. Vol. 1. Sandgrouse to New World orioles. Russel Slack, Rare Bird Books, York, UK.
Sloan, N.F. & Simmons, G.A. (1973). Foraging behavior of the Chipping Sparrow in response to high populations of jack pine budworm. *Amer. Midl. Nat.* **90(1)**: 210–215.
Slud, P. (1960). The birds of finca 'La Selva,' Costa Rica: a tropical wet forest locality. *Bull. Amer. Mus. Nat. Hist.* **121**: 49–148.
Slud, P. (1964). The birds of Costa Rica: distribution and ecology. *Bull. Amer. Mus. Nat. Hist.* **128**: 1–430.
Small, B. (1992). Ageing and sexing of Ortolan and Cretzschmar's Buntings in the field. *Birding World* **5**: 223–228.
Small, D.M., Gimpel, M. & Gruber, J. (2007). Field Sparrow (*Spizella pusilla*) longevity record. *North Amer. Bird Bander* **32(2)**: 78.
Small, D.M., Gimpel, M.E., Parks, J., Guerard, J.B. & Gill, D.E. (2009). First documented cases of polygyny in the Grasshopper Sparrow. *Wilson J. Orn.* **121(4)**: 822–825.
Small, D.M., Parks, J., Gruber, J. & Gill, D.E. (2008). Grasshopper Sparrow (*Ammodramus savannarum*) longevity record. *North Amer. Bird Bander* **33(4)**: 186–187.
Small, S.L. (2005). Mortality factors and predators of Spotted Towhee nests in the Sacramento Valley, California. *J. Field Orn.* **76(3)**: 252–258.
Small, T.W., Sharp, P.J. & Deviche, P. (2007). Environmental regulation of the reproductive system in a flexibly breeding Sonoran Desert bird, the Rufous-winged Sparrow, *Aimophila carpalis*. *Horm. Behav.* **51(4)**: 483–495.
de Smet, G. (1996). De eerste Geelbrauwgors *Emberiza chrysophrys* in het West-Paelearctisch gebied: de vergeten vogel van oktober 1966. *Oriolus* **62(4)**: 92–94. In Dutch with English summary.
Smith, A. (1927). Rapid decomposition in some species of the genus *Saltator*. *Condor* **29(1)**: 80.
Smith, C.E. (1966). Preliminary notes on a six-year study of Rose-breasted Grosbeak plumages. *Bird-Banding* **37**: 49–51.
Smith, D.G. (1972). The role of the epaulets in the Red-winged Blackbird (*Agelaius phoeniceus*) social system. *Behaviour* **41**: 251–268.
Smith, E.C. (1974). Some additional information on birds in Afghanistan. *Ardea* **62(3/4)**: 226–235.
Smith, J.N.M. (1977). Feeding rates, search paths, and surveillance for predators in Great-tailed Grackle flocks. *Can. J. Zool.* **55**: 891–898.
Smith, J.N.M. (1978). Flycatching by male Song Sparrows, *Melospiza melodia*. *Can. Field-Nat.* **92(2)**: 195–196.
Smith, J.N.M. (1999). The basis for cowbird management: host selection, impacts on hosts, and criteria for taking management action. Pp. 104–108 in: Morrison *et al.* (1999).
Smith, J.N.M. & Arcese, P. (1994). Brown-headed Cowbirds and an island population of Song Sparrows: a 16-year study. *Condor* **96**: 916–934.
Smith, J.N.M. & Roff, D.A. (1980). Temporal spacing of broods, brood size, and parental care in Song Sparrows (*Melospiza melodia*). *Can. J. Zool.* **58(6)**: 1007–1015.
Smith, J.N.M. & Sweatman, H.P.A. (1976). Feeding habits and morphological variation in Cocos Finches. *Condor* **78(2)**: 244–248.
Smith, J.N.M., Cook, T.L., Rothstein, S.I., Robinson, S.K. & Sealy, S.G. eds. (2000). *Management of Cowbirds and their Hosts: Studies on Conservation of North American Passerine Birds*. University of Texas Press, Austin, Texas.
Smith, J.N.M., Keller, L.F., Marr, A.B. & Arcese, P. eds. (2006). *Conservation and Biology of Small Populations: the Song Sparrows of Mandarte*. Oxford University Press, New York.
Smith, J.N.M., Taitt, M.J., Rogers, C.M., Arcese, P., Keller, L.F, Cassidy, A.L.E.V. & Hochachka, W.M. (1996). A metapopulation approach to the population biology of the Song Sparrow *Melospiza melodia*. *Ibis* **138(1)**: 120–128.
Smith, J.N.M., Taitt, M.J., Zanette, L. & Myers-Smith, I.H. (2003). How do Brown-headed Cowbirds (*Molothrus ater*) cause nest failures in Song Sparrows (*Melospiza melodia*)? A removal experiment. *Auk* **120(3)**: 772–783.
Smith, K.G. (1988). Clutch-size dependent asynchronous hatching and brood reduction in *Junco hyemalis*. *Auk* **105(1)**: 200–203.
Smith, K.G. & Andersen, D.C. (1982). Food, predation, and reproductive ecology of the Dark-eyed Junco in northern Utah. *Auk* **99**: 650–661.

Smith, L.A., Burke, D.M., Nol, E. & Elliott, K.A. (2006). The effects of partial cutting on the Rose-breasted Grosbeak: abundance, food availability, and nest survival. *Can. J. Forest Res.* **36(5)**: 1087–1096.

Smith, L.A., Nol, E., Burke, D.M. & Elliott, K.A. (2007). Nest-site selection of Rose-breasted Grosbeaks in southern Ontario. *Wilson J. Orn.* **119(2)**: 151–161.

Smith, N.G. (1968). The advantage of being parasitized. *Nature (London)* **219**: 690–694.

Smith, N.G. (1979). Alternate responses by hosts to parasites which may be helpful or harmful. Pp. 7–15 in: Nickol, B.B. ed. (1979). *Host-parasite Interfaces*. Academic Press, New York, San Francisco & London.

Smith, N.G. (1980). Some evolutionary, ecological, and behavioural correlates of communal nesting by birds with wasps or bees. Pp. 1199–1205 in: Nöhring, R. ed. (1980). *Acta XVII Congressus Internationalis Ornithologici*. Vol. 2. Deutsche Ornithologen-Gesellschaft, Berlin.

Smith, N.G. (1983). *Zarhynchus wagleri* (Oropendola Cabecicastaña, Oropéndola, Chestnut-headed Oropendola). Pp. 614–616 in: Janzen, D.H. ed. (1983). *Costa Rican Natural History*. University of Chicago Press, Chicago, Illinois.

Smith, P. (2008). Probable irruptive event of Uniform Finch *Haplospiza unicolor* and a summary of previous Paraguayan records. URL: http://www.faunaparaguay.com/jhaplospiza.html (download 11 February 2011).

Smith, P.W., Smith, S.A. & Hoffman, W. (1991). A Yellow-faced Grassquit in Florida, with comments on importation of this and related species. *Florida Field Nat.* **19(1)**: 21–24.

Smith, R.D. (1992). Age determination, wing-feather colour and wing-length change in Snow Buntings *Plectrophenax nivalis*. *Ringing & Migration* **13(1)**: 43–51.

Smith, R.D. (1996). Racial composition of breeding and wintering Snow Buntings *Plectrophenax nivalis* in the north-east Scottish uplands. *Ringing & Migration* **17(2)**: 123–136.

Smith, R.D. & Marquiss, M. (1995). Production and costs of nesting attempts in Snow Buntings *Plectrophenax nivalis*: why do they attempt second broods? *Ibis* **137(4)**: 469–476.

Smith, R.D., Marquiss, M. & Watson, A. (2009). Whether a hen Snow Bunting pairs with the same cock for a second nest. *Scottish Birds* **29(1)**: 34–35.

Smith, R.L. (1959). The songs of the Grasshopper Sparrow. *Wilson Bull.* **71**: 141–152.

Smith, R.L. (1963). Some ecological notes on the Grasshopper Sparrow. *Wilson Bull.* **75**: 159–165.

Smith, R.W. (1966). A case of xanthochroism in the Yellow-faced Grassquit *Tiaris olivacea*. *Ibis* **108**: 627–628.

Smithe, F.B. (1966). *The Birds of Tikal*. Natural History Press, Garden City, New York.

Smyth, C.H. (1928). Descripción de una colección de huevos de aves argentinas. *Hornero* **4**: 124–152. In Spanish.

Smyth, M. & Bartholomew, G.A. (1966). The water economy of the Black-throated Sparrow and the Rock Wren. *Condor* **68**: 447–458.

Smythies, B.E. (1986). *The Birds of Burma*. 3rd revised edition. Nimrod Press, Liss, UK.

Snethlage, E. (1907). Über unteramazonische Vögel. *J. Orn.* **55**: 283–299. In German.

Snethlage, E. (1913). Über die Verbreitung der Vogelarten in Unteramazonien. *J. Orn.* **61**: 469–539. In German.

Snethlage, E. (1914). *Catalogo das Aves Amazônicas Contendo Todas as Espécies Descritas e Mencionadas até 1913*. Boletim do Museu Goeldi de Historia Natural e Ethnographia **8**. Museu Goeldi de Historia Natural e Ethnographia, Pará, Brazil. 530 pp. In Portuguese.

Snethlage, E. (1925). Neue Vogelarten aus Nord-Brasilien. *J. Orn.* **73**: 264–274. In German.

Snethlage, E. (1935a). Beiträge zur Brutbiologie brasilianischer Vögel. [Part 1]. *J. Orn.* **83(1)**: 1–24. In German.

Snethlage, E. (1935b). Beiträge zur Fortpflanzungsbiologie brasilianischer Vögel. Schluß. *J. Orn.* **83(4)**: 532–562. In German.

Snethlage, E. & Schreiner, K. (1929). Beiträge zur brasilianischen Oologie. Pp. 576–640 in: Steinbacher, F. ed. (1929). *Verhandlungen des VI. Internationalen Ornithologen-Kongresses in Kopenhagen 1926*. Dornblüth, Berlin. In German.

Snethlage, H. (1927). Meine Reise durch Nordostbrasilien. I. Reisebericht. *J. Orn.* **75(3)**: 453–484. In German.

Snethlage, H. (1928a). Meine Reise durch Nordostbrasilien. II. Biologische Beobachtungen. *J. Orn.* **76(3)**: 503–581. In German.

Snethlage, H. (1928b). Meine Reise durch Nordostbrasilien. III. Bausteine zur Biologie der angetroffenen Arten. *J. Orn.* **76(4)**: 668–738. In German.

Sniegowski, P.D., Ketterson, E.D. & Nolan, V. (1988). Can experience alter the avian annual cycle? Results of migration experiments with Indigo Buntings. *Ethology* **79**: 333–341.

Snow, B.K. (1974). Vocal mimicry in the Violaceous Euphonia, *Euphonia violacea*. *Wilson Bull.* **86**: 179–180.

Snow, B.K. & Snow, D.W. (1971). The feeding ecology of tanagers and honeycreepers in Trinidad. *Auk* **88**: 291–322.

Snow, D.W. (1976). *The Web of Adaptation. Bird Studies in the American Tropics*. Times Book Company & Quadrangle, New York.

Snow, D.W. & Collins, C.T. (1962). Social breeding behavior of the Mexican Tanager. *Condor* **64**: 161.

Snow, D.W. & Lill, A. (1974). Longevity records for some Neotropical land birds. *Condor* **76**: 262–267.

Snow, D.W. & Perrins, C.M. eds. (1998). *The Birds of the Western Palearctic*. Vol. 2. Passerines. Concise edition. Oxford University Press, Oxford, UK.

Snow, D.W. & Snow, B.K. (1964). Breeding seasons and annual cycles of Trinidad land-birds. *Zoologica (New York)* **49**: 1–39.

Snow, D.W. & Snow, B.K. (1980). Relationships between hummingbirds and flowers in the Andes of Colombia. *Bull. Brit. Mus. (Nat. Hist.) Zool.* **38**: 105–139.

Snyder, D.E. (1966). *The Birds of Guyana*. Peabody Museum, Salem, Massachusetts.

Snyder, L. & Bly, B.L. (2009). Differential use of agricultural fields and rangeland nesting habitat by McCown's Longspur (*Calcarius mccownii*) and Chestnut-collared Longspur (*Calcarius ornatus*) in western Nebraska. *Nebraska Bird Rev.* **77(1)**: 35–41.

Snyder, N.F.R. & Snyder, H.A. (1969). A comparative study of mollusc predation by Limpkins, Everglade Kites, and Boat-tailed Grackles. *Living Bird* **8**: 177–223.

Sockman, K.W. (2009). Annual variation in vocal performance and its relationship with bill morphology in Lincoln's Sparrows, *Melospiza lincolnii*. *Anim. Behav.* **77(3)**: 663–671.

Soderberg, P.M. (1963). *Buntings, Cardinals, Lovebirds and Mannikins, Foreign Birds for Cage and Aviary*. TFH Publications, Jersey City, New Jersey.

Sodhi, N.S. & Nagata, H. (1996). Paternity assurance behaviour of the Japanese Reed Bunting (*Emberiza yessoensis*). *J. Ethol.* **14(2)**: 145–149.

Sodhi, N.S., Adlard, R.D., Nagata, H. & Kara, A.U. (1999). Low prevalence of blood parasites in six *Emberiza* species in Japan. *Jap. J. Orn.* **47(2)**: 65–67.

Sodhi, N.S., Bennett, G.F. & Nagata, H. (1996). Absence of blood parasites in the Japanese Reed Bunting *Emberiza yessoensis*. *Jap. J. Orn.* **45(2)**: 115–117.

Soha, J.A. & Marler, P. (2001). Cues for discrimination of conspecific song in the White-crowned Sparrow (*Zonotrichia leucophrys*). *Ethology* **107(9)**: 813–826.

Soha, J.A., Lohr, B. & Gill, D.E. (2009). Song development in the Grasshopper Sparrow, *Ammodramus savannarum*. *Anim. Behav.* **77(6)**: 1479–1489.

Sokolov, E.P. & Sokolov, A.M. (1986). [New bird species-hosts of Common Cuckoo]. *Trudy Zool. Inst. (Leningr.)* **147**: 145–146. In Russian.

Sokolov, E.P. & Sokolov, A.M. (1987). [Ecology of the Grey-hooded Bunting (*Emberiza fucata*) in southwestern part of the region east to the Baikal Lake]. *Ornitologiya* **22**: 31–34. In Russian.

Solbakken, K.A. & Myklebust, M. (2000). Grahodespurv pa Tiitran i Oktober 1999 – det første funnet i Norge. *Vår Fuglefauna* **23(3)**: 108–111. In Norwegian.

Soler, J.J., Møller, A.P. & Soler, M. (1998). Nest building, sexual selection and parental investment. *Evol. Ecol.* **12**: 427–441.

van Someren, V.G.L. (1956). Days with birds: studies of habits of some East African species. *Fieldiana Zool.* **38**: 1–520.

Sora, H. (1976). Breeding of *Prunella rubida* and *Emberiza fucata* in Shikoku. *Tori* **25(100)**: 115. In Japanese with English summary.

Soriano, P.J., Naranjo, M.E., Renjifo, C., Figuera, M., Rondón, M. & Ruiz, R.L. (1999). Aves consumidoras de frutos de cactáceas columnares del enclave semiárido de Lagunillas, Mérida, Venezuela. *Ecotropicas* **12(2)**: 91–100. In Spanish with English summary.

Soriano, P.S. (1931). Food habits and economic status of the Brewer and Red-winged Blackbirds. *Calif. Fish & Game* **17**: 361–395.

Sosa, H. (2008). Avifauna mendocina: primera cita para la provincia de Mendoza del Tordo Patagónico *Curaeus curaeus* (Molina 1782) (Aves, Icteridae). *Xolmis* **2**: 18. In Spanish.

Souza, D. (2002). *All the Birds of Brazil. An Identification Guide*. Editora Dall, Feira de Santana, Bahia, Brazil.

Sparks, T.H., Bairlein, F., Bojarinova, J.G., Hüppop, O., Lehikoinen, E.A., Rainio, K., Sokolov, L.V. & Walker, D. (2005). Examining the total arrival distribution of migratory birds. *Global Change Biol.* **11**: 22–30.

Sparks, T.H., Huber, K. & Tryjanowski, P. (2008). Something for the weekend? Examining the bias in avian phenological recording. *Int. J. Biometeorology* **52(6)**: 505–510.

Spaulding, N.G. (1937). Nesting of the Puerto Rico Oriole. *J. Agric. Univ. Puerto Rico* **21**: 551–558.

Spaw, C.D. & Rohwer, S. (1987). A comparative study of eggshell thickness in cowbirds and other passerines. *Condor* **89**: 307–318.

Speirs, J.M. & Speirs, D.H. (1968). *Melospiza lincolnii lincolnii*, Lincoln's Sparrow. Pp. 1434–1476 in: Bent & Austin (1968).

Spence, M.J. & Smith, B.I. (1961). A subspecies of *Torreornis inexpectata* from Cuba. *Auk* **78**: 95–97.

Spencer, A. (2008a). Audio recordings of *Tangara labradorides* from El 18, Valle del Cauca, Colombia. Xeno-Canto, XC22310. Unpubl.

Spencer, A. (2008b). Audio recordings of *Urothraupis stolzmanni*, from Papallacta Pass, Napo, Ecuador. Xeno-Canto XC17347. Unpubl.

Spencer, A. (2008c). Audio recordings of *Diglossa indigotica* from Serranía de las Paraguas, Chocó, Colombia. Xeno-Canto XC22142, XC22143. Unpubl.

Spencer, A. (2009). Audio recordings of *Dacnis flaviventer* and *Cyanerpes nitidus* from Cristalino Jungle Lodge, Brazil. Xeno-Canto, XC38580 and XC38583. Unpubl.

Spencer, A. (2010). Audio recordings of *Diglossa glauca* from Tungurahua, Ecuador. Xeno-Canto XC61390, XC61391. Unpubl.

Springborn, E.G. & Meyers, J.M. (2005). Home range and survival of breeding Painted Buntings in Sapalo Island, Georgia. *Wildl. Soc. Bull.* **33(4)**: 1432–1439.

Sproule, M. (2006). Notes on the care and breeding of the Turquoise Tanager *Tangara mexicana*. *Avicult. Mag.* **112(4)**: 161–168.

Sprunt, A. (1924). Notes on the breeding of the Carolina Junco (*Junco hyemalis carolinensis*) in the mountains of North Carolina. *Auk* **41**: 610–612.

Sprunt, A. (1931). Observations on the color of the iris in the Boat-billed Grackle (*Megaquiscalus major*). *Auk* **48**: 431–432.

Sprunt, A. (1968). Eastern Painted Bunting *Passerina ciris ciris* (Linnaeus). Pp. 137–154 in: Bent & Austin (1968).

Staav, R. (1976). Videsparven i Sverige, utbredning och uppträdande under flyttningen. *Fauna & Flora* **71(5)**: 202–207. In Swedish.

Stabler, R.M. (1959). Nesting of the Blue Grosbeak in Colorado. *Condor* **61**: 46–48.

Stahl, J. (1999). Rotrücken-Kronfink – seine Haltung und Zucht. *Gefiederte Welt* **123(3)**: 93–97. In German.

Stahlecker, D.W. (2002). First report of a ground nest of Canyon Towhees. *Wilson Bull.* **114(3)**: 289–290.

Stallcup, W. (1954). Myology and serology of the avian family Fringillidae. *Univ. Kansas Publ. Mus. Nat. Hist.* **8**: 157–211.

Stanback, M.T. & Powell, E.M. (2010). Predator vocalizations affect foraging trade-offs of Northern Cardinals. *Wilson J. Orn.* **122(1)**: 168–173.

Stanbury, A., Davies, M., Grice, P., Gregory, R. & Wotton, S. (2010). The status of the Cirl Bunting in the UK in 2009. *British Birds* **103(12)**: 702–711.

Stanford, J. (1995). Winter record for Field Sparrow at Sand Lake. *South Dakota Bird Notes* **47(1)**: 14.

Stanimirovic, Z. (1998). Crnogrla Strnadica (*Emberiza cirlus*) u Beogradu. *Ciconia* **7**: 130–131. In Serbo-Croatian with Englich summary.

Stankovic, B. (2008). Rock Bunting *Emberiza cia*. *Acrocephalus (Ljubljana)* **29(138/139)**: 192.

Staples, C.P. & Harrison, J.G. (1949). Further as to colour change with-out a moult with particular reference to the Snow-bunting (*Plectrophenax nivalis nivalis* (Linnaeus)) and sub-tractive change. *Bull. Brit. Orn. Club* **69**: 33–37, 89–103.

Stattersfield, A.J. & Capper, D.R. eds. (2000). *Threatened Birds of the World*. Lynx Edicions & BirdLife International, Barcelona & Cambridge.

Stattersfield, A.J., Crosby, M.J., Long, A.J. & Wege, D.C. eds. (1998). *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*. BirdLife Conservation Series **7**. BirdLife International, Cambridge, UK.

Steadman, D.W. (1982). The origin of Darwin's finches (Fringillidae, Passeriformes). *Trans. San Diego Soc. Nat. Hist.* **19(19)**: 279–296.

Steadman, D.W. (1984). The status of *Geospiza magnirostris* on Isla Floreana, Galápagos. *Bull. Brit. Orn. Club* **104(3)**: 99–102.

Steadman, D.W. & McKitrick, M.C. (1982). A pliocene bunting from Chihuahua, Mexico. *Condor* **84**: 240–241.

Steadman, D.W., Olson, S.L., Barber, J.C., Meister, C.A. & Melvill, M.E. (1980). Weights of some West Indian birds. *Bull. Brit. Orn. Club* **100**: 155–158.

Steffensen, J.P., Andersen, K.K., Bigler, M., and 17 other authors (2008). High-resolution Greenland ice core data show abrupt climate change happens in few years. *Science (Washington, D.C.)* **321**: 680–684.

Steinbacher, G. (1938). Zur Brutbiologie der Orangebrusttangare (*Calospiza thoracica* Tem.). *Beitr. Fortpflanzungsbiol. Vögel* **14**: 81–84. In German.

Steinbacher, J. (1981). Von Stärlingen und dem Schwarzkehltrupial *Icterus gularis* Wagler. *Gefiederte Welt* **105(11)**: 201. In German.

Steinheimer, F.D. (2004). Charles Darwin's bird collection and ornithological knowledge during the voyage of H.M.S. Beagle, 1831–1836. *J. Orn.* **145(4)**: 300–320, appendix URL: http://www.do-g.de/fileadmin/do-g_dokumente/dokumente/Steinheimer_appendix_2.pdf [40 pp.] (download 22 June 2011).

Steinheimer, F.D. & Sudhaus, W. (2006). Die Speziation der Darwinfinken und der Mythos ihrer initialen Wirkung auf Charles Darwin. *Naturwiss. Rundsch.* **59(8)**: 409–422. In German.

Stepanyan, L.S. (1979). [On the nomenclature of subspecies of *Emberiza variabilis* Temminck, 1835 (Aves, Emberizidae)]. *Zoologicheskii Zhurnal* **58(12)**: 1894–1896. In Russian.

Stepanyan, L.S. (1990). *Konspekt ornitologicheskoi fauny SSSR*. [*Conspectus of the Ornithological Fauna of the USSR*]. Nauka, Moscow. In Russian with English summary.

Stepney, P.H.R. (1975). Brewer's Blackbird: historical aspect, recent changes, and fluctuations. *Bird-Banding* **46**: 106–125.

Stepney, P.H.R. & Power, D.M. (1973). Analysis of the eastward breeding expansion of Brewer's Blackbird plus general aspects of avian expansions. *Wilson Bull.* **85(4)**: 452–464.

Steullet, A.B. & Deautier, E.A. (1940). Sobre la presencia de *Pitylus fuliginosus* y *Columba albipennis* en la Argentina. *Notas Museo Plata (Palaeontol.)* **5**: 45–47. In Spanish.

Stevens, D.K., Donald, P.F., Evans, A.D., Buckingham, D.L. & Evans, J. (2002). Territory distribution and foraging patterns of Cirl Buntings (*Emberiza cirlus*) breeding in the UK. *Biol. Conserv.* **107(3)**: 307–313.
Stevenson, H.M. (1978). The populations of Boat-tailed Grackles in the southeastern United States. *Proc. Biol. Soc. Washington* **91**: 27–51.
Stevenson, H.M. & Anderson, B.H. (1994). *The Birdlife of Florida*. University Press of Florida, Gainesville, Florida.
Steward, P.A. & Skinner, R.W. (1967). Weights of birds from Alabama and North Carolina. *Wilson Bull.* **79**: 37–42.
Stewart, K.A. & MacDougall-Shackleton, E.A. (2008). Local song elements indicate local genotypes and predict physiological condition in Song Sparrows *Melospiza melodia*. *Biol. Letters (London)* **4(3)**: 240–242.
Stiles, E.W. (1980). Bird community structure in alder forests in Washington. *Condor* **82**: 20–30.
Stiles, F.G. (1983). Birds. Chapter 10 in: Janzen, D.H. ed. (1983). *Costa Rican Natural History*. University of Chicago Press, Chicago, Michigan.
Stiles, F.G. (1984). The Nicaraguan Seed-finch (*Oryzoborus nuttingi*) in Costa Rica. *Condor* **86**: 118–122.
Stiles, F.G. (1988). Notes on the distribution and status of certain birds in Costa Rica. *Condor* **90**: 931–933.
Stiles, F.G. (1996). When black plus white equals gray: the nature of variation in the Variable Seedeater complex (Emberizidae: *Sporophila*). *Orn. Neotropical* **7**: 75–107.
Stiles, F.G. (1998a). Las aves endémicas de Colombia. Pp. 378–385, 428–432 in: Chaves, M.E. & Arango, N. eds. (1998). *Informe Nacional sobre el Estado de la Biodiversidad, Colombia 1997*. Vol. 1. Diversidad biológica. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Programa de Naciones Unidas para el Medio Ambiente, Ministerio del Medio Ambiente, Bogotá, Colombia.
Stiles, F.G. (1998b). Notes on the biology of two threatened species of *Bangsia* tanagers in northwestern Colombia. *Bull. Brit. Orn. Club* **118**: 25–31.
Stiles, F.G. (2004). The Tumaco Seedeater (*Sporophila insulata*, Emberizidae): a species that never was? *Orn. Neotropical* **15(1)**: 17–30.
Stiles, F.G. & Hespenheide, H.A. (1972). Observations on two rare Costa Rican finches. *Condor* **74**: 99–101.
Stiles, F.G. & Skutch, A.F. (1989). *A Guide to the Birds of Costa Rica*. Cornell University Press & Comstock Publishing Associates, Ithaca, New York.
Stiles, F.G., Bohórquez, C.I., Cadena, C.D., de la Zerda, S., Hernández, M., Rosselli, L., Kelsey, M., Valencia, I.D. & Knapp, D. (2000). *Aves de la Sabana de Bogotá, Guía de Campo*. Asociación Bogotana de Ornitología & CAR, Bogotá, Colombia.
Stiles, F.G., Rosselli, L. & Bohórquez, C.I. (1999). New and noteworthy records of birds from the middle Magdalena valley of Colombia. *Bull. Brit. Orn. Club* **119(2)**: 113–129.
Stoate, C. & Szczur, J. (2001). Whitethroat *Sylvia communis* and Yellowhammer *Emberiza citrinella* nesting success and breeding distribution in relation to field boundary vegetation. *Bird Study* **48(2)**: 229–235.
Stoate, C., Moreby, S.J. & Szczur, J. (1998). Breeding ecology of farmland Yellowhammers *Emberiza citrinella*. *Bird Study* **45(1)**: 109–121.
Stober, J.M. & Krementz, D.G. (2000). Survival and reproductive biology of the Bachman's Sparrow. *Proc. Ann. Conf. Southeastern Assoc. Fish & Wildl. Agencies* **54**: 383–390.
Stober, J.M. & Krementz, D.G. (2006). Variation in Bachman's Sparrow home-range size at the Savannah River Site, South Carolina. *Wilson J. Orn.* **118(2)**: 138–144.
Stoddard, M. & Prum, R. (2008). Evolution of avian plumage color in a tetrahedral color space: a phylogenetic analysis of New World buntings. *Amer. Naturalist* **171(6)**: 755–776.
Stoffels, J. & van der Weijden, W.J. (1978). Record of a White Throated Sparrow *Zonotrichia albicollis* in the Netherlands. *Limosa* **51(1/2)**: 75–77.
Stöhr, A. (2002). Hinweise zur Bestimmung der Zaunammer *Emberiza cirlus*. *Limicola* **16(1)**: 1–21. In German with English summary.
Stokes, A.W. (1993). A banding study of Lazuli Buntings in northern Utah, 1974–1981. *Utah Birds* **9**: 17–25.
Stokes, D.W. & Stokes, L.Q. (2000). *Stokes Oriole Book: the Complete Guide to Attracting, Identifying, and Enjoying Orioles*. Little & Brown, Boston & London.
Stolt, B.O. (1977). On the migration of the Ortolan Bunting *Emberiza hortulana* L. *Zoon* **5**: 51–61.
Stolt, B.O. (1987). What is the migratory direction through Europe of Ortolan Buntings, *Emberiza hortulana*, from Scandinavia and Finland? *Vår Fågelvärld* **46(2)**: 48–53.
Stolt, B.O. (1993). Notes on reproduction in a declining population of the Ortolan Bunting *Emberiza hortulana* L. *J. Orn.* **134**: 59–68.
Stolt, B.O. & Fransson, T. (1995). Body mass, wing length and spring arrival of the Ortolan Bunting *Emberiza hortulana*. *Ornis Fenn.* **72(1)**: 14–18.
Stone, W. (1918). Birds of the Panama Canal Zone, with special reference to a collection made by Mr. Lindsey L. Jewel. *Proc. Acad. Nat. Sci. Philadelphia* **70**: 239–280.
Stone, W. (1927). [Recent literature review] Chapman on *Saltator aurantiirostris*. *Auk* **44(3)**: 452.
Stoner, E.A. (1947). Nest stealing by Black-headed Grosbeak. *Auk* **64(1)**: 129–130.
Stones, A.J., Bean, N.A.J. & van Balen, S. (1997). Black-faced Bunting *Emberiza spodocephala* on Taliabu Island, Sula Island Group; the first record for Indonesia. *Kukila* **9**: 56–57.
Storer, R.W. (1955). A preliminary survey of the sparrows of the genus *Aimophila*. *Condor* **57**: 193–201.
Storer, R.W. (1957). The hybrid origin of *Chlorophanes purpurascens*. *Auk* **74(4)**: 507.
Storer, R.W. (1958). The affinities of *Oreothraupis arremonops*. *Auk* **75**: 352–354.
Storer, R.W. (1960). Notes on the systematics of the tanager genus *Conothraupis*. *Auk* **77**: 350–351.
Storer, R.W. (1961). A hybrid between the Painted and Indigo Buntings. *Wilson Bull.* **73**: 209.
Storer, R.W. (1969). What is a tanager? *Living Bird* **8**: 127–136.
Storer, R.W. (1970a). Subfamily Thraupinae – tanagers. Pp. 246–408 in: Paynter, R.A. ed. (1970). *Check-list of Birds of the World. A Continuation of the Work of James L. Peters*. Vol. 13. Museum of Comparative Zoology, Cambridge, Massachusetts.
Storer, R.W. (1970b). Subfamily Tersinae – swallow-tanager. Pp. 408–409 in: Paynter, R.A. ed. (1970). *Check-list of Birds of the World. A Continuation of the Work of James L. Peters*. Vol. 13. Museum of Comparative Zoology, Cambridge, Massachusetts.
Storer, R.W. (1989a). Geographic variation in the Yellow-rumped Tanager (Aves: Thraupinae). *Proc. Biol. Soc. Washington* **102(3)**: 553–554.
Storer, R.W. (1989b). Notes on Paraguayan birds. *Occas. Pap. Mus. Zool. Univ. Mich.* **719**: 1–21.
Storer, R.W. & Zimmermann, D.A. (1959). Variation in the Blue Grosbeak (*Guiraca caerulea*) with special reference to the Mexican populations. *Occas. Pap. Mus. Zool. Univ. Mich.* **609**: 1–13.
Stotz, D.F. (1992). Buff-throated Saltator eats army ants. *Wilson Bull.* **104(2)**: 373–374.
Stotz, D.F., Fitzpatrick, J.W., Parker, T.A. & Moskovits, D.K. eds. (1996). *Neotropical Birds: Ecology and Conservation*. University of Chicago Press, Chicago, Illinois.
Stouffer, P.C., Strong, C. & Naka, L.N. (2009). Twenty years of understorey bird extinctions from Amazonian rain forest fragments: consistent trends and landscape-mediated dynamics. *Divers. Distr.* **15(1)**: 88–97.
Stowers, J.F., Harke, D.T. & Stickley, A.R. (1968). Vegetation used for nesting by the Red-winged Blackbird in Florida. *Wilson Bull.* **80**: 320–324.
Stoyanov, G.P., Nikolov, B.P., Hristova, I.P., Aleksov, R.L. & Stanchev, R.H. (2005). Black-headed Bunting *Emberiza melanocephala*. *Acrocephalus (Ljubljana)* **26(126)**: 162.
Straka, U. (1991). Zum Vorkommen der Schneeammer (*Plectrophenax nivalis* L.) in Ackerbaugebieten Niederösterreichs in den Wintern 1984/85 bis 1988/89. *Egretta* **34(1)**: 34–41. In German with English summary.
Stralberg, D., Jongsomjit, D., Howell, C.A., Snyder, M.A., Alexander, J.D., Wiens, J.A. & Root, T.L. (2009). Re-shuffling of species with climate disruption: a no-analog future for California birds? *PLoS One* **4**: e6825.
Straneck, R. (1990). *Canto de las Aves Pampeanas II*. Cassette. Literature of Latin America, Buenos Aires, Argentina.
Strauch, J.G. (1977). Further bird weights from Panama. *Bull. Brit. Orn. Club* **97**: 61–65.
Strecker, J.K. (1893). Nesting of the Painted Bunting. *Nidiologist* **1**: 39–40.
Strehl, C.E. & White, J. (1986). Effects of superabundant food on breeding success and behaviour of the Red-winged Blackbird. *Oecologia (Berlin)* **70(2)**: 178–186.
Stresemann, E. (1919). Beiträge zur Kenntnis der Gefiederwandlungen der Vögel 1. *Verh. Orn. Ges. Bayern* **14**: 75–81. In German.
Stresemann, E. & Portenko, L.A. eds. (1960). *Atlas der Verbreitung palaearktischer Vögel*. 1st instalment. Akademie-Verlag, Berlin. In German.
Stresemann, E. & Stresemann, V. (1969). Die Mauser einiger *Emberiza*-Arten 1. *J. Orn.* **110**: 291–313. In German.
Stresemann, E. & Stresemann, V. (1970). Die Vollmauser der Schneeammer *Plectrophenax nivalis*. *Beitr. Vogelkd.* **16**: 386–392. In German.
Stresemann, E., Portenko, L.A. & Mauersberger, G. eds. (1971). *Atlas der Verbreitung palaearktischer Vögel*. 3rd instalment. Akademie-Verlag, Berlin. In German.
Strewe, R. (1999). Notes on the rediscovery of the Baudó Oropendola *Psarocolius cassini* in Chocó, Colombia. *Cotinga* **12**: 40–43.
Strewe, R. (2001a). Notes on nests and breeding activity of fourteen bird species from southwestern Colombia. *Orn. Neotropical* **12**: 265–269.
Strewe, R. (2001b). First breeding records of Black-chinned Mountain-tanager *Anisognathus notabilis* and first nesting records in the wild of Blue-winged Mountain-tanager *A. flavinucha* with ecological notes. *Cotinga* **15**: 38–42.
Strewe, R. & Kreft, S. (1999). First records of Masked Mountain-tanager (*Buthraupis wetmorei*) and Black-backed Bush-tanager (*Urothraupis stolzmanni*) (Thraupinae) for Nariño, southwestern Colombia. *Orn. Neotropical* **10**: 111–113.
Strewe, R. & López-Lanús, B. (2002). *Psarocolius cassini*. Pp. 458–461 in: Renjifo *et al.* (2002).
Strewe, R. & Navarro, C. (2004). New and noteworthy records of birds from the Sierra Nevada de Santa Marta region in Colombia. *Bull. Brit. Orn. Club* **124**: 38–51.
Strote, J. & Nowicki, S. (1996). Responses to songs with altered tonal quality by adult Song Sparrows (*Melospiza melodia*). *Behaviour* **133(3/4)**: 161–172.
Stuart, T.E.H. (2000). The first record of Variable Seedeater *Sporophila americana* in Bolivia. *Cotinga* **13**: 76.
Stuart Baker, E.C. (1926). *The Fauna of British India, Including Ceylon and Burma. Birds*. Vol. 3. 2nd edition. Taylor and Francis, London.
Stubblefield, M.D. & Rising, J.D. (2002). Review of Eastern and Spotted Towhee taxa based on possible Spotted Towhee in Central Park, NYC 29 April 2001. *Kingbird* **52(3)**: 198–211.
Studds, C.E., Kyser, T.K. & Marra, P.P. (2008). Natal dispersal driven by environmental conditions interacting across the annual cycle of a migratory songbird. *Proc. Natl. Acad. Sci. USA* **105**: 2929–2933.
Studer, A. (1982). *La Redécouverte de l'Ictéridé* Curaeus forbesi *ao Brésil*. Université Nancy, Nancy, France. In French.
Studer, A. & Vielliard, J. (1988). Premières données étho-écologiques sur l'Ictéridé brésilien *Curaeus forbesi* (Sclater, 1886) (Aves, Passeriformes). *Rev. Suisse Zool.* **95(4)**: 1063–1077. In French.
Sturge, R.J., Jacobsen, F., Rosensteel, B.B., Neale, R.J. & Omland, K.E. (2009). Colonization of South America from Caribbean Islands confirmed by molecular phylogeny with increased taxon sampling. *Condor* **111(3)**: 575–579.
Stutchbury, B.J.M. & Morton, E.S. (2001). *Behavioral Ecology of Tropical Birds*. Academic Press, San Diego, California.
Stutchbury, B.J.M., Capuano, B. & Fraser, G.S. (2005). Avian frugivory on a gap-specialist, the red elderberry (*Sambucus racemosa*). *Wilson Bull.* **117(4)**: 336–340.
Stutchbury, B.J.M., Martin, P.R. & Morton, E.S. (1996). Nesting behavior of the Slate-colored Seedeater (*Sporophila schistacea*) in Panama. *Orn. Neotropical* **7(1)**: 63–65.
Styblo, P. & Mlikovsky, J. (1992). Weights and measurements of birds from the Svjatoj Nos wetlands, Lake Baikal. Pp. 89–102 in: Mlikovsky, J. & Styblo, P. eds. (1992). *Ecology of the Svjatoj Nos wetlands, Lake Baikal: Results of the Svjatoj Nos 1991 Expedition*. Ninox Press, Prague.
Suarez, S.D. & Gallup, G.G. (1987). The question of an auditory self-concept in Song Sparrows, *Melospiza melodia*. *Anim. Behav.* **35(2)**: 610–612.
Südbeck, P., Bauer, H.G., Boschert, M., Boye, P. & Knief, W. (2007). Rote Liste der Brutvögel Deutschlands. 4th edition. *Ber. Vogelschutz* **44**: 23–81. In German.
Sudhaus, W. (1969). Am Brutplatz der Zwergammer (*Emberiza pusilla*) in Nordnorwegen. *Vogelwelt* **90**: 53–59. In German.
Sugiyama, M.S. (2001). Narrative theory and function: why evolution matters. *Phil. Lit. (Johns Hopkins Univ. Press)* **25(2)**: 233–250.
Sullivan, B.L., Kershner, E.L., Dunn, J.J., Kaler, R.S.A., Lynn, S., Munkwitz, N.M. & Plissner, J.H. (2005). The birds of San Clemente Island. *Western Birds* **36(3)**: 158–273.
Sullivan, K.A. (1988a). Age-specific profitability and prey choice. *Anim. Behav.* **36(2)**: 613–615.
Sullivan, K.A. (1988b). Ontogeny of time budgets in Yellow-eyed Juncos: adaptation to ecological constraints. *Ecology* **69(1)**: 118–124.
Sullivan, K.A. (1990). Daily time allocation among adult and immature Yellow-eyed Juncos over the breeding season. *Anim. Behav.* **39(2)**: 380–387.
Sullivan, K.A. (1999). Yellow-eyed Junco (*Junco phaeonotus*). No. **464** in: Poole, A. & Gill, F. eds. (1999). *The Birds of North America*. Vol. 12. The Birds of North America Inc., Philadelphia, Pennsylvania.
Sullivan, K.A. & Roper, J.J. (1996). Impacts of predation on passerine post-fledging success. *Trans. North Amer. Wildl. Nat. Resour. Conf.* **61**: 77–85.
Sullivan, K.A. & Weathers, W.W. (1992). Brood size and thermal environment influence field metabolism of nestling Yellow-eyed Juncos. *Auk* **109(1)**: 112–118.
Sullivan, K.A., Cole, J. & Villalobos, E.M. (1989). Intraspecific nest usurpation by a Yellow-eyed Junco. *Wilson Bull.* **101(4)**: 654–655.
Sulloway, F.J. (1982a). The Beagle collections of Darwin's finches (Geospizinae). *Brit. Mus. (Nat. Hist.) Bull. Zool. Ser.* **43(2)**: 49–94.
Sulloway, F.J. (1982b). Darwin and his finches: the evolution of a legend. *J. Hist. Biol.* **15(1)**: 1–53.
Šulpin, L. (1931). [Notes on *Emberiza yessoensis continentalis* Witherby from the coastal part of Oriental Siberia and comments on its relations]. *Bull. Acad. Sci. Leningrad* **1931**: 721–727. In Russian.
Šulpin, L. (1932). [On the biology and distribution of the Rufous Bunting (*Emberiza rutila* Pall.)]. *Ann. Mus. Zool. Acad. Sci. Union Républ. (Leningrad)* **32**: 469–480. In Russian.
Sultana, J. & Gauci, C. (1984–1985). Two new species for Malta – Red-eyed Vireo and Chestnut Bunting. *Il-Merill* **23**: 11.
Sundberg, J. (1995). Parasites, plumage coloration and reproductive success in the Yellowhammer, *Emberiza citrinella*. *Oikos* **74(2)**: 331–339.
Sung Ha-Cheol & Handford, P. (2006). Songs of the Savannah Sparrow: structure and geographic variation. *Can. J. Zool.* **84(11)**: 1637–1646.
Sung Ha-Cheol & Park Shi-Ryong (1994). Species recognition on the basis of song by Yellow-throated Bunting (*Emberiza elegans*). *Korean J. Zool.* **37(4)**: 574–579. In Korean with English summary.
Surmacki, A. (2004). Habitat use by Reed Bunting *Emberiza schoeniclus* in an intensively used farmland in western Poland. *Ornis Fenn.* **81(3)**: 137–143.
Sushkin, P.P. (1925). Notes on systematic and distribution of certain Palaearctic Birds. *Proc. Boston Soc. Nat. Hist.* **38**: 1–55.
Suter, S.M., Ermacora, D., Rieille, N. & Meyer, D.R. (2009). A distinct Reed Bunting dawn song and its relation to extrapair paternity. *Anim. Behav.* **77(2)**: 473–480.

Suter, S.M., Keiser, M., Feignoux, R. & Meyer, D.R. (2007). Reed Bunting females increase fitness through extra-pair mating with genetically dissimilar males. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **274**: 2865–2871.
Suthers, H.B. (1994). Sex determination by wing and tail measurements in the Song Sparrow and Field Sparrow. *North Amer. Bird Bander* **19(3)**: 77–83.
Sutter, G.C., Troupe, T. & Forbes, M. (1995). Abundance of Baird's Sparrows *Ammodramus bairdii*, in native prairie and introduced vegetation. *Ecoscience* **2(4)**: 344–348.
Sutton, G.M. (1941). The juvenal plumage and post-juvenal molt of the Vesper Sparrow. *Occas. Pap. Mus. Zool. Univ. Mich.* **445**: 1–10.
Sutton, G.M. (1942). Notes on birds of the Monterrey district of Nuevo Leon, Mexico. *Wilson Bull.* **54**: 199–203.
Sutton, G.M. (1948). Comments on *Icterus cucullatus cucullatus* in the United States. *Condor* **50**: 257–258.
Sutton, G.M. (1950). The Crimson-collared Grosbeak. *Wilson Bull.* **62(4)**: 155–156.
Sutton, G.M. (1951a). *Mexican Birds: First Impressions*. University of Oklahoma Press, Norman, Oklahoma.
Sutton, G.M. (1951b). Dispersal of mistletoe by birds. *Wilson Bull.* **63**: 235–237.
Sutton, G.M. (1967). *Oklahoma Birds: their Ecology and Distribution, with Comments on the Avifauna of the Southern Great Plains*. 1st edition. University of Oklahoma Press, Norman, Oklahoma.
Sutton, G.M. & Burleigh, T.D. (1940). Birds of Tamazunchale, San Luis Potosí. *Wilson Bull.* **52**: 221–233.
Sutton, G.M. & Parmelee, D.F. (1955). Summer activities of the Lapland Longspur on Baffin Island. *Wilson Bull.* **67**: 110–127.
Sutton, G.M. & Pettingill, O.S. (1934). The Alta Mira Oriole and its nest. *Condor* **45**: 125–132.
Sutton, G.M. & Pettingill, O.S. (1942). Birds of the Gómez Farias region, southwestern Tamaulipas. *Auk* **59**: 1–34.
Sutton, G.M., Lea, R.B. & Edwards, E.P. (1950). Notes on the ranges and breeding habits of certain Mexican birds. *Bird-Banding* **21(2)**: 45–59.
Svagelj, W.S., Fernández, G.J. & Mermoz, M.E. (2009). Effects of nest-site characteristics and parental activity on cowbird parasitism and nest predation in Brown-and-yellow Marshbirds. *J. Field Orn.* **80(1)**: 9–18.
Svensson, L. (1975). Dvärgsparv *Emberiza pusilla* och sävsparvhona *E. schoeniclus* – problemet att skilja dem åt i fält. *Vår Fågelvärld* **34(4)**: 311–318. In Swedish.
Svensson, L. (1992). *Identification Guide to European Passerines*. 4th edition. Published privately, Stockholm.
Svensson, L. (1994). Sexing and ageing of Black-faced Bunting. *Birding World* **7(5)**: 203–204.
Svensson, L. (1996). Ageing Yellowhammers *Emberiza citrinella*. *Ringing & Migration* **17(2)**: 122.
Svensson, L., Mullarney, K. & Zetterström, D. (2009). *Collins Bird Guide*. 2nd edition. HarperCollins, London.
Svingen, P.H. (2001). A fall record of the Black-headed Grosbeak in Lake County. *Loon* **73(3)**: 179–180.
Svingen, P.H. (2005). Black-headed Grosbeak in Rock County. *Loon* **77(4)**: 258–259.
Swain, S.D. (1987). Overnight changes in the circulating energy substrate concentrations in the Vesper Sparrow (*Pooecetes gramineus*). *Comp. Biochem. Physiol Part A Physiol.* **86(3)**: 439–441.
Swanson, D.L. (1990). Seasonal variation in cold hardiness and peak rates of cold-induced thermogenesis in the Dark-eyed Junco (*Junco hyemalis*). *Auk* **107(3)**: 561–566.
Swanson, D.L. & Liknes, E.T. (2001). Range expansion and first documented nesting of Great-tailed Grackles (*Quiscalus mexicanus*) in South Dakota. *Proc. South Dakota Acad. Sci.* **80**: 13–20.
Swanson, D.W. (1985). New nesting record for Botteri's Sparrow, *Aimophila botterii*, in south Texas. *Southwest. Nat.* **30(1)**: 161.
Swanson, H.M., Kinney, B. & Cruz, A. (2004). Breeding biology of the Chipping Sparrow in ponderosa pine forests of the Colorado Front Range. *Wilson Bull.* **116(3)**: 246–251.
Swarth, H.S. (1920). Revision of the avian genus *Passerella* with special reference to the distribution and migration of the races in California. *Univ. Calif. Publ. Zool.* **21**: 75–224.
Swarth, H.S. (1929). A new bird family (Geospizidae) from the Galapagos Islands. *Proc. Calif. Acad. Sci.* **Ser. 4, no. 18**: 29–43.
Swarth, H.S. (1931). *The Avifauna of the Galapagos Islands*. Occasional Papers of the California Academy of Science **18**. California Academy of Science, San Fransisco, California. 299 pp.
Swash, A. & Still, R. (2000). *Birds, Mammals & Reptiles of the Galápagos Islands: an Identification Guide*. Pica Press & WildGuides, Robertsbridge & Old Basing.
Sweeney, R.J., Lovette, I.J. & Harvey, E.L. (2004). Evolutionary variation in feather waxes of passerine birds. *Auk* **121(2)**: 435–445.
Swenk, M.H. & Stevens, O.A. (1929). Harris's Sparrow and the study of it by trapping. *Wilson Bull.* **41**: 129–177.
Sworth, H.S. (1904). *Birds of the Huachuca Mountains, Arizona*. Pacific Coast Avifauna **4**. Cooper Ornithological Club, Santa Clara, California. 70 pp.
Szabó-Szeley, L. (2004). Erste Brutnachweise und Expansion der Kappenammer *Emberiza melanocephala* in Rumänien. *Limicola* **18(4)**: 205–208. In German with English summary.
Taber, R.C. (1947). The Dickcissel in Wisconsin. *Passenger Pigeon* **9**: 39–46.
Taber, W. (1968a). Western Painted Bunting *Passerina ciris pallidior* Mearns. Pp. 154–155 in: Bent & Austin (1968).
Taber, W. (1968b). *Passerculus sanwichensis beldingi*, Belding's Sparrow. Pp. 714–717 in: Bent & Austin (1968).
Taber, W. (1968c). *Passerculus sandwichensis sanctorum* Ridgway, San Benito Savannah Sparrow. Pp. 718–720 in: Bent & Austin (1968).
Taber, W. (1968d). *Passerculus sandwichensis guttatus* Lawrence, Abreojos Savannah Sparrow. Pp. 720–721 in: Bent & Austin (1968).
Taber, W. (1968e). *Passerculus sandwichensis rostratus* (Cassin), Large-billed Savannah Sparrow. Pp. 722–724 in: Bent & Austin (1968).
Taber, W. & Johnston, D.W. (1968). Indigo Bunting *Passerina cyaneus* (Linnaeus). Pp. 80–111 in: Bent & Austin (1968).
Taczanowski, L. (1884). *Ornithologie du Pérou*. Vols. 1–2. R. Friedländer und Sohn & Oberthur, Berlin & Rennes. In French.
Tada, M. & Anzai, T. (1994). Breeding bird communities at the foot of Mt. Toyama in Oku-Nikko, northern Kanto. *Jap. J. Orn.* **43(1)**: 35–39. In Japanese with English summary.
Takano, T., Hamaguchi, T., Morioka, T., Kanouchi, T. & Kabaya, T. (2001). [Wild Birds of Japan]. Yama-Kei, Tokyo. In Japanese.
Takekawa, J.Y., Sacks, B.N., Woo, I., Johnson, M.L. & Wylie, G.D. (2006). Tidal saltmarsh fragmentation and persistence of San Pablo Song Sparrows (*Melospiza melodia samuelis*): assessing benefits of wetland restoration in San Francisco Bay. *Studies Avian Biol.* **32**: 238–246.
Tallman, D.A. (1974). *Colonization of a Semi-isolated Temperate Cloud Forest: Preliminary Interpretation of Distributional Patterns of Birds in the Carpish Region of the Department of Huánuco, Peru*. MSc thesis, Louisiana State University, Baton Route, Louisiana.
Tallman, D.A., Swanson, D.L. & Palmer, J.S. (2002). *Birds of South Dakota*. South Dakota Ornithologists' Union, Aberdeen, South Dakota.
Tamada, K. (2007). Grassland birds at Cape Shiretoko, northern Japan. *Strix* **25**: 119–124. In Japanese with English summary.
Tamada, K. & Umeki, M. (2007). Breeding birds of wildlife protection area in Sapporo and Otaru. *Hokkaido Kankyu Kagaku Kenkyu Senta Shoho* **33**: 58–66. In Japanese with English summary.
Tamplin, J.W., Demastes, J.W. & Remsen, J.V. (1993). Biochemical and morphometric relationships among some members of the Cardinalinae. *Wilson Bull.* **105(1)**: 93–113.
Tarboton, W.R. (1980). Avian populations in Transvaal savanna. Pp. 113–124 in: Johnson, D.N. ed. (1980). *Proceedings of the Fourth Pan-Afrian Ornithological Congress*. Southern African Ornithological Society, Johannesburg & Mahé, Seychelles.
Tarboton, W.R. (2001). *A Guide to the Nests and Eggs of Southern African Birds*. Struik, Cape Town.
Tarroux, A. & McNeil, R. (2003). Influence of rain on the breeding and molting phenology of birds in a thorn woodland of northeastern Venezuela. *Orn. Neotropical* **14**: 371–380.
Tashian, R.E. (1952). Some birds from the Palenque region of northeastern Chiapas, Mexico. *Auk* **69**: 60–69.
Tashian, R.E. (1953). The birds of southeastern Guatemala. *Condor* **55**: 198–210.
Tashian, R.E. (1957). Nesting behaviour of the Crested Oropendola (*Psarocolius decumanus*) in Northern Trinidad, B.W.I. *Zoologica (New York)* **42**: 87–97.
Tasker, R.R. (1955). Chipping Sparrow with song of Clay-colored Sparrow at Toronto. *Auk* **72**: 303.
Taylor, K. (1987). The Rusty Blackbird (*Euphagus carolinus*) on Vancouver Island. *Victoria Naturalist (Brit. Columbia)* **44(2)**: 12–13.
Taylor, P. ed. (2003). *The Birds of Manitoba*. Manitoba Naturalists Society, Winnipeg, Manitoba, Canada.
Taylor, R.G.L. (1955). *Introduction to the Birds of Jamaica*. Macmillan, London.
Taylor, W.K. (1974). A new hybrid bunting (*Passerina cyanea* × *Passerina ciris*). *Auk* **91(3)**: 485–487.
Taylor, W.K., Anderson, B.H. & Stevenson, H.M. (1989). Breeding range extension of the Indigo Bunting, Painted Bunting, and Blue Grosbeak in Florida with new records for Seminole County. *Florida Field Nat.* **17**: 1–10.
Teather, K.L. (1989). Sex and egg size in Great-tailed Grackles. *Condor* **91**: 203–205.
Teather, K.L. (1993). Behavioral development of male and female Red-winged Blackbirds. *Wilson Bull.* **105**: 159–166.
Teather, K.L. & Robertson, R.J. (1986). Pair bonds and factors influencing the diversity of mating systems in Brown-headed Cowbirds. *Condor* **88**: 63–69.
Tebb, G. & Hamidan, N. (2002). The first Rustic Bunting *Emberiza rustica* in Jordan. *Sandgrouse* **24(1)**: 53–54.
Tebb, G. & Ranner, A. (2002). New and significant bird records for Buryatia, Russia. *Forktail* **18**: 101–105.
Tebb, G., Kautz, W., Kautz, R. & Juen, G. (2008). Der erste belegte Nachweis der Waldammer, *Emberiza rustica* (Pallas 1776), aus Österreich. *Egretta* **49**: 52–55. In German.
Tebb, G., Ofner, A. & Basnet, S. (2004). First documented record of Red-headed Bunting *Emberiza bruniceps* from Nepal. *Forktail* **20**: 99–100.
Tebbich, S. & Bshary, R. (2004). Cognitive abilities related to tool use in the Woodpecker Finch, *Cactospiza pallida*. *Anim. Behav.* **67(4)**: 689–697.
Tebbich, S., Taborsky, M., Fessl, B. & Blomqvist, D. (2001). Do Woodpecker Finches acquire tool-use by social learning? *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **268**: 2189–2193.
Tebbich, S., Taborsky, M., Fessl, B. & Dvorak, M. (2002). The ecology of tool-use in the Woodpecker Finch (*Cactospiza pallida*). *Ecol. Letters* **5(5)**: 656–664.
Tebbich, S., Taborsky, M., Fessl, B., Dvorak, M. & Winkler, H. (2004). Feeding behavior of four arboreal Darwin's finches: adaptations to spatial and seasonal variability. *Condor* **106(1)**: 95–105.
Telino, W.R., Lyra-Neves, R.M., Azevedo, S.M. & Larrazábal, M.E.L. (2008). First occurrence of the *Saltator atricollis* Vieillot, 1817 (Aves, Cardinalidae) in the state of Pernambuco, Brazil. *Ornithologia (CEMAVE)* **3(1)**: 34–37.
Tell, M. (1983). Breeding the Crested Black Bunting *Melophus lathami*. *Avicult. Mag.* **89(3)**: 133–135.
Tello, J.G. (1999). First description of nest and nestlings of White-winged Shrike-tanager *Lanio versicolor*. *Cotinga* **11**: 81–82.
Temme, M. (1974). New records of Philippine birds on the Island of Mindoro. *Bonn. Zool. Beitr.* **25(4)**: 292–296.
Temple, S.A. (2002). Dickcissel (*Spiza americana*). No. **703** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.
Templeton, C.N., Akcay, C., Campbell, S.E. & Beecher, M.D. (2010). Juvenile sparrows preferentially eavesdrop on adult song interactions. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **277**: 447–453.
Tenney, C.R. (1997). Black-chinned Sparrow (*Spizella atrogularis*). No. **270** in: Poole, A. & Gill, F. eds. (1997). *The Birds of North America*. Vol. 7. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Teplitsky, C., Mills, J.A., Alho, J.S., Yarrall, J.W. & Merilä, J. (2008). Bergmann's rule and climate change revisited: disentangling environmental and genetic responses in a wild bird population. *Proc. Natl. Acad. Sci. USA* **105(36)**: 13492–13496.
Teplitsky, C., Mouawad, N.G., Balbontín, J., de Lope, F. & Møller, A.P. (2011). Quantitative genetics of migration syndromes: a study of two Barn Swallow populations. *J. Evol. Biol.* **24**: 2025–2039.
Terborgh, J. (1971). Distribution on environmental gradients: theory and a preliminary interpretation of distributional patterns in the avifauna of the Cordillera Vilcabamba, Peru. *Ecology* **52**: 23–40.
Terborgh, J. (1989). *Where have all the Birds Gone?* Princeton University Press, Princeton, New Jersey.
Terborgh, J. & Faaborg, J. (1973). Turnover and ecological release in the avifauna of Mona Island, Puerto Rico. *Auk* **90**: 759–779.
Terborgh, J. & Weske, J.S. (1969). Colonization of secondary habitats by Peruvian birds. *Ecology* **50**: 765–782.
Terborgh, J. & Weske, J.S. (1975). The role of competition in the distribution of Andean birds. *Ecology* **56**: 562–576.
Terborgh, J., Robinson, S.K., Parker, T.A., Munn, C.A. & Pierpont, N. (1990). Structure and organization of an Amazonian forest bird community. *Ecol. Monogr.* **60**: 213–238.
Terres, J.K. (1956). Eastern Meadowlark (*Sturnella magna*) eating a traffic-killed bird. *Auk* **73**: 289.
Terrill, S.B. (1987). Social dominance and migratory restlessness in the Dark-eyed Junco (*Junco hyemalis*). *Behav. Ecol. Sociobiol.* **21(1)**: 1–11.
Tewary, P.D. & Kumar, V. (1982). Photoperiodic responses of a subtropical migratory finch, the Black-headed Bunting (*Emberiza melanocephala*). *Condor* **84(2)**: 168–171.
Thackeray, S.J., Sparks, T.H., Frederiksen, M., and 22 other authors (2010). Trophic level asynchrony in rates of phenological change for marine, freshwater and terrestrial environments. *Global Change Biol.* **16**: 3304–3314.
Thatcher, B.S., Krementz, D.G. & Woodrey, M.S. (2006). Henslow's Sparrow winter-survival estimates and response to prescribed burning. *J. Wildl. Management* **70(1)**: 198–206.
Thayer, J.E. (1925). The nesting of the Worthen Sparrow in Tamaulipas, Mexico. *Condor* **27**: 34.
Theimer, T.C. (1987). The effect of seed dispersion on the foraging success of dominant and subordinate Dark-eyed Juncos, *Junco hyemalis*. *Anim. Behav.* **35(6)**: 1883–1890.
Thévenot, M., Vernon, R. & Bergier, P. (2003). *The Birds of Morocco: an Annotated Checklist*. British Ornithologists' Union Checklist **20**. British Ornithologists' Union, Tring, UK.
Thewlis, R.M. (1995). A Black-headed Bunting *Emberiza melanocephala* record from South-East Asia. *Nat. Hist. Bull. Siam Soc.* **43(1)**: 171–172.
Thewlis, R.M. & Martins, R.P. (2000). Observations on the breeding biology and behaviour of Kozlov's Bunting *Emberiza kozlowi*. *Forktail* **16**: 57–59.
Thiollay, J.M. (2002). Avian diversity and distribution in French Guiana: patterns across a large forest landscape. *J. Trop. Ecol.* **18(4)**: 471–498.
Thomas, B.T. (1979). The birds of a ranch in the Venezuelan llanos. Pp. 213–232 in: Eisenberg, J.F. ed. (1979). *Vertebrate Ecology in the Northern Neotropics*. Smithsonian Institution Press, Washington, D.C.
Thomas, B.T. (1982). Weights of some Venezuelan birds. *Bull. Brit. Orn. Club* **102**: 48–52.
Thomas, B.T. (1996). Notes on the distribution, body mass, foods and vocal mimicry of the Gray Seedeater (*Sporophila intermedia*). *Orn. Neotropical* **7**: 165–169.
Thomas, C.D. & Lennon, J.J. (1999). Birds extend their ranges northwards. *Nature (London)* **399**: 213.

Thomas, C.D., Bodsworth, E.J., Wilson, R.J., Simmons, A.D., Davies, Z.G., Musche, M. & Conradt, L. (2001). Ecological and evolutionary processes at expanding range margins. *Nature (London)* **441**: 577–581.

Thomas, C.D., Cameron, A., Green, R.E., and 16 other authors (2004). Extinction risk from climate change. *Nature (London)* **427**: 145–148.

Thomas, J.W., Caceres, M., Lowman, J.J., Morehouse, C.B., Short, M.E., Baldwin, E.L., Maney, D.L. & Martin, C.L. (2008). The chromosomal polymorphism linked to variation in social behavior in the White-throated Sparrow (*Zonotrichia albicollis*) is a complex rearrangement and suppressor of recombination. *Genetics* **179(3)**: 1455–1468.

Thomas, R.H. (1946). An Orchard Oriole colony in Arkansas. *Bird-Banding* **17**: 161–167.

Thomasset, B.C. (1915). Hybrid buntings. *Avicult. Mag.* **Ser. 3, no. 6**: 380–381.

Thompson, C.F. & Lanyon, S.M. (1979). Reverse mounting in the Painted Bunting. *Auk* **96**: 417–418.

Thompson, C.W. (1991a). The sequence of molts and plumages in Painted Buntings and implications for theories of delayed plumage maturation. *Condor* **93**: 209–235.

Thompson, C.W. (1991b). Is the Painted Bunting actually two species? Problems determining species limits between allopatric populations. *Condor* **93(4)**: 987–1000.

Thompson, C.W. & Leu, M. (1995). Molts and plumages of Orange-breasted Buntings (*Passerina leclancherii*): implications for theories of delayed plumage maturation. *Auk* **112(1)**: 1–19.

Thompson, D.B., Tomback, D.F., Cunningham, M.A. & Baker, M.C. (1987). Seed selection by Dark-eyed Juncos (*Junco hyemalis*): optimal foraging with nutrient constraints? *Oecologia (Berlin)* **74(1)**: 106–111.

Thompson, M.C. & Ely, C. (1992). *Birds in Kansas*. University Press of Kansas, Lawrence, Kansas.

Thompson, W.L. (1968). The songs of five species of *Passerina*. *Behaviour* **31**: 261–287.

Thompson, W.L. (1969). Song recognition by territorial male buntings (*Passerina*). *Anim. Behav.* **17**: 658–663.

Thompson, W.L. (1970). Song variation in a population of Indigo Buntings. *Auk* **87**: 58–71.

Thompson, W.L. (1976). Vocalizations of the Lazuli Bunting. *Condor* **78**: 195–207.

Thorneycroft, H.B. (1966). Chromosomal polymorphism in the White-throated Sparrow, *Zonotrichia albicollis* (Gmelin). *Science (Washington, D.C.)* **154**: 1571–1572.

Threlfall, W. & Blacquiere, J.R. (1982). Breeding biology of the Fox Sparrow in Newfoundland. *J. Field Orn.* **53**: 235–239.

Thuiller, W. & Münkemüller, T. (2010). Habitat suitability modelling. Pp. 77–88 in: Møller, Fiedler & Berthold (2010).

Thuiller, W., Araújo, M.B., Pearson, R.G., Whittaker, R.J., Brotons, L. & Lavorel, S. (2004). Biodiversity conservation: uncertainty in predictions of extinction risk. *Nature (London)* **430**. **DOI**: 10.1038/nature02716.

Thuiller, W., Lavergne, S., Roquet, C., Boulangeat, I., Lafourcade, B. & Araujo, M.B. (2011). Consequences of climate change on the tree of life in Europe. *Nature (London)* **470**: 531–534.

Thurber, W.A. (1986). Clay-colored Sparrow in Delaware County, Pennsylvania. *Cassinia* **61**: 92.

Thurber, W.A. & Villeda, A. (1980). Notes on parasitism by Bronzed Cowbirds in El Salvador. *Wilson Bull.* **92**: 112–113.

Thurber, W.A., Serrano, J.F., Sermeño, A. & Benítez, M. (1987). Status of uncommon and previously unreported birds of El Salvador. *Proc. West. Found. Vert. Zool.* **3**: 109–293.

Ticehurst, C.B. (1932). On the scientific name of Crested Bunting. *Bull. Brit. Orn. Club* **53**: 15–16.

Timken, R.L. (1970). Food habits and feeding behavior of the Baltimore Oriole in Costa Rica. *Wilson Bull.* **82**: 184–188.

Tinbergen, N. (1939). The behavior of the Snow Bunting in spring. *Trans. Linn. Soc. New York* **5**: 1–95.

Tinoco, B. (2009). Seasonality of the bird community in the Tumbesian dry forest in southwest Ecuador. *Orn. Neotropical* **20**: 157–170.

Tobias, J. (2003). Further sightings of Selva Cacique *Cacicus koepckeae* in Manu National Park, Peru. *Cotinga* **19**: 79–81.

Tobias, J. (2007). Far from the birding crowd: range extensions and recent additions to the Bolivian avifauna. *Neotropical Birding* **2**: 36–39.

Tobias, J.A. & Seddon, N. (2007). Nine bird species new to Bolivia and notes on other significant records. *Bull. Brit. Orn. Club* **127(1)**: 49–84.

Tobias, J.A. & Williams, R.S.R. (1996). Notes on the behavior of the Masked Saltator in southern Ecuador. *Auk* **113(4)**: 942–944.

Tobias, J.A., Clay, R.P. & Lowen, J.C. (1997). Field identification of Lesser Grass-finch *Emberizoides ypiranganus*. *Cotinga* **8**: 75–78.

Tobias, S.H., Butchart, M. & Collar, N.J. (2006). Lost and found: a gap analysis for the Neotropical avifauna. *Neotropical Birding* **1**: 4–22.

Todd, R.L. (1987). Varied Bunting. *Wildl. Views* **30(8)**: 4.

Todd, W.E.C. (1912). Descriptions of seventeen new Neotropical birds. *Ann. Carnegie Mus.* **8**: 198–214.

Todd, W.E.C. (1923a). A review of the genus *Cyanocompsa*. *Auk* **40**: 58–69.

Todd, W.E.C. (1923b). A synopsis of the genus *Arremonops*. *Proc. Biol. Soc. Washington* **36**: 35–44.

Todd, W.E.C. & Carriker, M.A. (1922). The birds of the Santa Marta region of Colombia: a study in altitudinal distribution. *Ann. Carnegie Mus.* **14**: i–viii, 1–611.

Toledo, V.M. & Hernández, H.M. (1979). *Erythrina oliviae*: a new case of oriole pollination in Mexico. *Ann. Missouri Bot. Garden* **66(3)**: 503–511.

Tomek, T. (1997). Preliminary report on the investigation of birds in North Korea. *Fragmenta Faunistica (Warsaw)* **40(16–31)**: 319–332.

Tomek, T. (2002). The birds of North Korea. Passeriformes. *Acta Zool. Cracoviensia* **45(1)**: 1–235.

Tompa, F.S. (1964). Factors determining the numbers of Song Sparrows, *Melospiza melodia* (Wilson), on Mandarte Island, B.C., Canada. *Acta Zool. Fennica* **109**: 1–73.

Tompkins, D.M. & Gleeson, D.M. (2006). Relationship between avian malaria distribution and an exotic invasive mosquito in New Zealand. *J. Roy. Soc. New Zealand* **36**: 51–62.

Tong Fuchun, Xiao Yihua, Bai Hasi, Sun Danting, Gao Wei & Wang Qingli (2002). Breeding ecology of Jankowski's Bunting in the dry grassland in Baicheng, Jilin Province. *Acta Ecol. Sinica.* **22(9)**: 1485–1490.

Tonnis, B., Grant, P.R., Grant, B.R. & Petren, K. (2005). Habitat selection and ecological speciation in Galápagos warbler finches (*Certhidea olivacea* and *Certhidea fusca*). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **272**: 819–826.

Tordoff, H.B. (1954). A systematic study of the avian family Fringillidae based on the structure of the skull. *Misc. Publ. Univ. Mich. Mus. Zool.* **81**: 1–42.

Torti, V.M. & Dunn, P.O. (2005). Variable effects of climate change on six species of North American birds. *Oecologia (Berlin)* **145**: 486–495.

Toru, N., Iijima, K., Ushiyama, H. & Yamagishi, S. (1970). Territoriality of *Emberiza yessoensis* in a high population density. *Misc. Rep. Yamashina Inst. Orn.* **6**: 82–102.

Toru, T. (2007). Avian diversity of riparian deciduous, lowland, broadleaved forest in Hokkaido, Japan: a comparative study of habitats and seasons. *Biosphere Conserv.* **8(1)**: 31–41.

Tostain, O. (1980). Contribution à l'ornithologie de la Guyane française. *Oiseau et RFO (Nouv. Sér.)* **50**: 47–62. In French.

Tostain, O., Dujardin, J.L., Érard, C. & Thiollay, J.M. (1992). *Oiseaux de Guyane: Biologie, Écologie, Protection, Répartition*. Société d'Etudes Ornithologiques & Laboratoire d'Ecologie Générale, Muséum National d'Histoire Naturelle, Brunoy, France. In French with English summary.

Tostes, A.P. (2003). Repovoamento com Bicudos *Oryzoborus crassirostris maximiliani*. *Atualidades Orn.* **115**: 12. In Portuguese.

Tøttrup, A.P., Thorup, K., Rainio, K., Yosef, R., Lehikoinen, E. & Rahbek, C. (2008). Avian migrants adjust migration in response to environmental conditions en route. *Biol. Letters (London)* **4(6)**: 685–688.

Tourenq, C., Avirmed, A., Monchtujaa, B. & Feh, C. (1996). Observations ornithologiques dans le sud-ouest de la Mongolie (première partie). *Alauda* **64(3)**: 355–362. In French with English summary.

Toussaint, A. (2007). *Birds of Saint Lucia, West Indies*. Ministry of Foreign Affairs, Taipeh, Taiwan.

Toussaint, A., John, L. & Morton, M. (2009). *The Status and Conservation of Saint Lucia's Forest Birds*. National Forest Demarcation and Bio-Physical Resource Inventory Project, Technical Report **12**. Finnish Consulting Group International, Helsinki, Finland. 79 pp.

Townsend, A.K., Rimmer, C.C., Latta, S.C. & Lovette, I.J. (2007). Ancient differentiation in the single-island avian radiation of endemic Hispaniolan chat-tanagers (Aves: Calyptophilus). *Mol. Ecol.* **16(7)**: 3634–3642.

Townsend, J.M. (2007). In search of Haiti's birds. *Living Bird* **26(2)**: 14–21.

Townsend, J.M. (2009). Gray-crowned Palm-tanager (*Phaenicophilus poliocephalus*). In: Schulenberg, T.S. ed. (2009). Neotropical birds online. Cornell Laboratory of Ornithology, Ithaca, New York. URL: http://neotropical.birds.cornell.edu/portal/species/identification?p_p_spp=46132 (download 27 November 2010).

Tracey, K.F. & Greenlaw, J.S. (2009). Occurrence of Seaside and Sharp-tailed Sparrows on the central Gulf coast of Florida. *Florida Field Nat.* **37(3)**: 75–85.

Trail, P.W. & Baptista, L.F. (1988). The behavior, status, and relationships of the endemic St. Lucia Black Finch. *Natl. Geogr. Res.* **5(1)**: 82–97.

Trainer, J.M. (1983). Changes in song dialect distributions and microgeographic variation in song of White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*). *Auk* **100(3)**: 568–582.

Trainer, J.M. (1987). Behavioral associations of song types during aggressive interactions among male Yellow-rumped Caciques. *Condor* **89**: 731–738.

Trainer, J.M. (1988). Singing organization during aggressive interactions among male Yellow-rumped Caciques. *Condor* **90**: 681–688.

Trainer, J.M. (1989). Cultural evolution in song dialects of Yellow-rumped Caciques in Panama. *Ethology* **80**: 190–204.

Trainer, J.M. & Parsons, R.J. (2002). Delayed vocal maturation in polygynous Yellow-rumped Caciques. *Wilson Bull.* **114(2)**: 249–254.

Trainer, J.M. & Peltz, B.S. (1996). Song repertoire of the Bobolink: a reassessment. *Ethology* **102**: 50–62.

Traveset, A., Willson, M.F. & Sabag, C. (1998). Effect of nectar-robbing birds on fruit set of *Fuchsia magellanica* in Tierra del Fuego: a disrupted mutualism. *Functional Ecol.* **12(3)**: 459–464.

Traylor, M.A. (1941). Birds from the Yucatán Peninsula. *Field Mus. Nat. Hist. (Zool. Ser.)* **24**: 195–225.

Traylor, M.A. (1960). A new race of *Emberiza striolata*. *Nat. Hist. Misc. (Chicago)* **175**: 1–2.

Trenberth, K.E. (2007). Warmer oceans, stronger hurricanes. *Scientific American* **2007(7)**: 45-51.

Trévoux, Y. & Trévoux, J.P. (2008). L'hivernage du Bruant fou dans l'ouest de la France: règle ou exception ? *Ornithos* **15(1)**: 50–54. In French with English summary.

Trnka, A. & Prokop, P. (2006). Reedbed structure and habitat preference of reed passerines during the post-breeding period. *Biologia (Bratislava)* **61(2)**: 225–230.

Trollope, J. (1984). Breeding the Collared Warbling Finch *Poospiza hispaniolensis*. *Avicult. Mag.* **90(1)**: 27–32.

Trollope, J. (1993). The breeding and behaviour of the Cinereous Finch. *Avicult. Mag.* **99(2)**: 57–60.

Tryjanowski, P., Osiejuk, T.S. & Kupczyk, M. (2001). *Bunting Studies in Europe*. Bogucki Wydawnictwo Naukowe, Poznan, Poland.

Tsutsumi, M. & Matsuzawa, Y. (1990). Wild birds observed in the campus of the Faculty of Agriculture, Ibaraki University. 2. Change of habitat environment and species of the wild birds in the campus. *Sci. Rep. Fac. Agricult. Ibaraki Univ.* **38**: 121–125. In Japanese with English summary.

Tsybulin, S.M. (1988). [Abundance and distribution of *Emberiza godlewskii* in northern Altai]. Pp. 260–263 in: Shvetsov, Y.G. ed. (1988). [*Rare Terrestrial Vertebrates of Siberia*]. Nauka, Novosibirsk. In Russian.

Tubaro, P.L. (1992). Song repertoires of the White-browed Blackbird. *Wilson Bull.* **104**: 345–352.

Tubaro, P.L. & Gabelli, F.M. (1999). The decline of the Pampas Meadowlark: difficulties of applying the IUCN criteria to Neotropical grassland birds. *Studies Avian Biol.* **19**: 250–257.

Tubaro, P.L. & Lijtmaer, D.A. (2006). Environmental correlates of song structure in forest grosbeaks and saltators. *Condor* **108(1)**: 120–129.

Tubaro, P.L. & Segura, E.T. (1993). A comparative analysis of perched song in the White-browed and the Red-breasted Blackbird. *Bioacoustics* **4(4)**: 287–291.

Tubaro, P.L. & Segura, E.T. (1994). Dialect differences in the song of *Zonotrichia capensis* in the southern pampas: a test of the acoustic adaptation hypothesis. *Condor* **96(4)**: 1084–1088.

Tubaro, P.L., Gabelli, F.M., Mozetich, I.M. & Segura, E.T. (1996). Evaluation of the alerted detection hypothesis in the song of the Rufous-collared Sparrow. 1. Experiments with complete and sectioned songs. *Hornero* **14(3)**: 27–34.

Tubaro, P.L., Handford, P.T. & Segura, E.T. (1997). Song learning in the Rufous-collared Sparrow (*Zonotrichia capensis*). *Hornero* **14(4)**: 204–210.

Tucker, G.M. & Heath, M.F. eds. (1994). *Birds in Europe – their Conservation Status*. BirdLife Conservation Series **3**. BirdLife International, Cambridge, UK.

Tucker, J.W. & Robinson, W.D. (2003). Influence of season and frequency of fire on Henslow's Sparrows (*Ammodramus henslowii*) wintering on Gulf Coast pitcher plant bogs. *Auk* **120(1)**: 96–106.

Tucker, J.W., Hill, G.E. & Holler, N.R. (1998). Managing mid-rotation pine plantations to enhance Bachman's Sparrow habitat. *Wildl. Soc. Bull.* **26(2)**: 342–348.

Tucker, J.W., Robinson, W.D. & Grand, J.B. (2004). Influence of fire on Bachman's Sparrow, an endemic North American songbird. *J. Wildl. Management* **68(4)**: 1114–1123.

Tucker, J.W., Robinson, W.D. & Grand, J.B. (2006). Breeding productivity of Bachman's Sparrows in fire-managed longleaf pine forests. *Wilson J. Orn.* **118(2)**: 131–137.

Turner, W.C. & Barber, C.A. (2004). Male Song Sparrows *Melospiza melodia* do not announce their female's fertility. *J. Avian Biol.* **35(6)**: 483–486.

Twedt, D.J. & Bleier, W.J. (1991). Geographic and temporal variation in the diet of Yellow-headed Blackbirds. *Condor* **93**: 975–986.

Twedt, D.J. & Crawford, R.D. (1995). Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). No. **192** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.

Twedt, D.J., Bleier, W.J. & Linz, G.M. (1994). Geographic variation in Yellow-headed Blackbirds from the northern Great Plains. *Condor* **96**: 1030–1036.

Tweit, R.C. & Finch, D.M. (1994). Abert's Towhee (*Pipilo aberti*). No. **111** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.

Tweit, R.C. & Thompson, C.W. (1999). Pyrrhuloxia (*Cardinalis sinuata*). No. **391** in: Poole, A.F. & Gill, F.B. eds. (1999). *The Birds of North America*. Vol. 10. The Birds of North America Inc., Philadelphia, Pennsylvania.

Tye, H. & Tye, A. (1992). First description of the eggs and nest of the Golden-winged Sparrow *Arremon schlegeli*. *Orn. Neotropical* **3(2)**: 71.

Tyler, S. & Tyler, L. (2001). Biometrics and moult data for nomadic Lark-like Buntings, *Emberiza impetuani*, in south-eastern Botswana. *Ostrich* **72**: 118–120.

Tyurin, P.S. (1961). [On breeding of the Pine Bunting (*Emberiza leucocephalos* Gm.) in Tian Shan]. *Izv. Akad. Nauk Kirgi SSR (Ser. Biol.)* **3(1)**: 31–35. In Russian.

Uemura, T. (1989). Records of some species in a flock of the Rustic Bunting *Emberiza rustica*. *Strix* **8**: 292–293. In Japanese with English summary.

Ueno, Y., Sugishima, H. & Yasui, H. (1995). The first breeding record of the Yellow-throated Bunting *Emberiza elegans* from Honshu, Japan. *Jap. J. Orn.* **44(4)**: 229–230. In Japanese with English summary.

Ugalde, A.S. & Torres, A.A. (2006). Primer registro reproductivo de *Haplospiza rustica* en Ecuador. *Bol. Soc. Antioqueña Orn.* **16(2)**: 20–25. In Spanish with English summary.
Uhlig, R. (1993). Beobachtungen an der Hausammer (*Emberiza striolata*) in Tunesien. *Beitr. Vogelkd.* **39(1)**: 61. In German.
Uhrin, M. (1993). Hniezdenie Strnadky cia (*Emberiza cia*) na Muranskej Planine. *Zbornik Vychodoslovenskeho Muzea v Kosiciach Prirodny Vedy* **34**: 169–170. In Slovak with English summary.
Ulbricht, H. (1975). Zur Brutbiologie der Rohrammer, *Emberiza schoeniclus*. *Beitr. Vogelkd.* **21(6)**: 452–470. In German.
Ulfstrand, S. (2005). Prärieuggla och hackspettfink – fågelvärldens verktygsmakare. *Vår Fågelvärld* **64(1)**: 26–27. In Swedish.
Ullman, M. (1997). Next stop! Sweden. Ljus, arktisk sävsparv. *Vår Fågelvärld* **56 (7)**: 28–30. In Swedish.
Ullman, M. (2003). I fokus: dvärgsparv. *Vår Fågelvärld* **62(2)**: 51. In Swedish.
Ullman, M. (2009). Gulbrynad sparv. *Vår Fågelvärld* **68(1)**: 55. In Swedish.
Urban, E.K. (1959). Birds from Coahuila, México. *Univ. Kansas Publ. Mus. Nat. Hist.* **11**: 443–516.
Urbina-Torres, F., Romo de Vivar-Álvarez, C. & Navarro-Sigüenza, A.G. (2009). Notas sobre la distribución de algunas aves en Morelos, México. *Huitzil* **10**: 30–37. In Spanish.
Urquart, C. (1992). The illegal trade of wild birds in the Eastern Cape, Part 2. *Bee-eater* [*& BirdLife E Cape News*] **43**: 27–30.
Usai, A., Russo, G. & Maselli, V. (2008). Segnalazione di Zigolo Minore, *Emberiza pusilla* Pallas 1776, in Campania. *Riv. Ital. Orn.* **78(1)**: 66–67. In Italian.
Václav, R. & Prokop, P. (2007). Selekcia hniezdneho habitatu Strnádky Ciavej (*Emberiza cia*) v Národnom parku Slovenský Kras. *Tichodroma* **19**: 69–73. In Slovakian.
Vaes, T. (2008). Gelbkopfkernknacker – attraktiv, aber selten gehalten. *Gefiederte Welt* **132(5)**: 20–21. In German.
Vagvolgyi, J. & Vagvolgyi, M.W. (1989). The taxonomic status of the Small Ground-finch, *Geospiza* (Aves: Emberizidae) of Genovesa Island, Galápagos, and its relevance to interspecific competition. *Auk* **106(1)**: 144–148.
Väisänen, R.A., Lammi, E. & Koskimies, P. (1998). *Muuttuva Pesimälinnusto*. Kustannusosakeyhtiö Otava, Helsinki. In Finnish with English and Swedish summaries.
Valchuk, O.P. (2003). [Interruption of autumnal migration of Chestnut Bunting, *Emberiza rutila*, for moult in the south of Prymorye. A new model of interrelation of physiological and migration processes in the annual cycle of Palearctic passerines]. Pp. 154–156 in: Dorzhiev (2003).
Valdés, V. (1984). Datos de nidificación sobre aves que anidan en Cuba. *Poeyana* **282**: 1–10. In Spanish.
Vallecillo, S., Brotons, L. & Thuiller, W. (2009). Dangers of predicting bird species distributions in response to land-cover changes. *Ecol. Appl.* **19**: 538–549.
Vallely, A.C. & Aversa, T. (1997). New and noteworthy bird records from Belize including the first record of Chestnut-collared Swift *Cypseloides rutilus*. *Bull. Brit. Orn. Club* **117(4)**: 272–274.
Valone, T.J. & Wheelbarger, A.J. (1998). The effect of heterospecifics on the group-size effect in White-crowned Sparrows (*Zonotrichia leucophrys*). *Bird Behaviour* **12(3/4)**: 85–90.
Valqui, T. & Fjeldså, J. (1999). New brush-finch *Atlapetes* from Peru. *Ibis* **141**: 194–198.
Valqui, T. & Fjeldså, J. (2002). *Atlapetes melanopsis* nom. nov. for the Black-faced Brush-finch. *Ibis* **144**: 343.
Van Buskirk, J., Mulvihill, R.S. & Leberman, R.C. (2009a). Variable shifts in spring and autumn migration phenology in North American songbirds associated with climate change. *Global Change Biol.* **15**: 760–771.
Van Buskirk, J., Mulvihill, R.S. & Leberman, R.C. (2009b). Declining body sizes in North American birds associated with climate change. *Oikos* **119**: 1047–1055.
Van Houtan, K.S. & Alvarez-Loayza, P. (2006). Diet of nestling Green-and-gold Tanagers (*Tangara schrankii*), with notes on nesting behavior and seed dispersal. *Orn. Neotropical* **17(2)**: 307–312.
Van Tyne, J. (1932). Winter returns of Indigo Buntings in Guatemala. *Bird-Banding* **3**: 110.
Vandieken, J. (2008). Isabelltangaren – Ihre Haltung und Zucht. *Gefiederte Welt* **132(11)**: 8–12. In German.
Vandieken, J. (2009). Schillertangaren – Kleinode der Neuen Welt. *Gefiederte Welt* **133(12)**: 8–13. In German.
Vanhooydonck, B., Herrel, A., Gabela, A. & Podos, J. (2009). Wing shape variation in the Medium Ground Finch (*Geospiza fortis*): an ecomorphological approach. *Biol. J. Linn. Soc.* **98(1)**: 129–138.
Vardy, L.E. (1971). Color variation in the crown of the White-throated Sparrow, *Zonotrichia albicollis*. *Condor* **73**: 401–414.
de Vasconcelos, M.F. (2000). Ocorrência simpátrica de *Emberizoides herbicola*, *Embernagra platensis* e *Embernagra longicauda* (Passeriformes: Emberizidae) na região da Serra do Caraça, Minas Gerais. *Melopsittacus* **3(1)**: 3–5. In Portuguese with English summary.
de Vasconcelos, M.F. (2002). O pixoxó *Sporophila frontalis* nos municípios de Serro e Santa Bárbara, Minas Gerais: possíveis casos de extinções locais. *Atualidades Orn.* **106**: 2. In Portuguese.
de Vasconcelos, M.F. (2004). First record of the Variable Seedeater (*Sporophila americana*) for the state of Maranhão, Brazil. *Ararajuba* **12(2)**: 145.
de Vasconcelos, M.F. & de Araujo Silva, J. (2003). Descrição do jovem de Tibirro-rupestre *Embernagra longicauda*. *Cotinga* **20**: 21–23. In Portuguese with English summary.
de Vasconcelos, M.F. & D'Angelo Neto, S. (2009). First assessment of the avifauna of araucaria forests and other habitats from extreme southern Minas Gerais, Serra da Mantiqueira, Brazil, with notes on biogeography and conservation. *Pap. Avuls. Dept. Zool. São Paulo* **49(3)**: 49–71.
de Vasconcelos, M.F. & Endrigo, E. (2008). O Canário-rasteiro (*Sicalis citrina*) nas serras de Minas Gerais: notas adicionais. *Atualidades Orn.* **141**: 14–15. In Portuguese.
de Vasconcelos, M.F., D'Angelo Neto, S., Kirwan, G.M., Bornschein, M.R., Guimarães Diniz, M. & da Silva, J.F. (2006). Important ornithological records from Minas Gerais state, Brazil. *Bull. Brit. Orn. Club* **126(3)**: 212–238.
de Vasconcelos, M.F., D'Angelo Neto, S. & Ouriques, E.V. (2005). Consumo de folhas e flores por *Schistochlamys melanopis* (Latham, 1790) e por *Schistochlamys ruficapillus* (Vieillot, 1817) (Passeriformes: Thraupidae). *Atualidades Orn.* **125**: 5. In Portuguese.
de Vasconcelos, M.F., Lopes, L.E., Hoffmann, D., Silveira, L.F. & Schunck, F. (2008). Noteworthy records of birds from the Pantanal, Chiquitano dry forest and Cerrado of south-western Brazil. *Bull. Brit. Orn. Club* **128(1)**: 57–67.
de Vasconcelos, M.F., Maldonado-Coelho, M., Renato, D. & Buzzetti, C. (2003). Range extensions for the Gray-backed Tachuri (*Polystictus superciliaris*) and the Pale-throated Serra-finch (*Embernagra longicauda*) with a revision on their geographic distribution. *Orn. Neotropical* **14(4)**: 477–489.
de Vasconcelos, M.F., Werneck, M.S. & de la Peña, M.R. (2006). Observações sobre a construção de um Ninho de Cavalaria (*Paroaria capitata*) com material industrializado. *Rev. Bras. Orn.* **14(2)**: 167–168. In Portuguese with English summary.
Vaurie, C. (1956). Systematic notes on Palearctic birds. No. 23. Fringillidae: the genera *Emberiza*, *Calcarius*, and *Plectrophenax*. *Amer. Mus. Novit.* **1805**: 1–27.
Vaurie, C. (1959). *The Birds of the Palearctic Fauna: a Systematic Reference. Order Passeriformes*. H.F.&G. Witherby, London.
van der Veen, I.T. (2000). Daily routines and predator encounters in Yellowhammers *Emberiza citrinella* in the field during winter. *Ibis* **142(3)**: 413–420.
Vega Rivera, J.H., McShea, W.J. & Rappole, J.H. (2003). Comparison of breeding and postbreeding movements and habitat requirements for the Scarlet Tanager (*Piranga olivacea*) in Virginia. *Auk* **120(3)**: 632–644.
Vega Rivera, J.H., Ortega Huerta, M.A. & Guerrero, R. (2008). Análisis de la distribución del Colorín Pecho Naranja (*Passerina leclancherii*): una especie endémica de la vertiente del Pacífico mexicano. *Orn. Neotropical* **19(2)**: 265–274. In Spanish with English summary.
Vega, J.H. & Rappole, J.H. (1994). Composition and phenology of an avian community in the Rio Grande Plain of Texas. *Wilson Bull.* **106(2)**: 366–380.
Végvári, Z., Bókony, V., Barta, Z. & Kovács, G. (2010). Life history predicts advancement of avian spring migration in response to climate change. *Global Change Biol.* **16**: 1–11.
Veit, R.R. (2000). Vagrants as the expanding fringe of a growing population. *Auk* **117(1)**: 242–246.
Veit, R.R. & Peterson, W.R. (1993). *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.
Velásquez, M.C. (1994). La ruta de viaje del Tordo Arrocero (*Dolichonyx oryzivorus*). *Bol. Soc. Antioqueña Orn.* **5(9)**: 13–14. In Spanish.
Venturini, A.C. & Rehen, M.P. (2000). Contribuição ao conhecimento das aves dos municípos de Santa Maria do Jetibá y Itarana. *Neotropical Atlántico* **1**: 2. In Portuguese.
Venturini, A.C., Rehen, M.P., Paz, P.R. & Carmo, L.P. (2000). Da região centro serrana do Espírito Santo: municípios de Santa Maria do Jetibá y Itarana (parte 1). *Atualidades Orn.* **98**: 11–12. In Portuguese.
Venturini, A.C., Rehen, M.P., Paz, P.R. & Carmo, L.P. (2001). Contribuição ao conhecimento das aves da região centro serrana do Espírito Santo: municípios de Santa Maria do Jetibá y Itarana (parte 2). *Atualidades Orn.* **99**: 12. In Portuguese.
Venturini, A.C., Rogerio de Paz, P. & Kirwan, G.M. (2002). First breeding data for Cherry-throated Tanager *Nemosia rourei*. *Cotinga* **17**: 43–45.
Venturini, A.C., Rogerio de Paz, P. & Kirwan, G.M. (2005). A new locality and records of Cherry-throated Tanager *Nemosia rourei* in Espírito Santo, south-east Brazil, with fresh natural history data for the species. *Cotinga* **24**: 60–70.
Vepsalainen, V., Pakkala, T., Piha, M. & Tiainen, J. (2005). Population crash of the Ortolan Bunting *Emberiza hortulana* in agricultural landscapes of southern Finland. *Ann. Zool. Fennici* **42(2)**: 91–107.
Vera, P., Marin, M., Belda, E.J. & Monrós, J.S. (2009). Estructura y composición del nido del Escribano Palustre Iberoriental *Emberiza schoeniclus witherbyi*. *Rev. Catalana Orn.* **25**: 43–48. In Spanish with English summary.
Verbeek, N.A.M. (1964). A time and energy budget study of the Brewer´s Blackbird. *Condor* **66**: 70–74.
Vernon, C.J. (1970). New host species for three cuckoos. *Ostrich* **41**: 258–259.
Vernon, C.J. (1977). Birds of the Zimbabwe Ruins Area, Rhodesia. *Southern Birds* **4**: 1–68.
Vernon, C.J. (1978). Breeding seasons of birds in deciduous woodland at Zimbabwe, Rhodesia, from 1970 to 1974. *Ostrich* **49**: 102–115.
Vernon, C.J. (1984). Population dynamics of birds in *Brachystegia* woodland. Pp. 201–216 in: Ledger, J.A. ed. (1984). *Proceedings of the Fifth Pan-Afrian Ornithological Congress*. Southern African Ornithological Society, Johannesburg.
Verrill, A.E. & Verrill, A.H. (1909). Notes on the birds of San Domingo, with a list of the species, including a new hawk. *Proc. Acad. Nat. Sci. Philadelphia* **61**: 352–366.
Verrill, G.E. (1895). On some birds and eggs collected by Mr. Geo. Comer at Gough Island, Kerguelen Island, and the Island of South Georgia, with extracts from his notes, including a meteorological record for about six months at Gough Island. *Trans. Connecticut Acad. Arts & Sci.* **9**: 430–478.
Vickery, P.D. (1996). Grasshopper Sparrow (*Ammodramus savannarum*). No. **239** in: Poole, A. & Gill, F. eds. (1996). *The Birds of North America*. Vol. 6. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Vieillot, L.J.P. (1809). *Histoire Naturelle des Oiseaux de l'Amérique Septentrionale, Contenant un Grand Nombre d'Espèces Décrites ou Figurées pour la Première Fois*. Vol. 2. Desray, Paris. In French.
Vietinghoff-Scheel, E. von (1992). *Emberiza sulphurata* Temminck u. Schlegel. In: Dathe, H. & Loskot, W.M. eds. (1992). *Atlas der Verbreitung palaearktischer Vögel*. 18th instalment. Akademie-Verlag, Berlin. In German.
Vigil, C. (1973). *Aves Argentinas y Sudamericanas*. Editorial Atlántida, Buenos Aires. In Spanish.
Vignini, D. (1985). Observações sobre a reprodução de Patativa em cativeiro. *SOBoletim* **7**: 9–10. In Portuguese.
Villarán, A. (1999). Migración e invernada del Escribano Palustre (*Emberiza schoeniclus*) en España. *Ardeola* **46(1)**: 71–80. In Spanish with English summary.
Villarán, A. & Pascual-Parra, J. (2003). Biometrics, sex ratio and migration periods of Reed Buntings *Emberiza schoeniclus* wintering in the Tajo Basin, Spain. *Ringing & Migration* **21(4)**: 222–226.
Villard, M.A. & Bracken, R.A. (1989). First confirmed breeding record of LeConte's Sparrow, *Ammodramus leconteii*, in eastern Ontario. *Can. Field-Nat.* **103(1)**: 89–99.
Vincent, A.W. (1949). On the breeding habits of some African birds. Part 2. *Ibis* **91**: 660–688.
Vincent, J. (1936). The birds of northern Portuguese East Africa. Comprising a list of, and observations on, the collections made during the British Museum Expedition of 1931–32. Part 10. *Ibis* **Ser. 13, no. 6**: 48–125.
Vinicombe, K.E. (2007). The status of Red-headed Bunting in Britain. *British Birds* **100(9)**: 540–551.
Virkkala, R. (1987). Effects of forest management on birds breeding in northern Finland. *Ann. Zool. Fennici* **24(3)**: 281–294.
Visser, M.E. & Both, C. (2001). Adjustment to climate change is constrained by arrival date in a long-distance migrant bird. *Nature (London)* **411**: 296–298.
Visser, M.E. & Both, C. (2005). Shifts in phenology due to global climate change: the need for a yardstick. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **272**: 2561–2569.
Visser, M.E., Adriaensen, F., van Balen, J.H., and 11 other authors (2003). Variable responses to large-scale climate change in European *Parus* populations. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **270**: 367–372.
Visser, M.E., Both, C. & Lambrechts, M.M. (2004). Global climate change leads to mistimed avian reproduction. Pp. 89–110 in: Møller *et al.* (2004).
Visser, M.E., Holleman, L.J.M. & Caro, S.P. (2009). Temperature has a causal effect on avian timing of reproduction. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **276**: 2323–2331.
Visser, M.E., Holleman, L.J.M. & Gienapp, P. (2006). Shifts in caterpillar biomass phenology due to climate change and its impact on the breeding biology of an insectivorous bird. *Oecologia (Berlin)* **147**: 164–172.
Visser, M.E., van Noordwijk, A.J., Tinbergen, J.M. & Lessells, C.M. (1998). Warmer springs lead to mistimed reproduction in Great Tits (*Parus major*). *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **265**: 1867–1870.
Visser, M.E., Perdeck, A.C., van Balen, J.H. & Both, C. (2009). Climate change leads to decreasing bird migration distances. *Global Change Biol.* **15**: 1859–1865.
Voelker, G. (2004). Can migrants do it faster? Accelerated molt of Baird's Sparrows and further insights into southwestern molting grounds. *Condor* **106(4)**: 910–914.
Vogt, C.A. (2003). Audio recordings of *Thlypopsis ornata* from Talahua, Pichincha, Ecuador. Xeno-Canto 65596. Unpubl.
Vogt, C.A. (2006). Secondary nectar robbing, a previously unsubstantiated foraging behavior of the Cinereous Conebill (*Conirostrum cinereum*). *Orn. Neotropical* **17**: 613–617.
Voisin, J.F. (1979). The nest and eggs of the Gough Island Bunting. *Ostrich* **50(2)**: 122–124.
Vondrasek, J.R. (2006). Social factors affect the singing rates of female Northern Cardinals *Cardinalis cardinalis*. *J. Avian Biol.* **37(1)**: 52–57.
Vonk, H. & van Ijzendoorn, E.J. (1988). Yellow-browed Bunting on Schiermonnikoog in October 1982. *Dutch Birding* **10(3)**: 127–130. In Dutch with English summary.
Voous, K.H. (1983). *Birds of the Netherlands Antilles*. De Walburg Pers, Utrecht & Curaçao.
Voss, W.A. (1977a). Aves silvestres livres observadas no Parque zoológica em Sapucaia do Sul, RS, Brasil. *Pesquisas (Zool.)* **30**: 1–29. In Portuguese.
Voss, W.A. (1977b). Comunicação sobre a ocorrência do Sanhaçu-do-Coqueiro, *Thraupis palmarum* (Wied), na cidade de Porto Alegre-RS. *Pesquisas (Zool.)* **30**: 32. In Portuguese.

Voss, W.A. & Sander, M. (1980). Frutos de arvores nativas na alimentação das aves. *Trigo e Soja (Porto Alegre)* **51**: 26–30. In Portuguese.
Voss, W.A. & Sander, M. (1981). Frutos e sementes vários na alimentação das aves livres. *Trigo e Soja (Porto Alegre)* **58**: 28–31. In Portuguese.
Votier, S. & Bradshaw, C. (1996). Identification of Chestnut Bunting. *British Birds* **89(10)**: 437–449.
Vrezec, A. (2001a). Skalni strnad *Emberiza cia*. *Acrocephalus (Ljubljana)* **22(104/105)**: 62. In Slovenian with English summary.
Vrezec, A. (2001b). Oljèni vrtnik *Hippolais olivetorum* & Crnoglavi strnad *Emberiza melanocephala*. *Acrocephalus (Ljubljana)* **22(106/107)**: 131–132. In Slovenian with English summary.
de Vries, N. (2011). Two Dickcissels and Dark-eyed Junco on Flores, Azores, in November 2009. *Dutch Birding* **33(1)**: 44–46.
Vu Halinh, Post, J.R. & Cech, J.N. (2007). *Visitation and Fruit Consumption by Birds at a Reproductive* Ficus pertusa *at La Selva Biological Station*. Dartmouth Studies in Tropical Ecology 2007. Department of Biological Science, Dartmouth College, Hanover, New Hampshire.
Vucanovic, M. (1999). Planinska strnadica (*Emberiza cia*), nova gnezdarica Vojvodine. *Ciconia* **8**: 133–134. In Serbo-Croatian with English summary.
Vuilleumier, F. (1969a). Field notes on some birds from the Bolivian Andes. *Ibis* **111(4)**: 599–608.
Vuilleumier, F. (1969b). Systematics and evolution in *Diglossa* (Aves, Coerebidae). *Amer. Mus. Novit.* **2831**: 1–44.
Vuilleumier, F. (1970). L'organisation sociale des bandes vagabondes d'oiseaux dans les Andes du Pérou central. *Rev. Suisse Zool.* **77**: 209–235. In French.
Vuilleumier, F. (1984a). Zoogeography of Andean birds: two major barriers; and speciation and taxonomy of the *Diglossa carbonaria* superspecies. *Natl. Geogr. Soc. Res. Rep.* **16**: 713–731.
Vuilleumier, F. (1984b). Patchy distribution and systematics of *Oreomanes fraseri* (Aves, Coerebidae) of Andean *Polylepis* woodlands. *Amer. Mus. Novit.* **2777**: 1–17.
Vuilleumier, F. (1991). A quantatative survey of speciation phenomena in Patagonian birds. *Orn. Neotropical* **2**: 5–28.
Vuilleumier, F. (1994). Nidificación y status de *Phrygilus fruticeti* (Aves, Emberizidae) en la Patagonia chilena: ¿un ejemplo del fenómeno de "límite de la especie"? *Rev. Chilena Hist. Nat.* **67(3)**: 299–307. In Spanish with English summary.
Vuilleumier, F. & Ewert, D. (1978). The distribution of birds in Venezuelan páramos. *Bull. Amer. Mus. Nat. Hist.* **162**: 51–90.
Vuilleumier, F., LeCroy, M. & Mayr, E. (1992). New species of birds described from 1981 to 1990. *Bull. Brit. Orn. Club* **112a** (Suppl.): 267–309.
Wacker, D.W., Coverdill, A.J., Bauer, C.M. & Wingfield, J.C. (2010). Male territorial aggression and androgen modulation in high latitude populations of the Sooty, *Passerella iliaca sinuosa*, and Red Fox Sparrow, *Passerella iliaca zaboria*. *J. Orn.* **151(1)**: 79–86.
Waide, R.B. & Hailman, J.P. (1977). Birds of five families feeding from spider webs. *Wilson Bull.* **89(2)**: 345–346.
Waide, R.B. & Narins, P.M. (1988). Tropical forest bird counts and the effect of sound attenuation. *Auk* **105(2)**: 296–302.
Walk, J.W., Kershner, E.L., Benson, T.J. & Warner, R.E. (2010). Nesting success of grassland birds in small patches in an agricultural landscape. *Auk* **127(2)**: 328–334.
Walk, J.W., Wentworth, K., Kershner, E.L., Bollinger, E.K. & Warner, R.E. (2004). Renesting decisions and annual fecundity of female Dickcissels (*Spiza americana*) in Illinois. *Auk* **121(4)**: 1250–1261.
Walker, B. (2001). *A Field Guide to the Birds of Machu Picchu*. Peruvian National Trust Fund for Parks and Protected Areas, Lima, Peru.
Walker, H.A. (2009). Second documented nest of Varied Bunting (*Passerina versicolor*) in New Mexico. *New Mexico Orn. Soc. Bull.* **37(3)**: 74–86.
Walkinshaw, L.H. (1939a). Notes on the nesting of the Clay-colored Sparrow. *Wilson Bull.* **51**: 17–21.
Walkinshaw, L.H. (1939b). Nesting of the Field Sparrow and survival of the young. *Bird-Banding* **10**: 107–114.
Walkinshaw, L.H. (1944). The Eastern Chipping Sparrow in Michigan. *Wilson Bull.* **56**: 193–205.
Walkinshaw, L.H. (1959). A Chipping Sparrow nest in which eight eggs were laid and seven young reared. *Auk* **76**: 101–102.
Walkinshaw, L.H. (1968). Eastern Field Sparrow. Pp. 1217–1235 in: Bent & Austin (1968).
Wallace, D.I.M. (1976). Distinguishing Little and Reed Buntings. *British Birds* **69(12)**: 465–473.
Wallace, D.I.M. (1981). Confusing spring plumages of small buntings. *British Birds* **74(3)**: 153.
Walley, W.J. (1985). Breeding range extension of the Lark Sparrow into west-central Manitoba. *Blue Jay* **43(1)**: 18–24.
Walley, W.J. (1989). Breeding of the Scarlet Tanager, *Piranga olivacea*, in western Manitoba. *Can. Field-Nat.* **103(4)**: 572–576.
Wallis, H.M. (1912). On the nest and eggs of the House-bunting (*Emberiza saharae*) and the Algerian Blackbird (*Turdus merula mauritanica*). *Bull. Brit. Orn. Club* **29**: 83–84.
Wallschläger, D. (1983). Vergleich von Gesangsstrukturen Zentralasiatischer Ammern (*Emberiza*). *Mitt. Zool. Mus. Berlin* **59**: 85–116. In German.
Walter, D. (2007). Brutbiologie, Phänologie und Bestandsentwicklung einer voralpinen Population der Rohrammer *Emberiza schoeniclus*. *Orn. Anz.* **46(1)**: 1–18. In German with English summary.
Walters, J.R., Beissinger, S.R., Fitzpatrick, J.W., Greenberg, R., Nichols, J.D., Pulliam, H.R. & Winkler, D.W. (2000). The AOU Conservation Committee review of the biology, status, and management of Cape Sable Seaside Sparrows: final report. *Auk* **117(4)**: 1093–1115.
Walther, B.A. (2006). The winter distribution and habitat use of the near-threatened Cinereous Bunting *Emberiza cineracea*. *Sandgrouse* **28(1)**: 52–57.
Walther, B.A., Wisz, M.S. & Rahbek, C. (2004). Known and predicted African winter distributions and habitat use of the endangered Basra Reed Warbler (*Acrocephalus griseldis*) and the near-threatened Cinereous Bunting (*Emberiza cineracea*). *J. Orn.* **145(4)**: 287–299.
Wang Haitao, Jiang Yunlei & Gao Wei (2010). Jankowski's Bunting (*Emberiza jankowskii*): current status and conservation. *Chinese Birds* **1(4)**: 251–258.
Warburton, F.E. (1952). Nesting of Clay-colored Sparrow, *Spizella pallida*, in northern Ontario. *Auk* **69**: 314–316.
Ward, R.S. & Aebischer, N.J. (1994). *Changes in Corn Bunting Distribution on the South Downs in Relation to Agricultural Land Use & Cereal Invertebrates*. Uplands & Freshwater Team, Peterborough, UK.
Warren, P.S. (2002). Geographic variation and dialects in songs of the Bronzed Cowbird (*Molothrus aeneus*). *Auk* **119**: 349–361.
Warren, P.S. (2003). Winter dialects in the Bronzed Cowbird and their relationship to breeding-season dialects. *Anim. Behav.* **65(6)**: 1169–1178.
Wasser, D.E. & Sherman, P.W. (2010). Avian longevities and their interpretation under evolutionary theories of senescence. *J. Zool., London* **280(2)**: 103–155.
Wasserman, F.E. (1977). Intraspecific acoustical interference in the White-throated Sparrow (*Zonotrichia albicollis*). *Anim. Behav.* **25(4)**: 949–952.
Wasserman, F.E. (1984). Territories of Rufous-sided Towhees contain more than minimal food resources. *Wilson Bull.* **95(4)**: 664–667.
Wasserman, F.E. (1986). Sexual differences in the spatial distribution of foraging in White-throated Sparrows (*Zonotrichia albicollis*). *Auk* **103(2)**: 421–423.
Watada, M., Jitsukata, K. & Kakizawa, R. (1995). Genetic divergence and evolutionary relationships of the Old and New World Emberizidae. *Zool. Science (Tokyo)* **12(1)**: 71–77.
Watanabe, K. (2009). [A new record on rare winter visitor Rustic Bunting, *Emberiza rutila*, in Onomichi City, Hiroshima Prefecture]. *Hibakagaku* **230**: 35–37. In Japanese.
Watson, A. (1996). Scottish Snow Bunting *Plectrophenax nivalis* breeding and climate. *Ornis Fenn.* **73(3)**: 137–140. In Finnish with English summary.
Watson, A., Perkins, A.J., Maggs, H. & Wilson, J.D. (2009). Decline of Corn Buntings *Emberiza calandra* on east Scottish study areas in 1989–2007. *Bird Study* **56(2)**: 213–220.
Watts, B.D., Wilson, M.D., Bradshaw, D.S. & Allen, A.S. (1998). A survey of the Bachman's Sparrow in southeastern Virginia. *Raven* **69(1)**: 9–14.
Watts, B.D., Wilson, M.D., Smith, F.M., Paxton, B.J. & Williams, J.B. (2008). Breeding range extension of the Coastal Plain Swamp Sparrow. *Wilson J. Orn.* **120(2)**: 393–395.
Wauer, R.H. (1965). Wintering Rufous-crowned Sparrows found in Utah. *Condor* **67**: 447.
Wauer, R.H. (1967). New status for the Rufous-crowned Sparrow in Utah. *Wilson Bull.* **79**: 348–349.
Wauer, R.H. (1970). The occurrence of the Black-vented Oriole, *Icterus wagleri*, in the United States. *Auk* **87**: 811–812.
Weatherhead, P.J. (1980). Sexual dimorphism in two Savannah Sparrow populations. *Can. J. Zool.* **58(3)**: 412–415.
Weatherhead, P.J. & Clark, R.G. (1994). Natural selection and sexual size dimorphism in Red-winged Blackbirds. *Evolution* **48**: 1071–1979.
Weatherhead, P.J. & Robertson, R.J. (1977). Male behavior and female recruitment in the Red-winged Blackbird. *Wilson Bull.* **89**: 583–592.
Weatherhead, P.J. & Robertson, R.J. (1978). Intraspecific nest parasitism in the Savannah Sparrow. *Auk* **95(4)**: 744–745.
Weatherhead, P.J., Tinker, S. & Greenwood, H. (1982). Indirect assessment of avian damage to agriculture. *J. Appl. Ecol.* **19**: 773–782.
Weathers, W.W. (1986). Thermal significance of courtship display in the Blue-black Grassquit (*Volatinia jacarina*). *Natl. Geogr. Res.* **2(3)**: 291–301.
Weathers, W.W. (1997). Energetics and thermoregulation by small passerines of the humid, lowland tropics. *Auk* **114(3)**: 341–353.
Weathers, W.W. & Sullivan, K.A. (1989a). Nest attentiveness and egg temperature in the Yellow-eyed Junco. *Condor* **91(3)**: 628–633.
Weathers, W.W. & Sullivan, K.A. (1989b). Juvenile foraging proficiency, parental effort, and avian reproductive success. *Ecol. Monogr.* **59(3)**: 223–246.
Weathers, W.W. & Sullivan, K.A. (1991a). Growth and energetics of nestling Yellow-eyed Juncos. *Condor* **93(1)**: 138–146.
Weathers, W.W. & Sullivan, K.A. (1991b). Foraging efficiency of parent juncos and their young. *Condor* **93(2)**: 346–353.
Weathers, W.W. & Sullivan, K.A. (1993). Seasonal patterns of time and energy allocation by birds. *Physiol. Zool.* **66(4)**: 511–536.
Webb, D.R. & King, J.R. (1983). An analysis of the heat budgets of the eggs and nest of the White Crowned Sparrow, *Zonotrichia leucophrys*, in relation to parental attentiveness. *Physiol. Zool.* **56(4)**: 493–505.
Webb, E.A. & Bock, C.E. (1996). Botteri's Sparrow (*Aimophila botterii*). No. **216** in: Poole, A.F. & Gill, F.B. eds. (1996). *The Birds of North America*. Vol. 6. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Webber, T. (1985). Songs, displays, and other behavior at a courtship gathering of Blue-black Grassquits. *Condor* **87(4)**: 543–546.
Webster, F.S. (1974). The nesting season June 1–July 31, 1974, South Texas region. *Amer. Birds* **26(5)**: 922–925.
Webster, J.D. (1959a). Another collection from Zacatecas, Mexico. *Auk* **76**: 365–367.
Webster, J.D. (1959b). A revision of the Botteri Sparrow. *Condor* **61**: 136–146.
Webster, J.D. (1968). *Spizella wortheni wortheni* Ridgway, Worthen's Sparrow. Pp. 1236–1241 in: Bent & Austin (1968).
Webster, J.D. (1988). Skeletons and the genera of tanagers. *Proc. Indiana Acad. Sci.* **98**: 581–593.
Webster, J.D. (2003). Skeletal characters and the genera of blackbirds (Icteridae). *Condor* **105**: 239–257.
Webster, J.D. & Webster, J.R. (1999). Skeletons and the genera of sparrows (Emberizinae). *Auk* **116**: 1054–1074.
Webster, M.S. (1992). Sexual dimorphism, mating system and body size in New World blackbirds (Icterinae). *Evolution* **46**: 1621–1641.
Webster, M.S. (1994a). The spatial and temporal distribution of breeding female Montezuma Oropendolas: effects on male mating strategies. *Condor* **96**: 722–733.
Webster, M.S. (1994b). Interspecific brood parasitism of Montezuma Oropendolas by Giant Cowbirds: parasitism or mutualism? *Condor* **96**: 794–798.
Webster, M.S. (1994c). Female defence polygyny in a Neotropical bird, the Montezuma Oropendola. *Anim. Behav.* **48**: 779–794.
Webster, M.S. (1995). Effects of female choice and copulations away from colony on fertilization success of male Montezuma Oropendolas (*Psarocolius montezumae*). *Auk* **112**: 659–671.
Webster, M.S. (1997). Extreme sexual size dimorphism, sexual selection, and the foraging ecology of Montezuma Oropendolas. *Auk* **114**: 570–580.
Webster, M.S. (1999). Reconstructing the evolutionary origin of polygyny in Red-winged Blackbirds. *Auk* **116**: 1–4.
Webster, M.S. & Robinson, S.K. (1999). Courtship disruptions and male mating strategies: examples from female-defense mating systems. *Amer. Naturalist* **154(6)**: 717–729.
Webster, S.J. & Lefebvre, L. (2000). Neophobia by the Lesser-Antillean Bullfinch, a foraging generalist, and the Bananquit, a nectar specialist. *Wilson Bull.* **112(3)**: 424–427.
Webster, S.J. & Lefebvre, L. (2001). Problem solving and neophobia in a columbiform-passeriform assemblage in Barbados. *Anim. Behav.* **62(1)**: 23–32.
Weckstein, J.D., Kroodsma, D.E. & Faucett, R.C. (2002). Fox Sparrow (*Passerella iliaca*). No. **715** in: Poole, A. & Gill, F. eds. (2002). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.
Weckstein, J.D., Zink, R.M., Blackwell-Rago, R.C. & Nelson, D.A. (2001). Anomalous variation in mitochondrial genomes of White-crowned (*Zonotrichia leucophrys*) and Golden-crowned (*Z. atricapilla*) sparrows: pseudogenes, hybridization, or incomplete lineage sorting? *Auk* **118(1)**: 231–236.
Weeden, R.B. & Weeden, J.S. (1973). Two records of White-throated Sparrows (*Zonotrichia albicollis*) in Alaska. *Condor* **75(2)**: 248.
Wege, D.C. & Long, A.J. (1995). *Key Areas for Threatened Birds in the Neotropics*. BirdLife Conservation Series **5**. BirdLife International, Cambridge, UK.
Wege, D.C., Howell, S.N.G & Sada, A.M. (1993). The distribution and status of Worthen's Sparrow *Spizella wortheni*: a review. *Bird Conserv. Int.* **3**: 211–220.
Wehtje, W. (2003). The range expansion of the Great-tailed Grackle (*Quiscalus mexicanus*) in North America since 1880. *J. Biogeogr.* **30**: 1593–1607.
Weidensaul, S. (1999). *Living on the Wind. Across the Hemisphere with Migratory Birds*. North Point Press, New York.
Weir, J.T., Bermingham, E., Miller, M.J., Klicka, J. & González, M.A. (2008). Phylogeography of a morphologically diverse Neotropical montane species, the Common Bush-tanager (*Chlorospingus ophthalmicus*). *Mol. Phylogen. Evol.* **47**: 650–654.
Weir, J.T., Bermingham, E. & Schluter, D. (2009). The Great American Biotic Interchange in birds. *Proc. Natl. Acad. Sci. USA* **106(51)**: 21737–21742.
Weisshaupt, N. & Vilches-Morales, A. (2010). Age determination of Corn Buntings *Emberiza calandra* by skull ossification after the autumn moult. *Ringing & Migration* **25(1)**: 56–58.
Welch, G. (2010). Ortolan Bunting *Emberiza hortulana* at Long Valley. *Hong Kong Bird Rep.* **2005–06**: 216–219.

Weldon, A.J. & Haddad, N.M. (2005). The effects of patch shape on Indigo Buntings: evidence for an ecological trap. *Ecology* **86(6)**: 1422–1431.
Welford, M., Vásquez, A., Sambrano, P., Nunnery, T. & Ullman, B. (2007). Evidence for Giant Cowbird *Molothrus oryzivorus* brood-parasitism of Turquoise Jays *Cyanolyca turcosa* in northwest Ecuador, and how this alters our understanding of cowbird parasitism. *Cotinga* **27**: 58–60.
Wells, J.G. (1886). A catalogue of the birds of Grenada, West Indies, with observations thereon. *Proc. US Natl. Mus.* **9**: 609–633.
Wells, J.V. & Vickery, P.D. (1994). Extended flight-songs of Vesper Sparrows. *Wilson Bull.* **106(4)**: 696–702.
Wells, J.V. & Wells, A.C. (2002). Extreme extralimital summer record of Western Tanager *Piranga ludoviciana* from Bonaire, Netherlands Antilles. *Cotinga* **18**: 96–97.
Wells, K.M.S., Millspaugh, J.J., Ryan, M.R. & Hubbard, M.W. (2008). Factors affecting home range size and movements of post-fledging grassland birds. *Wilson J. Orn.* **120(1)**: 120–130.
Welsh, D.A. (1975). Savannah Sparrow breeding and territoriality on a Nova Scotia dune beach. *Auk* **92(2)**: 235–251.
Welstead, K., Krannitz, P. & Mahony, N.A. (2005). Using survival analysis of artificial and real Brewer's Sparrow (*Spizella breweri breweri*) nests to model site level and nest site factors associated with nest success in the south Okanagan region of Canada. *US For. Serv. Gen. Tech. Rep. PSW* **191**: 630–636.
Werner, T.K. & Sherry, T.W. (1987). Behavioural feeding specialization in *Pinaroloxias inornata*, the 'Darwin's finch' of Cocos Island, Costa Rica. *Proc. Natl. Acad. Sci. USA* **84(15)**: 5506–5510.
Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. eds. (2002). *The Migration Atlas: Movements of the Birds of Britain and Ireland*. T.&A.D. Poyser & A&C Black, London.
Weske, J.S. (1972). *The Distribution of the Avifauna in the Apurimac Valley of Peru with Respect to Environmental Gradients, Habitat, and Related Species*. PhD thesis, University of Oklahoma, Norman, Oklahoma.
Weske, J.S. & Terborgh, J.W. (1974). *Hemispingus parodii*, a new species of tanager from Peru. *Wilson Bull.* **86**: 97–103.
West, D.A. (1962). Hybridization in grosbeaks (*Pheucticus*) of the Great Plains. *Auk* **79**: 399–424.
West, G.C. & Bailey, E.P. (1986). Rustic Bunting, Purple Finch, and Cassin's Finch in south coastal Alaska. *Murrelet* **67(1)**: 32.
West, G.C. & Peyton, L.J. (1972). The spring migration of the Tree Sparrow through southern Yukon Territory. *Bird-Banding* **43**: 241–256.
West, G.C., Peyton, L.J. & Irving, L. (1968). Analysis of spring migration of Lapland Longspurs to Alaska. *Auk* **85**: 639–653.
West, M.J. & King, A.P. (1988). Female visual displays affect the development of male song in the cowbird. *Nature (London)* **334**: 244–246.
West, M.J., King, A.P. & Eastzer, D.H. (1981). The cowbird: reflections on development from an unlikely source. *Amer. Sci.* **69**: 56–66.
Western, H.G. (1954). Notes on the development of immature Black-headed Grosbeaks (*Pheucticus melanocephalus*). *Proc. Iowa Acad. Sci.* **61**: 636–646.
Westmoreland, D. & Kiltie, R.A. (1996). Egg crypsis and clutch survival in three species of blackbirds (Icteridae). *Biol. J. Linn. Soc.* **58**: 159–172.
Westneat, D.F. (1987a). Extra-pair copulations in a predominantly monogamous bird: observations of behavior. *Anim. Behav.* **35**: 865–876.
Westneat, D.F. (1987b). Extra-pair fertilizations in a predominantly monogamous bird: genetic evidence. *Anim Behav.* **35**: 877–886.
Westneat, D.F. (1988a). Male parental care and extra-pair copulations in the Indigo Bunting. *Auk* **105**: 149–160.
Westneat, D.F. (1988b). The relationships among polygyny, male parental care, and female breeding success in the Indigo Bunting. *Auk* **105(2)**: 372–374.
Westneat, D.F. (1989). Intensity of nest defense in Indigo Buntings increases with stage and not number of visits. *Auk* **106**: 747–749.
Westneat, D.F. (1990). Genetic parentage in the Indigo Bunting: a study using DNA fingerprinting. *Behav. Ecol. Sociobiol.* **27**: 67–76.
Westneat, D.F. (1993). Temporal patterns of within-pair copulations, male mate-guarding, and extra-pair events in eastern Red-winged Blackbirds (*Agelaius phoeniceus*). *Behaviour* **124**: 267–290.
Westneat, D.F. (1995). Paternity and paternal behaviour in the Red-winged Blackbird, *Agelaius phoeniceus*. *Anim. Behav.* **49**: 21–35.
Weston, F.M. (1968). Bachman's Sparrow. Pp. 956–975 in: Bent & Austin (1968).
Weston, H.G. (1947). Breeding behavior of the Black-headed Grosbeak. *Condor* **49**: 54–73.
Weston, H.G. (1955). Notes on the development of immature Black-headed Grosbeaks. *Proc. Iowa Acad. Sci.* **61**: 636–646.
Wetherbee, D.K. (1968). Southern Swamp Sparrow. Pp. 1475–1490 in: Bent & Austin (1968).
Wetmore, A. (1914). The development of the stomach in the euphonias. *Auk* **31**: 458–461.
Wetmore, A. (1922). Bird remains from the caves of Porto Rico. *Bull. Amer. Mus. Nat. Hist.* **46**: 297–333.
Wetmore, A. (1926). Observations on the birds of Argentina, Paraguay, Uruguay, and Chile. *Bull. US Natl. Mus.* **133**: plate 1, i–iv, 1–448.
Wetmore, A. (1927). *The Birds of Porto Rico and the Virgin Islands*. Part 4: Psittaciformes to Passeriformes. Scientific Survey of Porto Rico and the Virgin Islands **9**. The New York Academy of Sciences, New York. 571 pp.
Wetmore, A. (1932). Birds collected in Cuba and Haiti by the Parrish-Smithsonian Expedition of 1930. *Proc. US Natl. Mus.* **81**: 1–40.
Wetmore, A. (1939). Observations on the birds of northern Venezuela. *Proc. US Natl. Mus.* **87**: 173–260.
Wetmore, A. (1941). Notes on birds of the Guatemalan highlands. *Proc. US Natl. Mus.* **89**: 523–581.
Wetmore, A. (1942). Descriptions of three additional birds from southern Vera Cruz. *Proc. Biol. Soc. Washington* **55**: 105–108.
Wetmore, A. (1943). The birds of southern Veracruz, Mexico. *Proc. US Natl. Mus.* **93**: 215–340.
Wetmore, A. (1944). A collection of birds from northern Guanacaste, Costa Rica. *Proc. US Natl. Mus.* **95**: 25–80.
Wetmore, A. (1952). The birds of the islands of Taboga, Taboguilla, and Urava, Panama. *Smithsonian Misc. Coll.* **121(2)**: 1–32.
Wetmore, A. (1953). Description of *Sicalis luteola eisenmanni*. *Smithsonian Misc. Coll.* **122**: 9.
Wetmore, A. & Lincoln, F.C. (1932). Description of a new tanager from Île à Vache, Haiti. *Auk* **49**: 36–37.
Wetmore, A. & Lincoln, F.C. (1933). Additional notes on the birds of Haiti and the Dominican Republic. *Proc. US Natl. Mus.* **82**: 1–68.
Wetmore, A. & Swales, B.H. (1931). *The Birds of Haiti and the Dominican Republic*. Bulletin of the United States National Museum **155**. US Government Printing Office, Washington, D.C.
Wetmore, A., Pasquier, R.F. & Olson, S.L. (1984). *The Birds of the Republic of Panamá*. Part 4. Passeriformes. Hirundinidae (swallows) to Fringillidae (finches). Smithsonian Miscellaneous Collections **150**. Smithsonian Institution Press, Washington, D.C.
Wheatley, N. & Brewer, D. (2001). *Where to Watch Birds in Central America, Mexico and the Caribbean*. Princeton University Press & Christopher Helm, Princeton, Oxford & London.
Wheeler, C. & Porter, R. (2009). White-crowned Sparrow – new to Norfolk. *Trans. Norfolk Norwich Nat. Soc.* **42(2)**: 15–17.
Wheelwright, N.T. & Beagley, J.C. (2005). Proficient incubation by inexperienced Savannah Sparrows *Passerculus sandwichensis*. *Ibis* **147(1)**: 67–76.
Wheelwright, N.T. & Rising, J.D. (1993). Savannah Sparrow (*Passerculus sandwichensis*). No. **45** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 2. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
Wheelwright, N.T. & Seabury, R.E. (2003). Fifty : fifty offspring sex ratios in Savannah Sparrows (*Passerculus sandwichensis*). *Auk* **120(1)**: 171–179.
Wheelwright, N.T., Haber, W.A., Murray, K.G. & Guindon, C. (1984). Tropical fruit-eating birds and their food plants: survey of a Costa Rica lower montane forest. *Biotropica* **16**: 173–192.
Whillans, K.V. & Falls, J.B. (1990). Effects of male removal on parental care of female White-throated Sparrows, *Zonotrichia albicollis*. *Anim. Behav.* **39(5)**: 869–878.
Whitaker, A. & Oren, D. (1999). Important ornithological records from the Rio Jurúa, western Amazonia, including twelve additions to the Brazilian avifauna. *Bull. Brit. Orn. Club* **119**: 235–238.
Whitaker, L.M. (1957). Lark Sparrow oiling its tarsi. *Wilson Bull.* **69**: 179–180.
White, A., Bjerke, J., Dean, P. & Sealey, K. (2006). Grassquits on new providence based on analysis of Christmas bird count data. *Bahamas Nat. J. Sci.* **1(1)**: 52–56.
White, E.W. & Sclater, P.L. (1883). Supplementary notes on the birds of the Argentine Republic. *Proc. Zool. Soc. London* **1883(1)**: 37–43.
Whitehead, M.A., Schweitzer, S.H. & Post, W. (2000). Impact of brood parasitism on nest survival parameters and seasonal fecundity of six songbird species in south-eastern old-field habitat. *Condor* **102(4)**: 946–950.
Whitehead, M.A., Schweitzer, S.H. & Post, W. (2002). Cowbird/host interactions in a south-eastern old-field: a recent contact area? *J. Field Orn.* **73(4)**: 379–386.
Whitmore, R.C. (1981). Structural characteristics of Grasshopper Sparrow habitat. *J. Wildl. Management* **45(3)**: 811–814.
Whitney, B.M., Rowlett, J.L. & Rowlett, R.A. (1994). Distributional and other noteworthy records for some Bolivian birds. *Bull. Brit. Orn. Club* **114(3)**: 149–162.
Whittaker, A. (1998). Observations on the behavior, vocalizations and distribution of the Glossy-backed Becard (*Pachyramphus surinamus*), a poorly-known canopy inhabitant of Amazonian rainforests. *Ararajuba* **6(1)**: 37–41.
Whittaker, A. (2004). Noteworthy ornithological records from Rondônia, Brazil, including a first country record, comments on austral migration, life history, taxonomy and distribution, with relevant data from neighbouring states, and a first record for Bolivia. *Bull. Brit. Orn. Club* **124(4)**: 239–271.
Whittaker, A., Parrini, R. & Zimmer, K.J. (2010). First nesting records of the Black-legged Dacnis *Dacnis nigripes*, with notes on field identification, ecology, conservation and recent records from Espírito Santo, Brazil. *Contínga* **32**: 65–73.
Whittaker, D.J., Reichard, D.G., Dapper, A.L. & Ketterson, E.D. (2009). Behavioral responses of nesting female Dark-eyed Juncos *Junco hyemalis* to hetero- and conspecific passerine preen oils. *J. Avian Biol.* **40(6)**: 579–583.
Whittingham, L.A., Kirkconnell, A. & Ratcliffe, L.M. (1992). Differences in song and sexual dimorphism between Cuban and North American Red-winged Blackbirds (*Agelaius phoeniceus*). *Auk* **109**: 928–933.
Whittingham, L.A., Kirkconnell, A. & Ratcliffe, L.M. (1996). Breeding behavior, social organization and morphology of Red-shouldered (*Agelaius assimilis*) and Tawny-shouldered (*A. humeralis*) Blackbirds. *Condor* **98**: 832–836.
Whittingham, L.A., Kirkconnell, A. & Ratcliffe, L.M. (1997). The context and function of duet and solo songs in the Red-shouldered Blackbird. *Wilson Bull.* **109**: 279–289.
Whittingham, M.J., Swetnam, R.D., Wilson, J.D., Chamberlain, D.E. & Freckleton, R.P. (2005). Habitat selection by Yellowhammers *Emberiza citrinella* on lowland farmland at two spatial scales: implications for conservation management. *J. Appl. Ecol.* **42(2)**: 270–280.
Wible, M.W. (1974). Florida Cardinals feeding on nectar. *Auk* **91(2)**: 418–419.
Wiedenmann, R.N. & Rabenold, K.N. (1987). The effects of social dominance between two subspecies of Dark-eyed Juncos, *Junco hyemalis*. *Anim. Behav.* **35(3)**: 856–864.
Wiens, J.A. (1971). "Egg-dumping" by the Grasshopper Sparrow in a Savannah Sparrow nest. *Auk* **88**: 185–186.
Wiens, J.A. (1982). Song pattern variation in the Sage Sparrow (*Amphispiza belli*): dialects or epiphenomena? *Auk* **99(2)**: 208–229.
Wiens, J.A., van Horne, B. & Rotenberry, J.T. (1990). Comparisons of the behavior of Sage and Brewer's Sparrows in shrubsteppe habitats. *Condor* **92(1)**: 264–266.
Wiggins, D.A. (1990). Brewer's Blackbird parasitizes Tree Swallow. *Wilson Bull.* **102(1)**: 182.
Wiggins, D.A., Patti, S. & Pogue, D.W. (2004). First breeding record of Spotted Towhee in Oklahoma. *Bull. Okla. Orn. Soc.* **37(3)**: 22–24.
Wiggins, I.L. (1965). Galápagos finch captured in flight by Laughing Gull. *Condor* **67**: 82.
Wiggins, I.L. & Wiggins, B.L. (1939). An unusual nesting site of the Western Tanager. *Condor* **41**: 80–81.
Wilbur, S.R. (1987). *Birds of Baja California*. University of California Press, Los Angeles, California.
Wilczynski, W., Ryan, M.J. & Brenowitz, E.A. (1989). The display of the Blue-black Grassquit: the acoustic advantage of getting high. *Ethology* **80(1–4)**: 218–222.
Wiley, J.W. (1985). Shiny Cowbird parasitism in two avian communities in Puerto Rico. *Condor* **87**: 165–176.
Wiley, J.W. (1986). Growth of Shiny Cowbird and host chicks. *Wilson Bull.* **98**: 126–131.
Wiley, J.W., Post, W. & Cruz, A. (1991). Conservation of the Yellow-shouldered Blackbird *Agelaius xanthomus*, an endangered West Indian species. *Biol. Conserv.* **55(2)**: 119–138.
Wiley, R.H. (1975). Multidimensional variation in an avian display: implications for social communication. *Science (Washington, D.C.)* **190**: 482–483.
Wiley, R.H. (1976a). Affiliation between the sexes in Common Grackles. 1. Specificity and seasonal progression. *Z. Tierpsychol.* **40**: 59–79.
Wiley, R.H. (1976b). Affiliation between the sexes in Common Grackles. 2. Spatial and vocal co-ordination. *Z. Tierpsychol.* **40**: 244–264.
Wiley, R.H. (1990). Prior-residence and coat-tail effects in dominance relationships of male Dark-eyed Juncos, *Junco hyemalis*. *Anim. Behav.* **40(3)**: 587–596.
Wiley, R.H. & Cruz, A. (1980). The Jamaican Blackbird: a "natural experiment" for hypotheses in socioecology. *Evol. Biol.* **13**: 261–293.
Wiley, R.H. & Hartnett, S.A. (1979). Effects of hunger on aggression, approach and avoidance by juncos (*Junco hyemalis*). *Z. Tierpsychol.* **51(1)**: 77–84.
Wiley, R.H. & Wiley, M.S. (1980a). Spacing and timing in the nesting ecology of a tropical blackbird: comparison of populations in different environments. *Ecol. Monogr.* **50**: 153–178.
Wiley, R.H. & Wiley, M.S. (1980b). Territorial behavior of a blackbird: mechanisms of site-dependent dominance. *Behaviour* **73**: 130–154.
Wilkins, G.H. (1923). Report on the birds collected during the voyage of the Quest (Shackelton-Rowett Expedition) to the southern Atlantic. *Ibis* **Ser. 11, no. 5**: 474–511.
Willard, D.E., Foster, M.S., Barrowclough, G.F., Dickerman, R.W., Cannell, P.F., Coats, S.L., Cracraft, J.L. & O'Neill, J.P. (1991). The birds of Cerro de la Neblina, Territorio Federal Amazonas, Venezuela. *Fieldiana Zool.* **65**: 1–80.
Willard, F.C. (1912). Breeding of the Scott Sparrow. *Condor* **14**: 195–196.
Willey, D.W. (1990). Nesting success of San Clemente Sage Sparrows. *Southwest. Nat.* **35(1)**: 28–31.
Willey, D.W. (1997). Characteristics of nesting areas used by San Clemente Island Sage Sparrows. *Condor* **99(1)**: 217–219.
Williams, A.J. & Imber, M.J. (1982). Ornithological observations at Gough Island in 1979, 1980 and 1981. *South Afr. J. Antarct. Res.* **12**: 40–45.
Williams, C.B. (1922). Notes on the food and habits of some Trinidad birds. *Bull. Dept. Agric. Trinidad & Tobago* **20**: 123–185.

Williams, J.B. & Hansell, H. (1981). Bioenergetics of captive Belding's Savannah Sparrows (*Passerculus sandwichensis beldingi*). *Comp. Biochem. Physiol Part A Physiol.* **69(4)**: 783–787.
Williams, L. (1952). Breeding behavior of the Brewer Blackbird. *Condor* **54**: 3–47.
Williams, M.D. (1981a). Discovery of the nest and eggs of the Cinereous Finch (*Piezorhina cinerea*), a Peruvian endemic. *Auk* **98**: 187–189.
Williams, M.D. (1981b). First description of the nest, eggs, and young of the Tumbes Sparrow (*Aimophila* (*Rhynchospiza*) *stolzmanni*). *Condor* **83(1)**: 83–84.
Williams, P.L. (1982). *A Comparison of Colonial and Non-colonial Nesting by Northern Orioles in Central Coastal California*. MSc thesis, University of California, Berkeley, California.
Williamson, F.S.L. (1968). *Calcarius lapponicus lapponicus* (Linnaeus), Common Lapland Longspur; *Calcarius lapponicus alascencis* Ridgway, Alaska Longspur. Pp. 1597–1627 in: Bent & Austin (1968).
Williamson, F.S.L. & Emison, W.B. (1971). Variation in the timing of breeding and molt of the Lapland Longspur (*Calcarius lapponicus*) in Alaska, with relation to differences in latitude. *BioScience* **21**: 701–707.
Williamson, F.S.L. & Peyton, L.J. (1962). Faunal relationships of birds in the Iliamna Lake Area, Alaska. *Biol. Pap. Univ. Alaska* 5: 1–73.
Willis, E.O. (1960a). A study of the foraging behavior of two species of ant-tanagers. *Auk* **77**: 150–170.
Willis, E.O. (1960b). Red-crowned Ant-tanagers, Tawny-crowned Greenlets, and forest flocks. *Wilson Bull.* **72**: 105–106.
Willis, E.O. (1960c). Voice, courtship, and territorial behavior of ant-tanagers in British Honduras. *Condor* **62**: 73–87.
Willis, E.O. (1961). A study of nesting ant-tanagers in British Honduras. *Condor* **63**: 479–503.
Willis, E.O. (1966a). Competitive exclusion and birds at fruiting trees in western Colombia. *Auk* **83**: 479–480.
Willis, E.O. (1966b). Ecology and behavior of the Crested Ant-tanager. *Condor* **68**: 56–71.
Willis, E.O. (1972). Taxonomy, ecology, and behavior of the Sooty Ant-tanager (*Habia gutturalis*) and other ant-tanagers (Aves). *Amer. Mus. Novit.* **2480**: 1–38.
Willis, E.O. (1976a). Effects of a cold wave on an Amazonian avifauna in the upper Paraguay drainage, western Mato Grosso, and suggestions on Oscine-Suboscine relationships. *Acta Amazonica* **6**: 379–394.
Willis, E.O. (1976b). Similarity of a tanager (*Orchesticus abeillei*) and an ovenbird (*Philydor rufus*): a possible case of mimicry. *Ciênc. Cult.* **28**: 1492–1493.
Willis, E.O. (1977). Lista preliminar das aves da parte noroeste e áreas vizinhas da Reserva Ducke, Amazonas, Brasil. *Rev. Bras. Biol.* **37**: 585–601. In Portuguese.
Willis, E.O. (1979). The composition of avian communities in remanescent woodlots in southern Brazil. *Pap. Avuls. Dept. Zool. São Paulo* **33**: 1–25.
Willis, E.O. (1980). Ecological roles of migratory and resident birds on Barro Colorado Island, Panama. Pp. 202–225 in: Keast, A. & Morton, E.W. eds. (1980). *Migrant Birds in the Neotropics: Ecology, Behavior, Distribution, and Conservation*. Smithsonian Institution Press, Washington, D.C.
Willis, E.O. (1987). Possible long-distance pair migration in *Cyanerpes cyaneus*. *Wilson Bull.* **99(3)**: 498–499.
Willis, E.O. (1989). Mimicry in bird flocks of cloud forests in southeastern Brazil. *Rev. Bras. Biol.* **49(2)**: 615–619.
Willis, E.O. & Eisenmann, E. (1979). A revised list of birds of Barro Colorado Island, Panama. *Smithsonian Contrib. Zool.* **291**: i–iii, 1–31.
Willis, E.O. & Oniki, Y. (1991). Avifaunal transects across open zones of northern Minas Gerais, Brazil. *Ararajuba* **2**: 41–58.
Willis, E.O. & Oniki, Y. (2002). Roosting behavior of the Sayaca Tanager (*Thraupis sayaca*) in southeastern Brazil. *Orn. Neotropical* **13**: 195–196.
Willis, E.O. & Oniki, Y. (2003). Roosting and nesting of the Burnished-buff Tanager (*Tangara cayana*) in southeastern Brazil. *Orn. Neotropical* **14(20)**: 279–283.
Willis, E.O. & Oniki, Y. (2007). Spring and fall nesting by Epaulet Orioles *Icterus cayanensis tibialis* (Aves, Passeriformes, Icteridae) in southeastern Brazil. *Rudolstädter Naturhist. Schr.* **14**: 87–91.
Willoughby, E.J. (1991). Molt of the genus *Spizella* (Passeriformes, Emberizidae) in relation to ecological factors affecting plumage wear. *Proc. West. Found. Vert. Zool.* **4(4)**: 247–286.
Willoughby, E.J. (1992). Incorrect use of the Humphrey-Parkes molt and plumage terminology for buntings of the genus *Passerina*. *Condor* **94**: 295–297.
Wilson, M.F. (1966a). Breeding ecology of the Yellow-headed Blackbird. *Ecol. Monogr.* **36**: 51–77.
Wilson, M.F. (1966b). Polygamy among Swamp Sparrows. *Auk* **83**: 666.
Wilson, M.F., St. John, R.D., Lederer, R.J. & Muzos, S.J. (1971). Clutch size in grackles. *Bird-Banding* **42(1)**: 28–35.
Wilson, J.K. (1976). Nesting success of the Lark Bunting near the periphery of its breeding range. *Kansas Orn. Soc. Bull.* 27: 13–22.
Wilson, S. & Arcese, P. (2003). El Niño drives timing of breeding but not population growth in the Song Sparrow (*Melospiza melodia*). *Proc. Natl. Acad. Sci. USA* **100(19)**: 11139–11142.
Wilson, S. & Arcese, P. (2006). Nest depredation, brood parasitism, and reproductive variation in island populations of Song Sparrows (*Melospiza melodia*). *Auk* **123(3)**: 784–794.
Wiltschko, W., Wiltschko, R., Emlen, S.T. & Demong, N.J. (1980). Nocturnal activity and orientation behaviour during spring migration and early summer in the Indigo Bunting *Passerina cyanea*. *J. Comp. Physiol.* **137**: 47–49.
Wingelmaier, K., Winkler, H. & Nemeth, E. (2007a). Mating behavior of Reed Buntings (*Emberiza schoeniclus*) in captivity. *Wilson J. Orn.* **119(3)**: 463–466.
Wingelmaier, K., Winkler, H. & Nemeth, E. (2007b). Reed Bunting (*Emberiza schoeniclus*) males sing an 'all-clear' signal to their incubating females. *Behaviour* **144(2)**: 195–206.
Wingfield, J.C. (1985a). Influences of weather on reproductive function in male Song Sparrows, *Melospiza melodia*. *J. Zool., London* **205(4)**: 525–544.
Wingfield, J.C. (1985b). Influences of weather on reproductive function in female Song Sparrows, *Melospiza melodia*. *J. Zool., London* **205(4)**: 545–558.
Wingfield, J.C. (2008). Organization of vertebrate annual cycles: implications for control mechanisms. *Phil. Trans. R. Soc. Lond. B* **363**: 425–441.
Winkel, W. & Hudde, H. (1997). Long-term trends in reproductive traits of tits (*Parus major*, *Parus caeruleus*) and Pied Flycatchers *Ficedula hypoleuca*. *J. Avian Biol.* **28**: 187–190.
Winkelman, J.E. (1981). Rustic Bunting *Emberiza rustica* in the Netherlands: identification and occurrence. *Limosa* **54(3)**: 81–88. In Dutch with English summary.
Winker, K., Gibson, D.D., Sowls, A.L., Lawhead, B.E., Martin, P.D., Hoberg, E.P. & Causey, D. (2002). The birds of St. Matthew Island, Bering Sea. *Wilson Bull.* **114(4)**: 491–509.
Winkler, D.W., Dunn, P.O. & McCulloch, C.E. (2002). Predicting the effects of climate change on avian life-history traits. *Proc. Natl. Acad. Sci. USA* **99**: 13595–13599.
Winnett-Murray, K. (1985). First reported nest of the White-eared Ground-sparrow (*Melozone leucotis*). *Condor* **87(4)**: 554.
Winter, B.M. & Best, L.B. (1985). Effect of prescribed burning on placement of Sage Sparrow nests. *Condor* **87(2)**: 294–295.
Winter, M. (1999a). Relationship of fire history to territory size, breeding density, and habitat of Baird's Sparrow in North Dakota. *Studies Avian Biol.* **19**: 171–177.
Winter, M. (1999b). Nesting biology of Dickcissels and Henslow's Sparrows in southwestern Missouri prairie fragments. *Wilson Bull.* **111(4)**: 515–526.
Winter, M., Johnson, D.H. & Faaborg, J. (2000). Evidence for edge effects on multiple levels in tallgrass prairie. *Condor* **102(2)**: 256–266.
Winter, M., Shaffer, J.A., Johnson, D.H., Donovan, T.M., Svedarsky, W.D., Jones, P.W. & Euliss, B.R. (2005). Habitat and nesting of Le Conte's Sparrows in the northern tallgrass prairie. *J. Field Orn.* **76(1)**: 61–71.
Winterbottom, J.M. (1970). The birds of the alien Acacia thickets of the South-Western Cape. *Zool. Afr.* **5(1)**: 49–57.
Winterbottom, J.M. (1972). Status of the Lark-like Bunting in the south-west Cape. *Ostrich* **43(2)**: 133.
Wiseman, A.J. (1977). Interrelation of variables in postjuvenal molt of Cardinals. *Bird-Banding* **48**: 206–223.
With, K.A. (1994a). McCown's Longspur (*Calcarius mccownii*). No. **96** in: Poole, A. & Gill, F. eds. (1994). *The Birds of North America*. Vol. 3. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania.
With, K.A. (1994b). The hazards of nesting near shrubs for a grassland bird, the McCown's Longspur. *Condor* **96(4)**: 1009–1019.
With, K.A., King, A.W. & Jensen, W.E. (2008). Remaining large grasslands may not be sufficient to prevent grassland bird declines. *Biol. Conserv.* **141(12)**: 3152–3167.
Witt, C.C. (2005). Syntopic breeding suggests mimicry of the Black-and-white Seedeater (*Sporophila luctuosa*) by the Black-and-white Tanager (*Conothraupis speculigera*). *Orn. Neotropical* **16(3)**: 387–396.
Wittenberger, J.F. (1978). Breeding biology of an isolated Bobolink population in Oregon. *Condor* **80**: 355–371.
Wittenberger, J.F. (1980a). Feeding of secondary nestlings by polygynous male Bobolinks in Oregon. *Wilson Bull.* **92**: 330–340.
Wittenberger, J.F. (1980b). Vegetation structure, food supply, and polygyny in Bobolinks. *Ecology* **61**: 140–150.
Wittenberger, J.F. (1982). Factors affecting how male and female Bobolinks apportion parental investments. *Condor* **84**: 22–39.
Wittenberger, J.F. (1983). A contextual analysis of two song variants in the Bobolink. *Condor* **85**: 172–184.
Wolf, L.L. (1971). Predatory behavior in Montezuma Oropendola. *Wilson Bull.* **83(2)**: 197–198.
Wolf, L.L. (1976). Avifauna of the Cerro de la Muerte region, Costa Rica. *Amer. Mus. Novit.* **2060**: 1–37.
Wolf, L.L. (1977). *Species Relationships in the Avian Genus* Aimophila. Ornithological Monographs **23**. American Ornithologists' Union, Lawrence, Kansas.
Wolfe, J.D., Chandler, R.B. & King, D.I. (2009). Molt patterns, age, and sex criteria for selected highland Costa Rican resident landbirds. *Orn. Neotropical* **20(3)**: 451–459.
Wolfenbarger, L.L. (1999a). Female mate choice in Northern Cardinals: is there a preference for redder males? *Wilson Bull.* **111(1)**: 76–83.
Wolfenbarger, L.L. (1999b). Is red coloration of male Northern Cardinals beneficial during the nonbreeding season?: A test of status signaling. *Condor* **101(3)**: 655–663.
Wolfenbarger, L.L. (1999c). Red coloration of male Northern Cardinals correlates with mate quality and territory quality. *Behav. Ecol.* **10**: 80–90.
Wolff, J. (2006). Hepatic Tanager nesting log. *Colorado Birds* **40(2)**: 90–94.
Wonke, G. & Wallschläger, D. (2009). Song dialects in the Yellowhammer *Emberiza citrinella*: bioacoustic variation between and within dialects. *J. Orn.* **150(1)**: 117–126.
Wood, H.B. (1951). Development of white in tails of Juncos, *Junco hyemalis*. *Auk* **68**: 522–523.
Wood, T.M., Gallo, F. & Donahue, P.K. (1992). Observations at a Paradise Tanager nest. *Wilson Bull.* **104**: 360–362.
Wood, W.E. & Yezerinac, S.M. (2006). Song Sparrow (*Melospiza melodia*) song varies with urban noise. *Auk* **123(3)**: 650–659.
Woodall, P. (1971). The Cape Bunting around Salisbury. *Honeyguide* **67**: 25–26.
Woodin, M.C., Skoruppa, M.K., Blacklock, G.W. & Hickman, G.C. (1999). Discovery of a second population of White-collared Seedeaters, *Sporophila torqueola* (Passeriformes: Emberizidae) along the Rio Grande of Texas. *Southwest. Nat.* **44(4)**: 535–538.
Woodruff, C. & Woodruff, A. (1991). Predation by Rusty Blackbirds on songbirds at a winter feeder. *Chat* **55**: 54–55.
Woods, R.W. (1975). *The Birds of the Falkland Islands*. Anthony Nelson, Oswestry, Shropshire, UK.
Woods, R.W. (1988). *Guide to Birds of the Falkland Islands*. Anthony Nelson, Oswestry, Shropshire, UK.
Woodward, P.W. (1983). Behavioral ecology of fledgling Brown-headed Cowbirds and their hosts. *Condor* **85**: 151–163.
Woolfenden, G. (1956). Comparative breeding behaviour of *Ammospiza caudacuta* and *A. maritima*. *Univ. Kansas Publ. Mus. Nat. Hist.* **10**: 45–75.
Woolfenden, G.E. & Van Deventer, M. (2006). First record of the Varied Bunting from Florida. *Florida Field Nat.* **34(1)**: 1–3.
Wormington, A. (1986). Fall vagrancy of the Indigo Bunting in Northern Ontario. *Ontario Birds* **4(3)**: 104–109.
Worth, C.B. (1939). Nesting of some Panamanian birds. *Auk* **56**: 306–310.
Wortman-Wunder, E. (1997). Territory size in Lincoln's Sparrows (*Melospiza lincolnii*). *Southwest. Nat.* **42(4)**: 446–453.
Wotton, S.R., Langston, R.H.W., Gibbons, D.W. & Pierce, A.J. (2000). The status of the Cirl Bunting *Emberiza cirlus* in the UK and the Channel Islands in 1998. *Bird Study* **47(2)**: 138–146.
Wotton, S.R., Rylands, K., Grice, P., Smallshire, D. & Gregory, R. (2004). The status of the Cirl Bunting in Britain and the Channel Islands in 2003. *British Birds* **97(8)**: 376–384.
Wray, T. & Whitmore, R.C. (1979). Effects of vegetation on nesting success of Vesper Sparrows. *Auk* **96(4)**: 802–805.
Wright, A.L. (1999). Distribution and abundance of Brown-headed Cowbirds in the wilderness of central Idaho. *Studies Avian Biol.* **18**: 94–96.
Wright, J. (1994). The Yellow-browed Bunting on Scilly. *Birding World* **7(10)**: 410–411.
Wright, J. (2009). Grey-necked Bunting *Emberiza buchanani*: first records for Vietnam and south-east Asia. *Birding Asia* **11**: 106.
Wright, J.E. & Ferraro, L.I. (1985). Hebras fúngicas como principal componente de nidos de boyero en el NE Argentino. *Rev. Fac. Cienc. Exact. Nat. Agrimen. Univ. Nac. Nordeste* **6**: 5–16. In Spanish.
Wunderle, J.M. (1980). Breeding ecology of the Bananaquit (*Coereba flaveola*) on Grenada. *Diss. Abstr. Int. B Sci. Eng.* **41(5)**: 1636–1637.
Wunderle, J.M. (1981a). Colour phases of the Bananaquit *Coereba flaveola* on St Vincent, West Indies. *Ibis* **123(3)**: 354–358.
Wunderle, J.M. (1981b). An analysis of a morph ratio cline in the Bananaquit (*Coereba flaveola*) on Grenada, West Indies. *Evolution* **35(2)**: 333–344.
Wunderle, J.M. (1981c). Movements of adult and juvenile Bananaquits within a morpho-ratio cline. *Auk* **98(3)**: 571–577.
Wunderle, J.M. (1982). The timing of the breeding season in the Bananaquit (*Coereba flaveola*) on the island of Grenada, W.I. *Biotropica* **14(2)**: 124–131.
Wunderle, J.M. (1984). Mate switching and a seasonal increase in polygyny in the Bananaquit. *Behaviour* **88(1/2)**: 123–144.
Wunsch, H. (1976). Beobachtungen zum Fortpflanzungsverhalten der Prachtammer in Gefangenschaft. *Gefiederte Welt* **100(2)**: 22–24. In German.
Wyatt, C.W. (1871). Notes on some of the birds of the United States of Columbia. *Ibis* **Ser. 3, no. 1**: 319–335.
Wyatt, V.E. (1997). Use of *Anemone canadensis* in Rose-breasted Grosbeak nests. *Ontario Birds* **15**: 74–75.
Wyatt, V.E. & Francis, C.M. (2002). Rose-breasted Grosbeak (*Pheucticus ludovicianus*). No. **692** in: Poole, A. & Gill, F. eds. (1998). *The Birds of North America*. Vol. 18. The Birds of North America Inc., Philadelphia, Pennsylvania.
Wyman, L.E. (1911). Harris's Sparrow (*Zonotrichia querula*) in southern Idaho. *Auk* **28**: 267–268.
Xiong Lihu, Petersson, B. & Lu Jianjian (2006). Sakhalin Leaf-warbler and Japanese Yellow Bunting – two new bird records from Zhejiang Province, China. *Zool. Res.* **27(3)**: 335–336. In Chinese with English summary.

Yamada, F. (2006). A record of a first summer male Ortolan Bunting *Emberiza hortulana* on Tokunoshima Island, Kagoshima. *Jap. J. Orn.* **55(2)**: 114–116.
Yamagishi, S. (1970). Observations on the breeding biology of *Emberiza cioides*. *Misc. Rep. Yamashina Inst. Orn.* **6**: 103–130. In Japanese with English summary.
Yamagishi, S. (1971). A study of the home range and the territory in Meadow Bunting (*Emberiza cioides*). *Misc. Rep. Yamashina Inst. Orn.* **6(4)**: 356–388. In Japanese with English summary.
Yamagishi, S. (1978). Social organization and stability of local density of breeders in the Meadow Bunting *Emberiza cioides*. *J. Yamashina Inst. Orn.* **10(3)**: 199–299. In Japanese with English summary.
Yamagishi, S. (1981). Effect of parents' age class on breeding success of the Meadow Bunting *Emberiza cioides* (Aves: Emberizidae). *Jap. J. Ecol.* **31(1)**: 117–119.
Yamagishi, S. (1991). The function of autumn song in the Siberian Meadow Bunting *Emberiza cioides*. Pp. 1220–1228 in: Bell, B.D., Cossee, R.O., Flux, J.E.C., Heather, B.D., Hitchmough, R.A., Robertson, C.J.R. & Williams, M.J. eds. (1991). *Acta 20 Congressus Internationalis Ornithologici*. Christchurch, New Zealand 2–9 December 1990. Vol. 2. New Zealand Ornithological Congress Trust Board, Wellington.
Yamagishi, S., Nakamura, T., Suyama, S., Iijima, K. & Ushiyama, H. (1973). A comparative study on the wintering ecology of five species of *Emberiza* in Saga Plain, Kyushu, especially of *E. spodocephala*. *Misc. Rep. Yamashina Inst. Orn.* **7(2)**: 160–178. In Japanese with English summary.
Yamaguchi, A. (1998a). A sexually dimorphic learned birdsong in the Northern Cardinal. *Condor* **100(3)**: 504–511.
Yamaguchi, A. (1998b). Can a sexually dimorphic learned birdsong be used for male-female recognition? *Behaviour* **135(7)**: 833–844.
Yamaguchi, A. (2001). Sex differences in vocal learning in birds. *Nature (London)* **411**: 257–258.
Yamaguchi, N. & Yahara, T. (2002). Factors causing variation in flock size: decision making to join a foraging flock. *Ecol. Res.* **17(3)**: 361–371.
Yamamoto, Y. (2005). First record of Savannah Sparrow in Hokkaido, northern Japan. *Strix* **23**: 189–191.
Yamanoguchi, K. (1975). A Chestnut Bunting from Kyushu. *Misc. Rep. Yamashina Inst. Orn.* **7(5)**: 562–563. In Japanese with English summary.
Yamashina, Y. (1933). [On the breeding of *Emberiza l. leucocephalos* in Sakhalin]. *Tori* **8(37)**: 102–111. In Japanese.
Yamashina, Y. (1957). Notes on *Emberiza jankowskii* Taczanowski, with special reference to its speciation. *J. Fac. Sci., Hokkaido Univ. (Ser. VI. Zool.)* **13**: 164–171.
Yang, S.H. & Selander, R.K. (1968). Hybridization in the Grackle *Quiscalus quiscula* in Louisiana. *Syst. Zool.* **17**: 107–143.
Yasukawa, K. & Searcy, W.A. (1981). Nesting synchrony and dispersion in Red-winged Blackbirds: is the harem competitive or cooperative? *Auk* **98**: 659–668.
Yasukawa, K. & Searcy, W.A. (1995). Red-winged Blackbird (*Agelaius phoeniceus*). No. **184** in: Poole, A.F. & Gill, F.B. eds. (1995). *The Birds of North America*. Vol. 5. The American Ornithologists' Union & The Academy of Natural Sciences of Philadelphia, Washington & Philadelphia.
Yasukawa, K., Blank, J.L. & Patterson, C.B. (1980). Song repertoires and sexual selection in the Red-winged Blackbird. *Behav. Ecol. Sociobiol.* **7**: 233–238.
Yasukawa, K., Boley, R.A. & Simon, S.E. (1987). Seasonal change in the vocal behavior of female Red-winged Blackbirds, *Agelaius phoeniceus*. *Anim. Behav.* **35**: 1416–1423.
Yasukawa, K., McClure, J.L., Boley, R.A. & Zanocco, J. (1990). Provisioning of nestlings by male and female Red-winged Blackbirds, *Agelaius phoeniceus*. *Anim. Behav.* **40**: 153–166.
Yaukey, P.H. (1994). Variation in racial dominance within the winter range of the Dark-eyed Junco (*Junco hyemalis* L.). *J. Biogeogr.* **21(4)**: 359–368.
Yen Chunewei (1989). A plumage study of the Cardinal (*Cardinalis cardinalis cardinalis*) of western Pennsylvania. *Bull. Natl. Mus. Nat. Sci. Taiwan* **1**: 11–21.
Yésou, P. (1998). Afflux de Bruants des Neiges *Plectrophenax nivalis* en France (Sept. 1996–Mai 1997). *Ornithos* **5(4)**: 180–187. In French with English summary.
Yésou, P., Duquet, M. & Corso, A. (2003). Le Bruant à tête rousse *Emberiza bruniceps* en France et en Italie: statut et origine. *Ornithos* **10(6)**: 249–251. In French with English summary.
Yokel, D.A. (1986). Monogamy and brood parasitism: an unlikely pair. *Anim. Behav.* **34**: 1348–1358.
Yokel, D.A. (1989). Intrasexual aggression and the mating behavior of Brown-headed Cowbirds: their relation to population densities and sex ratios. *Condor* **91**: 43–51.
Yokel, D.A. & Rothstein, S.I. (1991). The basis for female choice in an avian brood parasite. *Behav. Ecol. Sociobiol.* **29**: 39–45.
Yom-Tov, Y. (1992). Clutch size and laying dates of three species of buntings *Emberiza* in England. *Bird Study* **39(2)**: 111–114.
Yom-Tov, Y. (2001). Global warming and body mass decline in Israeli passerine birds. *Proc. Royal Soc. London (Ser. B Biol. Sci.)* **268**: 947–952.
Yom-Tov, Y., Yom-Tov, S., Wright, J., Thorne, C.J.R. & du Feu, R. (2006). Recent changes in body weight and wing length among some British passerine birds. *Oikos* **112**: 91–101.
Yosef, R. & Tryjanowski, P. (2002a). Differential spring migration of Ortolan Bunting *Emberiza hortulana* by sex and age at Eilat, Israel. *Ornis Fenn.* **79(4)**: 173–180.
Yosef, R. & Tryjanowski, P. (2002b). Spring migration ecology of Cretzschmar's Bunting (*Emberiza caesia*) through Elat, Israel. *Israel J. Zool.* **48(2)**: 149–153.
Young, B.E. (1989). First specimen record of the Indigo Bunting *Passerina cyanea* in British Columbia. *Can. Field-Nat.* **103(3)**: 415.
Young, B.E. (1991). Annual molts and interruption of the fall migration for molting in Lazuli Buntings. *Condor* **93**: 236–250.
Young, B.E., Franke, I., Hernandez, P.A., Herzog, S.K., Paniagua, L., Tovar, C. & Valqui, T. (2009). Using spatial models to predict areas of endemism and gaps in the protection of Andean slope birds. *Auk* **126(3)**: 554–565.
Young, C.G. (1929). A contribution to the ornithology of the coastland of British Guiana. Part 3. *Ibis* **Ser. 12, no. 5**: 221–261.
Young, H., Stollberg, B. & Deusing, M. (1941). The spread of the Cardinal through Wisconsin. *Passenger Pigeon* **3**: 1–4.
Yuen, H.J. (1975). Agonistic behavior of the Red Crested Cardinal. *Elepaio* **33(6)**: 55–61.
Yunick, R.P. (1996). A comparison of long-term banding data from two Rose-breasted Grosbeak populations in New York State. *North Amer. Bird Bander* **21(1)**: 3–13.
Yuri, T. & Mindell, D.P. (2002). Molecular phylogenetic analysis of Fringillidae, "New World nine-primaried oscines" (Aves: Passeriformes). *Mol. Phylogen. Evol.* **23(2)**: 229–243.
Zackrisson, R. (1972). Breeding of *Poospiza ornata* in Sweden. *Avicult. Mag.* **78(4)**: 113–117.
Zalba, S.M., Sánchez, R.C. & Cozzani, N.C. (2009). Priorities for the conservation of an endangered grassland bird: clues from its nesting biology. *Orn. Neotropical* **20**: 35–46.
Zalik, N.J. & Perlut, N.G. (2008). Simultaneous incubation by two females and nestling provisioning by four adults at a Savannah Sparrow nest. *Wilson J. Orn.* **120(3)**: 628–630.
Zalik, N.J. & Strong, A.M. (2008). Effects of hay cropping on invertebrate biomass and the breeding ecology of Savannah Sparrows (*Passerculus sandwichensis*). *Auk* **125(3)**: 700–710.
Zapata, A.R.P. (1967). Observaciones sobre aves de Puerto Deseado, Provincia de Santa Cruz. *Hornero* **10**: 351–378. In Spanish.
Zapata, A.R.P. (2000). Primera cita de *Thraupis bonariensis schulzei* Brodkorb, 1938 para la provincia de Buenos Aires (Aves: Emberizidae). *Neotrópica* **46**: 78. In Spanish.
Zapata, A.R.P. (2002). Primer registro de *Schistochlamys ruficapillus ruficapillus* (Emberizidae) para Paraguay. *Hornero* **17(2)**: 97–98. In Spanish with English summary.
Zavialov, E.V. & Tabachishin, V.G. (1997). [First record of the Rustic Bunting *Emberiza rustica* in Saratov region]. *Russ. Orn. Zhurnal Ekspress Vypusk* **20**: 21–22. In Russian.
Zavialov, E.V. & Tabachishin, V.G. (1999). [New data on the Red-headed Bunting *Emberiza bruniceps* distribution in northern part of the Lower Volga]. *Russ. Orn. Zhurnal Ekspress Vypusk* **71**: 22. In Russian.
Zavialov, E.V. & Tabachishin, V.G. (2007). [Modern northern boundaries of the Red-headed Bunting (*Emberiza bruniceps*) habitat in the northern lower-Volga region]. *Povolzhskii Ekolog. Zhurnal* **1**: 16–23. In Russian.
Zeng Shaoju, Lu Kai, Hua Fangyuan, Zhao Wenlong, Zhang Xinwen & Zuo Mingxue (2004). [Cluster analysis of the song complexity and the volumes of song control nuclei among ten oscine species]. *Zool. Res.* **25(6)**: 522–526. In Chinese with English summary.
Zhang Luping, Brooks, D.R. & Causey, D. (2004). Two species of *Synhimantus* (*dispharynx*) Railliet, Henry and Siso, 1912 (Nematoda: Acuarioidea: Acuariidae), in passerine birds from the area de Conservación Guanacaste, Costa Rica. *J. Parasitol.* **90(5)**: 1133–1138.
Zhao Zhengjie, Nickel, H. & Groh, G. (1994). Vorkommen und Gesang der Jankowskiammer (*Emberiza jankowskii*) in der chinesischen Provinz Jilin. *J. Orn.* **135(4)**: 617–620. In German with English summary.
Zimmer, J.T. (1924). New birds from central Peru. *Field Mus. Nat. Hist. (Zool. Ser.)* **12**: 51–67.
Zimmer, J.T. (1929). A study of the Tooth-billed Red Tanager, *Piranga flava*. *Field Mus. Nat. Hist. (Zool. Ser.)* **17(5)**: 169–219.
Zimmer, J.T. (1930). Birds of the Marshall Field Peruvian Expedition, 1922–1923. *Field Mus. Nat. Hist. (Zool. Ser.)* **17(7)**: 233–480.
Zimmer, J.T. (1942a). Studies of Peruvian birds. No. 43. Notes on the genera *Dacnis*, *Xenodacnis*, *Coereba*, *Conirostrum*, and *Oreomanes*. *Amer. Mus. Novit.* **1193**: 1–16.
Zimmer, J.T. (1942b). Studies of Peruvian birds. No. 44. Notes on the genera *Diglossa* and *Cyanerpes*, with addenda to *Ochthoeca*. *Amer. Mus. Novit.* **1203**: 1–7.
Zimmer, J.T. (1943a). Studies of Peruvian birds. No. 45. The genera *Tersina*, *Chlorophonia*, *Tanagra*, *Tanagrella*, *Chlorochrysa*, and *Pipraeidae*. *Amer. Mus. Novit.* **1225**: 1–24.
Zimmer, J.T. (1943b). Studies of Peruvian birds. No. 46. The genus *Tangara*. Part 1. *Amer. Mus. Novit.* **1245**: 1–14.
Zimmer, J.T. (1943c). Studies of Peruvian birds. No. 47. The genus *Tangara*. Part 2. *Amer. Mus. Novit* **1246**: 1–14.
Zimmer, J.T. (1943d). A new species of finch from Ecuador. *Proc. Biol. Soc. Washington* **56**: 33–34.
Zimmer, J.T. (1944). Studies of Peruvian birds. No. 48. The genera *Iridisornis*, *Delothraupis*, *Anisognathus*, *Buthraupis*, *Comopsocoma*, *Dubusia*, and *Thraupis*. *Amer. Mus. Novit.* **1262**: 1–21.
Zimmer, J.T. (1945). Studies of Peruvian birds. No. 50. The genera *Ramphocelus*, *Piranga*, *Habia*, *Lanio*, and *Tachyphonus*. *Amer. Mus. Novit.* **1304**: 1–26.
Zimmer, J.T. (1947a). Studies of Peruvian birds. No. 51. The genera *Chlorothraupis*, *Creurgops*, *Eucometis*, *Trichothraupis*, *Nemosia*, *Hemithraupis*, and *Thlypopsis*, with additional notes on *Piranga*. *Amer. Mus. Novit.* **1345**: 1–23.
Zimmer, J.T. (1947b). Studies of Peruvian birds. No. 52. The genera *Sericossypha*, *Chlorospingus*, *Cnemoscopus*, *Hemispingus*, *Conothraupis*, *Chlorornis*, *Lamprospiza*, *Cissopis*, and *Schistochlamys*. *Amer. Mus. Novit* **1367**: 1–26.
Zimmerman, D.A. & Harry, G.B. (1951). Summer birds of Autlan, Jalisco. *Wilson Bull.* **63**: 302–314.
Zimmerman, J.L. (1965a). Bioenergetics of the Dickcissel, *Spiza americana*. *Physiol. Zool.* **38**: 370–389.
Zimmerman, J.L. (1965b). Carcass analysis of wild and thermal-stressed Dickcissels. *Wilson Bull.* **77(1)**: 55–70.
Zimmerman, J.L. (1965c). Digestive efficiency and premigratory obesity in the Dickcissel. *Auk* **82(2)**: 370–389.
Zimmerman, J.L. (1966a). Effects of extended tropical photoperiod and temperature on the Dickcissel. *Condor* **68(4)**: 377–387.
Zimmerman, J.L. (1966b). Polygyny in the Dickcissel. *Auk* **83(4)**: 534–546.
Zimmerman, J.L. (1971). The territory and its density-dependent effect in *Spiza americana*. *Auk* **88**: 591–612.
Zimmerman, J.L. (1982). Nesting success of Dickcissels in preferred and less preferred habitats. *Auk* **99**: 292–298.
Zimmerman, J.L. (1983). Cowbird parasitism of Dickcissels in different habitats and at different nest densities. *Wilson Bull.* **95**: 7–22.
Zimmerman, J.L. (1984). Nest predation and its relationship to habitat and nest density in Dickcissels. *Condor* **86**: 68–72.
Zimmerman, J.L. (1988). Breeding season habitat selection by the Henslow's Sparrow (*Ammodramus henslowii*) in Kansas. *Wilson Bull.* **100(1)**: 17–24.
Zimmerman, J.L. (1993). *The Birds of Konza*. University Press of Kansas, Lawrence, Kansas.
Zimmerman, J.L. & Finck, E.J. (1989). Philopatry and correlates of territorial fidelity in male Dickcissels. *North Amer. Bird Bander* **14(3)**: 83–85.
Zimmermann, C.E. (1995). Nota sobre a ocorrência de *Dacnis nigripes* (Pelzeln) (Passeriformes, Coerebidae) em Santa Catarina, Brasil. Aspects of *Dacnis nigripes* (Pelzeln) (Passeriformes, Coerebidae) biology in Santa Catarina, Brazil. *Rev. Bras. Zool.* **12(1)**: 185–188. In Portuguese with English summary.
Zink, R.M. (1982). Patterns of genetic and morphologic variation among sparrows in the genera *Zonotrichia*, *Melospiza*, *Junco*, and *Passerella*. *Auk* **99**: 632–649.
Zink, R.M. (1986). *Patterns and Evolutionary Significance of Geograpical Variation in the* schistacea *Group of the Fox Sparrows (*Passerella iliaca*)*. Ornithological Monographs **40**. American Ornithologists' Union, Lawrence, Kansas.
Zink, R.M. (1988). Evolution of brown towhees: allozymes, morphometrics and species limits. *Condor* **90**: 72–82.
Zink, R.M. (1991). The geography of mitochondrial DNA variation in two sympatric sparrows. *Evolution* **45**: 329–339.
Zink, R.M. (1994). The geography of mitochondrial DNA variation, population structure, hybridization, and species limits in the Fox Sparrow (*Passerella iliaca*). *Evolution* **48**: 96–111.
Zink, R.M. (2008). Microsatellite and mitochondrial DNA differentiation in the Fox Sparrow. *Condor* **110**: 482–492.
Zink, R.M. (2010). Drawbacks with the use of microsatellites in phylogeography: the Song Sparrow *Melospiza melodia* as a case study. *J. Avian Biol.* **41(1)**: 1–7.
Zink, R.M. & Avise, J.C. (1990). Patterns of mitochondrial DNA and allozyme evolution in the avian genus *Ammodramus*. *Syst. Zool.* **39**: 148–161.
Zink, R.M. & Blackwell, R.C. (1996). Patterns of allozyme, mitochondrial DNA, and morphometric variation in four sparrow genera. *Auk* **113**: 59–67.
Zink, R.M. & Dittmann, D.L. (1991). Evolution of brown towhees: mitochondrial DNA evidence. *Condor* **93**: 98–105.
Zink, R.M. & Dittmann, D.L. (1993a). Gene flow, refugia, and evolution of geographic variation in the Song Sparrow (*Melospiza melodia*). *Evolution* **47**: 717–729.
Zink, R.M. & Dittmann, D.L. (1993b). Population structure and gene flow in the Chipping Sparrow and a hypothesis for evolution in the genus *Spizella*. *Wilson Bull.* **105(3)**: 399–413.
Zink, R.M. & Kale, H.W. (1995). Conservation genetics of the extinct Dusky Seaside Sparrow *Ammodramus maritimus nigrescens*. *Biol. Conserv.* **74(1)**: 69–71.
Zink, R.M., Dittmann, D.L., Cardiff, S.W. & Rising, J.D. (1991). Mitochondrial DNA variation and the taxonomic status of the Large-billed Savannah Sparrow. *Condor* **93**: 1016–1019.
Zink, R.M., Dittmann, D.L. & Rootes, W.L. (1991). Mitochondrial DNA variation and the phylogeny of *Zonotrichia*. *Auk* **108(3)**: 578–584.
Zink, R.M., Kessen, A.E., Line, T.V. & Blackwell-Rago, R.C. (2001). Comparative phylogeography of some aridland bird species. *Condor* **103(1)**: 1–10.
Zink, R.M., Pavlova, A., Drovetski, S. & Rohwer, S. (2008). Mitochondrial phylogeographies of five widespread Eurasian bird species. *J. Orn.* **149(3)**: 399–413.

Zink, R.M., Rising, J.D., Mockford, S., Horn, A.G., Wright, J.M. & Westberg, M.C. (2005). Mitochondrial DNA variation, species limits, and rapid evolution of plumage coloration and size in the Savannah Sparrow. *Condor* **107**: 21–28.

Zink, R.M., Rootes, W.L. & Dittmann, D.L. (1991). Mitochondrial DNA variation, population structure, and evolution of the Common Grackle (*Quiscalus quiscula*). *Condor* **93**: 318–329.

Zöphel, U., Schulenburg, J., Busching, W.D. & Todte, I. (2005). Avifaunistische Beobachtungen im Westchentej. *Erforsch. Biol. Ressourcen Mongolei* **9**: 273–279. In German with English summary.

Zotta, A. (1936). Sobre el contenido estomacal de aves argentinas. *Hornero* **6**: 261–270. In Spanish.

Zotta, A. (1937). Una nueva subespecie de Pecho Colorado, *Pezites militaris catamarcanus*, subsp. nov. *Hornero* **6**: 449–454. In Spanish.

Zottoli, S.J. (1976). Fishing behavior of Common Grackles. *Auk* **93**: 640–642.

Zuckerberg, B., Woods, A. & Porter, W.F. (2009). Poleward shifts in breeding bird distributions in New York State. *Global Change Biol.* **15**: 1866–1883.

Zuñiga, A. & Sandoval, L. (2011). La Tangara Aliamarilla *Thraupis abbas* en Costa Rica, historia y dos nuevos registros. *Cotinga* **33**: 78–79. In Spanish.

Zvonov, B.M. (2005). Acoustic image of Yellow-breasted Bunting *Emberiza aureola* Pall. *Biol. Bull. (Moscow)* **32(5)**: 467–472.

Zwartjes, P.W. & Farley, G.H. (1998). Observations of breeding site fidelity of Green-tailed Towhees (*Pipilo chlorurus*) in central New Mexico. *Texas J. Sci.* **50(3)**: 258–261.

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